Advanced Hypersonic Weapon Program

Environmental Assessment

June 2011

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This Environmental Assessment documents the potential environmental impacts of conducting a single demonstration flight test of the Advanced Hypersonic Weapon (AHW) / Hypersonic Glide Body (HGB). The AHW/HGB flight test vehicle would be launched from Pacific Missile Range Facility, using an existing Strategic Target System with three stages. Following booster separation, the AHW/HGB would glide at hypersonic velocities in the upper atmosphere, prior to impacting in the vicinity of Illeginni Islet, U.S. Army Kwajalein Atoll, Republic of the Marshall Islands.

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Executive Summary

EXECUTIVE SUMMARY

Introduction

Over the past few years, the Department of Defense (DoD) has been developing and demonstrating technologies for a Conventional Prompt Global Strike (CPGS) capability. This capability would provide the President with the ability to promptly engage targets at strategic range without using nuclear weapons.

The Army leverages the Advanced Hypersonic Weapon (AHW) to develop and demonstrate CPGS technologies. This technology demonstration concept uses a Hypersonic Glide Body (HGB) vehicle, which demonstrates several key technologies needed to achieve prompt global reach effects on targets with precision. Based on current work, the AHW program would be designed to develop, integrate, and flight test the AHW/HGB concept to demonstrate the maturity of key technologies.

The U.S. Army Space and Missile Defense Command (USASMDC)/Army Forces Strategic Command (ARSTRAT) is responsible for the AHW CPGS technology demonstration program. This Environmental Assessment (EA) is being prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, as amended, and its implementing regulations, 42 United States Code 4321 et seq. and 40 Code of Federal Regulations (CFR) 1500-1508; and 32 CFR Part 651, Environmental Analysis of Army Actions; and Chief of Naval Operations Instruction 5090.1C, Environmental Readiness Program. Although compliance with NEPA does not apply to overseas actions, the United States has an agreement with the Republic of the Marshall Islands (RMI) to apply various environmental standards, including NEPA compliance, to all U.S. actions at U.S. Army Kwajalein Atoll/Reagan Test Site (USAKA/RTS) and elsewhere in the RMI that involves USAKA/RTS support. It is the responsibility of USASMDC/ARSTRAT to ensure that such actions comply with NEPA.

A Document of Environmental Protection, which addresses impacts from the Proposed Action and other programs with the potential to impact Illeginni Islet, and further describes environmental controls the installation intends to implement, is being prepared concurrent with this EA.

Proposed Action

The AHW program includes a flight test designed to develop and demonstrate several key hypersonic technologies. The launch would include a flight using a 3-stage Strategic Target System vehicle. The HGB would be the payload on the Strategic Target System vehicle. Data gathered during the flight test would be used to better understand hypersonic technologies and environments in which CPGS systems must operate.

USASMDC/ARSTRAT proposes ground and flight testing as the major activities of the AHW program. The first flight proposed for the AHW program would be in calendar year 2011 from Kauai Test Facility (KTF) located on the Pacific Missile Range Facility (PMRF), Kauai, Hawaii. This flight test has been certified compliant with the Strategic Arms Reduction Treaty I and the Intermediate-Range Nuclear Forces Treaty. The Compliance Review Group has determined that the AHW Flight 1A, as briefed by the Army, 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 2,500 miles, with an instrumentation package designed to gather data to validate AHW design assumptions and environmental models.

The Strategic Target System makes use of surplus retired Polaris A3 first and second stages with an Orbus 1a third stage motor. The main components of the Strategic Target System vehicle are the three boosters, the payload, and control electronics. Splashdown of all three spent motor stages, and the nose shroud, would occur at different points in the open ocean.

Jettison of the shroud and HGB separation would occur at an altitude of several hundred thousand feet. Prior to HGB separation, the third stage cold gas Attitude Control System is used to orient the HGB for a safe separation. After separation, the HGB uses control surfaces to begin the hypersonic portion of the test flight. The mission planning process would consider avoiding all potential risks to environmentally significant areas. The AHW/HGB is planned to impact in the vicinity of Illeginni Island, with three possible impact zones 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 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 USAKA/RTS.

No-Action Alternative

Under the No-action Alternative, USASMDC/ARSTRAT would not pursue the AHW program. There would be no USASMDC/ARSTRAT role in the Office of the Secretary of Defense CPGS technology development and demonstration activity.

Impact Assessment Methodology

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. Additionally, this EA addresses Environmental Justice. These areas were analyzed as applicable for the proposed location or activity.

Results

Of the 12 broad areas considered for environmental analysis, 4 resources (geology and soils, infrastructure, land use, and socioeconomics) were not analyzed further due to no potential for impacts from the Proposed Action. This section summarizes the conclusions of the analyses made for each of the remaining areas of environmental consideration as well as any program actions or mitigation measures necessary to minimize impacts to the environment.

Air Quality

Kauai Test Facility. Existing facilities at KTF and PMRF would be used. No construction is planned. Thus, minimal impacts to air quality (machinery required to receive and prepare the Strategic Target System for launch) at KTF would be anticipated from site preparation activities. The testing of the AHW/HGB would include one launch of a 3-stage Strategic Target System vehicle from KTF. The Strategic Target System vehicle (Orbus 1) has been previously launched at KTF, and it is anticipated that the testing of the AHW/HGB with comparable rocket motors (Orbus 1a) at the same site would have air quality impacts similar to former launches. Each launch is a discrete event, and the addition of the AHW/HGB launch would not result in exceeding the limit on launches being performed annually at PMRF. Prior analysis of typical launch vehicles, including the Strategic Target System, at PMRF determined that exhaust emissions do not produce short-term exceedances of either the National Ambient Air Quality Standards or health-based guidance levels in areas to which the general public would have access.

Broad Ocean Area. The limited amount of 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. The greenhouse gas (GHG) emissions associated with the Proposed Action fall well below the Council on Environmental Quality threshold.

Airspace

Kauai Test Facility. The AHW/HGB launch would be conducted within the existing special use airspace in Warning Area W-188 and W-186 controlled by PMRF. The launch represents precisely the kind of activities for which special use airspace was created: namely, to accommodate national security and necessary military activities, and to confine or segregate activities considered to be hazardous to non-participating aircraft. Commercial and private aircraft 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 Kwajalein Atoll/Reagan Test Site. Illeginni is located under international airspace and, therefore, has no formal airspace restrictions governing it. Commercial and private aircraft would be notified in advance of the AHW/HGB launch by USAKA/RTS as part of their routine operations through NOTAMs by the FAA. The responsible commander would coordinate with the Administrator, FAA, through the appropriate U.S. Army airspace representative. No new special use airspace would be required. Operations at the USAKA/RTS airfields would not be obstructed.

Biological Resources

Kauai Test Facility. Compliance with relevant Navy policies and procedures would limit the potential for introduction of invasive weed plant species. Although ohai and lau`ehu have been observed north of PMRF/KTF, no threatened or endangered vegetation is located within the launch site boundary or in the offshore area, and thus no adverse effects are anticipated. 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.

There is no evidence of any long-term adverse impact on vegetation from the four Strategic Target System missiles launched from 1993 through 1996 as well as those from launches since 1996 of missiles similar in size and composition to the Strategic Target System launches at PMRF.

Since program activities could adversely affect nocturnal listed bird species, USASMDC/ ARSTRAT has agreed to avoid unnecessary nighttime lighting, try to overlap the full moon period, conduct lethal control of predators on nocturnal seabirds, and conduct monitoring for avian tower strikes at the two Aegis Ashore Test Center boresight towers and three Launch Area lighting and instrumentation towers. In addition, the USASMDC/ARSTRAT is in the process of consulting with the USFWS to determine what additional mitigations or permits will be required for AHW activities at PMRF.

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. 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.

The activities would incorporate procedures to avoid threatened or endangered wildlife that are foraging, resting, or hauled out, such as threatened green turtles or endangered Hawaiian monk seals. Personnel would be instructed to avoid all contact with monk seals and sea turtles or turtle nests that might occur within the area. If turtle nests are discovered, then KTF and AHW program personnel would contact PMRF Environmental, who would perform any required consultation with appropriate agencies. If humpback whales, monk seals, or sea turtles are observed in the offshore launch safety zone, the launch will be delayed.

U.S. Army 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 noisemakers (e.g., propane cannons, sirens, and recorded distress calls) and visual deterrents (e.g., scarecrows, Mylar flags, helium-filled balloons, 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, USAKA/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 USAKA Environmental Management Office, the RTS Range Directorate, and the Flight Test Operations Director at PMRF/KTF.

Based on prior consultations for the Hypersonic Technology Vehicle (HTV)-2 (Defense Advanced Research Projects Agency program) and Conventional Strike Missile (CSM) Air Force Demonstration programs, the National Marine Fisheries Service determined that the underwater impacts are discountable because there would be a limited number of test events and because of the expected low density of Endangered Species Act-listed species within the BOA. Similar findings for other marine mammal species are expected. Because of 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/HGB test are also expected to be discountable.

Cultural Resources

U.S. Army 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/HGB is on the northwest end of Illeginni. 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 that are considered eligible for listing on the RMI National Register are located on the eastern end of the islet, outside of AHW impact zones on the western end. Personnel involved in launch and other operational activities would follow USAKA Environmental Standards (UES) requirements in handling or avoiding any cultural resources uncovered during operational or monitoring activities.

Hazardous Materials and Waste

Kauai Test Facility. PMRF/KTF 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 PMRF and KTF, and would follow the same hazardous materials and hazardous waste handling procedures developed under existing plans described in the affected environment.

U.S. Army 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, USAKA/RTS and AHW program personnel would remove all debris if any 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

Kauai Test Facility. Activities required for the AHW program would comply with the Navy Occupational Safety and Health Program Manual. Launch preparation activities are routinely accomplished for both military and civilian operations 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 (ESQD) surrounding the launch pad 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 unprotected personnel. The ground hazard area includes the area that may be at risk from a vehicle failure very early in flight. It is a region 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 System 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). Teams are available for fire suppression, hazardous materials emergency response, and emergency medical response during launch activities. PMRF/KTF personnel take every reasonable precaution during the planning and execution of range operations and launch activities to prevent injury to human life and property.

The Flight Termination System provides a mechanism to protect the public with very high reliability, in the unlikely case of a 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.

U.S. Army Kwajalein Atoll/Reagan Test Site. USAKA/RTS would provide range support for the terminal phase of flight. USAKA/RTS is the target area for missile launch operations from many Pacific area launch locations, including PMRF. All program operations must first receive the approval of the Safety Office at USAKA/RTS. Final responsibility and authority for the safe conduct of missile and flight test operations lies with the USAKA/RTS Commander.

Noise

Kauai Test Facility. Noise would include transport vehicles, maintenance equipment, generators, and the launching and improbable detonation of test missiles. KTF supports a variety of sounding rocket missions; therefore, occasional rocket, missile, or drone launches produce high-intensity, short-duration sound events. Data collected in the nearest town of Kekaha indicated that noise levels from launches were no louder than noise generated from passing vehicles on a nearby highway. Due to the low test frequency, and the short duration of the proposed AHW/HGB launch, local populations would not be adversely affected.

U.S. Army Kwajalein Atoll/Reagan Test Site. As the AHW/HGB nears USAKA/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 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.

Water Resources

Kauai Test Facility. Under nominal 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 the Hazardous Materials Contingency Plan and the Hazardous Waste Management Plan.

Broad Ocean Area. A BOA impact of one Strategic Target System vehicle and the AHW/HGB would not significantly impact the composition of the surrounding seawater or biological diversity of marine life present.

Cumulative Impacts

The Proposed Action would not occur at the same time as other regional programs such as Aircrew Training Missions, Ground-Based Midcourse Defense launches, SpaceX Falcon launches, launches as part of the CSM and HTV-2 programs, or Minuteman-III launches. No other projects in the region of influence have been identified that would have the potential for cumulative impacts.

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Acronyms and Abbreviations

ACRONYMS AND ABBREVIATIONS

AAQS	Ambient Air Quality Standards
AFB	Air Force Base
AFRL	Air Force Research Laboratory
AHW	Advanced Hypersonic Weapon
Al_2O_3	Aluminum Oxide
ALTRV	Altitude Reservation
ARTCC	Air Route Traffic Control Center
ATCAA	Air Traffic Control Assigned Airspace
AT/FP	Anti-Terrorism/Force Protection
BOA	Broad Ocean Area
CFC	Chlorofluorocarbon
CFR	Code of Federal Regulations
CH_4	Methane
CHRIMP	Consolidated Hazardous Materials Reutilization and Inventory Management Program
CO_2	Carbon Dioxide
CPGS	Conventional Prompt Global Strike
CSM	Conventional Strike Missile
CY	Calendar Year
dB	Decibel
dBA	A-weighted decibel(s)
DoD	Department of Defense
DOE	Department of Energy
DRMO	Defense Reutilization and Marketing Office
DU	Depleted Uranium
EA	Environmental Assessment
EEZ	Exclusive Economic Zone

EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EMR	Electromagnetic Radiation
EO	Executive Order
EPA	Environmental Protection Authority
ESA	Endangered Species Act
ESQD	Explosive Safety-Quantity Distance
°F	Degrees Fahrenheit
FAA	Federal Aviation Administration
FACSFACPH	Fleet and Area Control and Surveillance Facility Pearl Harbor
FONSI	Finding of No Significant Impact
FTS	Flight Termination System
GHG	Greenhouse Gas
HAPC	Habitat Areas of Particular Concern
HCl	Hydrogen Chloride
HGB	Hypersonic Glide Body
HMMP	Hazardous Materials Management Plan
ICAO	International Civil Aviation Organization
IFR	Instrument Flight Rules
KEEP	Kwajalein Environmental Emergency Plan
KIUC	Kauai Island Utility Cooperative
KTF	Kauai Test Facility
kW	Kilowatt
LCU	Landing Craft Utility
µPA	Micropascal(s)
MBTA	Migratory Bird Treaty Act
MIL-STD	Military Standard
MMIII	Minuteman III
N_2O	Nitrous Oxide

NO_x	Nitrogen Oxides
NAAQS	National Ambient Air Quality Standards
NAVSEA	Naval Sea Systems Command
NAVSEA CRANE	Naval Sea Systems Command, Crane Division
NEPA	National Environmental Policy Act
nm	Nautical Mile(s)
NMFS	National Marine Fisheries Service
NNSA	National Nuclear Security Administration
NOTAM	Notice to Airmen
NOTMAR	Notice to Mariners
NSWC	Naval Surface Warfare Center
NWHI	Northwestern Hawaiian Islands
PL	Public Law
PM-2.5	Particulate Matter Measuring Less Than 2.5 Microns in Diameter
PM-10	Particulate Matter Measuring Less than 10 Microns in Diameter
PMRF	Pacific Missile Range Facility
psf	pounds per square foot
PVC	Polyvinyl Chloride
RCC	Range Commanders Council
RMI	Republic of the Marshall Islands
RSA	Rodent Sperm Analysis
SNL	Sandia National Laboratories
SNL/NM	Sandia National Laboratories/New Mexico
SOP	Standard Operating Procedures
START I	Strategic Arms Reduction Treaty I
THAAD	Terminal High Altitude Area Defense
UES	U.S. Army Kwajalein Atoll Environmental Standards
U.S.	United States
USAKA/RTS	U.S. Army Kwajalein Atoll/ Reagan Test Site

USASMDC/ARSTRAT	U.S. Army Space and Missile Defense Command/Army Forces Strategic Command
USC	United States Code
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Survey
UXO	Unexploded Ordnance
VOC	Volatile Organic Compound
WROF-C	Wild Rodent Ovarian Follicle Counting

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1.0 Purpose and Need for Proposed Action

1.0 PURPOSE AND NEED FOR PROPOSED ACTION

1.1 BACKGROUND

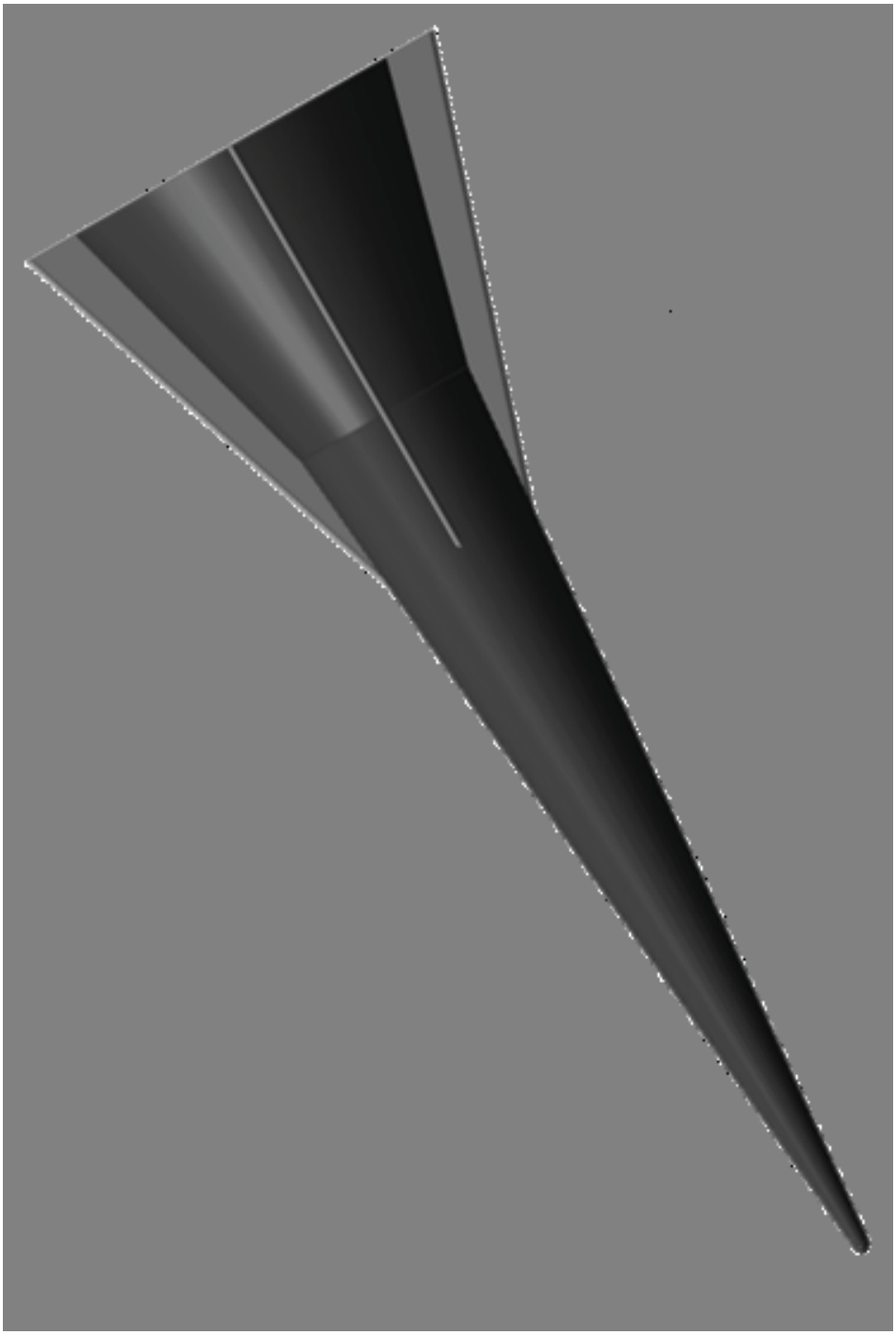
The United States currently conducts strikes on foreign threats with conventional weapons primarily through the use of forward-based systems (e.g., tactical aircraft, cruise missiles, unmanned aerial vehicles, and heavy bombers). Effective use of these systems requires: (1) adequate time to pre-position the aircraft and/or missiles within range of the targets; (2) minimal risk from local air defenses; and (3) when needed, availability of extensive mission-support assets (e.g., aircraft refueling tankers).

Over the past few years, the Department of Defense (DoD) has been developing and demonstrating technologies for a Conventional Prompt Global Strike (CPGS) capability. This capability would provide the President with the ability to promptly engage targets at strategic range without using nuclear weapons.

The Army leverages the Advanced Hypersonic Weapon (AHW) to develop and demonstrate CPGS technologies (Figure 1.1-1). This technology demonstration concept uses a Hypersonic Glide Body (HGB) vehicle, which demonstrates several key technologies needed to achieve prompt global reach effects on targets with precision. Based on current work, the AHW program would be designed to develop, integrate, and flight test the AHW/HGB concept to demonstrate the maturity of key technologies.

A follow-on flight test and the potential for future testing are uncertain at this time. As the requirements for additional flight testing become more certain, those activities would be addressed in future environmental documentation.

The U.S. Army Space and Missile Defense Command (USASMDC)/Army Forces Strategic Command (ARSTRAT) is responsible for the AHW CPGS technology demonstration program. This Proposed Action is being analyzed in accordance with the National Environmental Policy Act (NEPA) of 1969, as amended, and its implementing regulations, 42 United States Code (USC) 4321 et seq. 40 Code of Federal Regulations (CFR) 1500-1508; and 32 CFR Part 651, Environmental Analysis of Army Actions; and Chief of Naval Operations Instruction 5090.1C, Environmental Readiness Program. Although compliance with NEPA does not apply to overseas actions, the United States has an agreement with the Republic of the Marshall Islands (RMI) to apply various environmental standards, including NEPA compliance, to all U.S. actions at U.S. Army Kwajalein Atoll/Reagan Test Site (USAKA/RTS) and elsewhere in the RMI that involves USAKA/RTS support (U.S. Army Space and Missile Defense Command/Army Forces Strategic Command, 2006). It is the responsibility of USASMDC/ARSTRAT to ensure that such actions comply with NEPA.



Advanced Hypersonic Weapon Hypersonic Glide Body

Figure 1.1-1

1.2 PURPOSE AND NEED

The purpose of the AHW program is to develop, integrate, and flight test the AHW/HGB concept and demonstrate the maturity of key technologies. These technologies would include aspects such as precision navigation, guidance, and control and integrated system boost glide performance. The purpose of the flight test is to demonstrate hypersonic glide and kinetic energy technologies for CPGS. Through the application of these technologies, the flight test would demonstrate a system that could deliver a variety of payloads to achieve the desired effects on target long-range, non-ballistic flight and maneuverability; and precision strike capability for a delivery system that would include a kinetic energy warhead.

The AHW program is needed to validate guidance and control capabilities, and overall system performance. In addition, the AHW program has been designated as an alternative payload delivery vehicle approach to the U.S. Air Force Conventional Strike Missile (CSM) program.

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:

- *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
- *Environmental Standards and Procedures for United States Army Kwajalein Atoll (USAKA) Activities in the Republic of the Marshall Islands*, 11th Edition, 2009
- *Hawaii Range Complex Environmental Impact Statement/Overseas Environmental Impact Statement*, 2008
- *Environmental Standards and Procedures for United States Army Kwajalein Atoll (USAKA) Activities in the Republic of the Marshall Islands*, 10th Edition, 2006
- *Environmental Assessment for Minuteman III Modification*, 2004
- *U.S. 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, U.S. 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 is soliciting comments on this EA and the enclosed Draft Finding of No Significant Impact (FONSI) from interested and affected parties. A Notice of Availability for the EA and Draft FONSI was published in the following newspapers (Table 1.4-1):

Table 1.4-1. Local Newspapers

Country or State	City/Town	Newspaper
Hawaii	Lihue, Kauai	*The Garden Island*
Republic of the Marshall Islands	Majuro	*Marshall Islands Journal*
	USAKA/RTS	*Kwajalein Hourglass*

Copies of the EA and Draft FONSI have been placed in local libraries and are available on the Internet at http://www.govsupport.us/ahw. Agencies, organizations, and libraries that received a copy of the EA/Draft FONSI are listed in Appendix A.

1.5 DECISION(S) TO BE MADE

Following the public review period as specified in the newspaper notices, 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.

2.0 Description of the Proposed Action and Alternatives

2.0 DESCRIPTION OF THE 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 (Preferred and BOA), including the HGB, the launch vehicle, launch support facilities, rocket motor 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 program would consist of a flight test designed to develop and demonstrate several key hypersonic technologies. The launch would include a flight using a 3-stage Strategic Target System vehicle. The HGB would be the payload on the Strategic Target System booster. Data gathered during the flight test would be used to better understand hypersonic technologies and environments in which CPGS systems must operate.

USASMDC/ARSTRAT proposes ground and flight testing as the major activities of the AHW program. The Proposed Action first flight for the AHW program would occur in calendar year (CY) 2011 from Kauai Test Facility (KTF) located on the Pacific Missile Range Facility (PMRF), Barking Sands, Kauai, Hawaii.

2.1.1 HYPERSONIC GLIDE BODY DESCRIPTION

The HGB represents a test bed to demonstrate the application of hypersonic flight and kinetic energy weapon technologies. The vehicle would be designed to fit inside a Payload Assembly (nose shroud), and its mass at launch would be well-within the payload capability of the proposed boosters. Figure 1.1-1 shows the basic shape of the HGB, and Table 2.1.1-1 lists the vehicle's key system characteristics.

As shown in Table 2.1.1-1, hazardous materials used in the HGB would consist of batteries and several small explosive devices. No solid or liquid propellants, depleted uranium (DU), beryllium, or other radioactive materials would be carried in the HGB. Each battery would be environmentally qualified, including safeguards for containing accidental hazardous battery casing leakage or electrical anode or cathode shorting. The nitrogen gas cylinders would have adequate safety factors for proof and burst pressures in accordance with Military Standard (MIL-STD)-1411A (*Inspection and Maintenance of Compressed Gas Cylinders*). All explosive devices would be handled in accordance with DoD 6055.09-STD.

Table 2.1.1-1. HGB System Characteristics

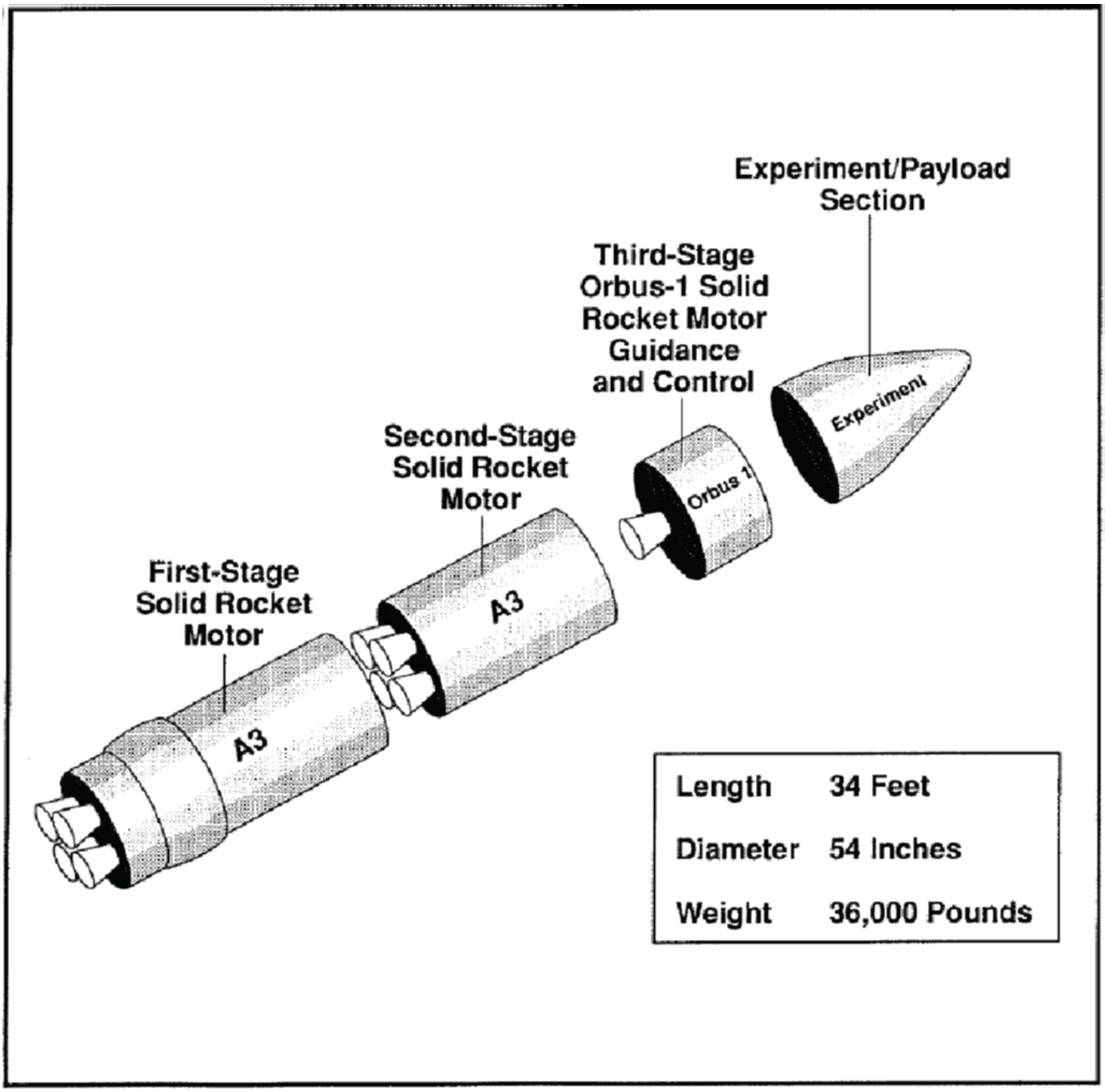
Structure	Aluminum, titanium, steel, tantalum, tungsten, carbon fabric, silica, and other alloys that include approximately 4.0 pounds of chromium and 10.3 pounds of nickel
Communications	Various 5- to 20-watt (radio frequency) transmitters; maximum 400-watt radio frequency pulse
Power	Up to two lithium ion and five nickel manganese hydride batteries, each weighing between 3 and 60 pounds; one Li-ion, prismatic cell technology 200-volt actuator battery weighing approximately 60 pounds
Propulsion/Propellant	Approximately 3 pounds of pressurized nitrogen gas
Other	Ten small Class C (1.4) electro-explosive devices for mechanical systems operation

2.1.2 LAUNCH VEHICLE DESCRIPTION

The proposed flight from KTF would use Strategic Target System boosters. This flight test has been previously certified compliant with the Strategic Arms Reduction Treaty I (START I) and the Intermediate-Range Nuclear Forces Treaty. The Compliance Review Group has determined that the AHW Flight 1A, as briefed by the Army, is consistent with U.S. obligations under the Intermediate-Range Nuclear Forces and New START. The flight test is designed to travel approximately 2,500 miles, with an instrumentation package. The instrumentation package is designed to gather data to validate AHW design assumptions and environmental models.

The Strategic Target System makes use of surplus retired Polaris A3 first and second stages with an Orbus 1a third stage motor. The main components of the Strategic Target System vehicle are the three boosters, the payload (the HGB), and control electronics. Figure 2.1.2-1 shows a typical Strategic Target System. The amount of propellant in the three boosters totals 30,541 pounds, and the vehicle generates approximately 75,000 pounds of thrust. Launches of the Strategic Target System were most recently analyzed in 2008 in the *Hawaii Range Complex Environmental Impact Statement/Overseas Environmental Impact Statement*.

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. The destruct package also contains logic to detect a premature separation of the booster stages and initiate a thrust termination action on its own. 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 near the Payload Assembly would disable the HGB's ability to fly in case it separated from the booster prematurely.



Typical Strategic Target System

Figure 2.1.2-1

2.1.3 LAUNCH SUPPORT FACILITIES, CONSTRUCTION, AND MODIFICATIONS

The proposed ground testing activities for the HGB development would include the following:

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

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

2.1.3.1 Sandia National Laboratories, Albuquerque, New Mexico

Sandia National Laboratories (SNL) is one of several national laboratories that support the Department of Energy's (DOE) statutory responsibilities for nuclear weapons research and design, development of other energy technologies, and basic scientific research. SNL is composed of four geographically separate facilities: Albuquerque, New Mexico; Tonopah, Nevada; Kauai, Hawaii; and Livermore, California (U.S. Department of Energy, 2006). Work associated with the AHW program would be performed at SNL/New Mexico (SNL/NM) and at KTF in Hawaii.

SNL/NM is a facility owned by the DOE, National Nuclear Security Administration (NNSA), and managed and operated by Sandia Corporation under contract to NNSA (U.S. Department of Energy, 2006). In addition to DOE/NNSA mission-oriented research, SNL/NM provides engineering, design, development, and testing support to a variety of Federal agencies and private-sector organizations through the NNSA's Work for Others program. Located at Kirtland Air Force Base (AFB) in Albuquerque, New Mexico, SNL/NM offers varied systems-engineering capabilities that span mechanical, electrical, and instrumentation design capabilities including aerodynamic, structural, and radar analysis capabilities. SNL also provides rapid prototype fabrication facilities and component-to full-system testing capabilities that provide highly-reliable payload and booster systems for flight test applications. These capabilities would enable SNL/NM to provide unique engineering and proof-of-concept testing for various flight and research systems. Work to be performed at SNL/NM includes the following:

- Explosive component developmental testing
- Assembly of prototype or flight hardware for development tests or potentially as final assembly, including flight sequence testing, actuation of battery, and functioning of all flight subsystems
- Subsystem and full-scale systems testing

- Lab-scale developmental testing
- Subsystem integration and testing
- Pressure assembly and testing
- Environment testing for reliability of components
- Shock and vibration testing
- Mass properties testing
- Acoustic testing
- Electronics tests
- Altitude testing (vacuum chamber)
- Structural load testing
- Systems pressure testing
- Antenna pattern testing
- Explosive warhead developmental testing, incorporating currently tested materials and explosives
- Assembly and handling for all supporting tests

These proposed activities would be consistent with routine and ongoing operations at existing SNL/NM facilities as evaluated in the SNL/NM Site-Wide Environmental Impact Statement (EIS).

2.1.3.2 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.

2.1.3.3 Redstone Arsenal, Alabama

The U.S. Army Aviation and Missile Research Development and Engineering Center would design, test, analyze, and fabricate certain elements of flight hardware for the AHW/HGB.

Motor processing for the Strategic Target System vehicle would be performed at Redstone Arsenal in Huntsville, Alabama by personnel with the Naval Sea Systems Command (NAVSEA), Naval Surface Warfare Center (NSWC), Crane Division (NAVSEA CRANE). NAVSEA CRANE would provide flight-certified Strategic Target System first, second, and third stages to the launch site at PMRF, Hawaii. NAVSEA CRANE would also provide one each of the first, second, and third stages certified and ready for assembly at Redstone Arsenal as spares. These proposed activities would be consistent with routine and ongoing operations at existing Redstone Arsenal facilities.

2.1.4 ROCKET MOTOR TRANSPORTATION

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

The aircraft that would transport the HGB would land at Kirtland AFB, New Mexico. Aircraft scheduling would be done by the U.S. Army. Palletization of the HGB would be done by SNL personnel at Kirtland AFB. The HGB would leave Kirtland AFB via aircraft following logistics coordination, shipping preparation, palletization, and loading of the flight article, the handling gear, and the ground support equipment.

The U.S. Air Force would be contracted by the U.S. Army to transport the rocket motors from Redstone Arsenal, Alabama, to PMRF. The U.S. Navy would be contracted by the U.S. Army to transport the hazardous material and test items from the PMRF airfield to KTF once the aircraft has landed.

2.1.5 LAUNCH SITE PREPARATIONS AND OPERATIONS

The AHW launch would occur at Launch Pad 42, north of the Nohili Ditch and behind the Nohili Dune. No new construction would be required to use this launch facility. Launch Pad 42 has previously been retrofitted with green shielded lights, which have been shown to minimize passerine, shorebird, and waterbird attraction and thus would lessen the chance of birds impacting facilities at the launch pad. Lighting will be minimized and will not be used where it is determined that it is unnecessary for Anti-Terrorism/Force Protection (AT/FP). Motion activated lighting will be used to the highest extent possible.

Prior to launch, routine activities would take place at the KTF to prepare for flight testing. These activities are described below. While working within the guidance and limitations of PMRF 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 PMRF 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, and consultation
- Advisory role throughout launch operations

2.1.6 FLIGHT TEST

The AHW/HGB is planned to impact in the vicinity of Illeginni Islet, USAKA.

2.1.6.1 Kauai Test Facility

KTF is located on and is a tenant activity of PMRF. KTF is operated independently by SNL personnel, but relies on base operations and logistic support from PMRF.

Launches of the Strategic Target System boosters were initially analyzed in the 1992 Strategic Target System EIS and most recently in the 2008 Hawaii Range Complex EIS/Overseas EIS. The proposed AHW payload (the HGB) would travel a distance of approximately 2,500 miles to Illeginni Islet in USAKA. The first test is scheduled in the fall of CY 2011. A modified 10,000-foot ground hazard area on PMRF would be used.

While working within the guidance and limitations of PMRF oversight, KTF 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 KTF, PMRF, and other range organizations. All activities would use existing facilities and infrastructure systems.

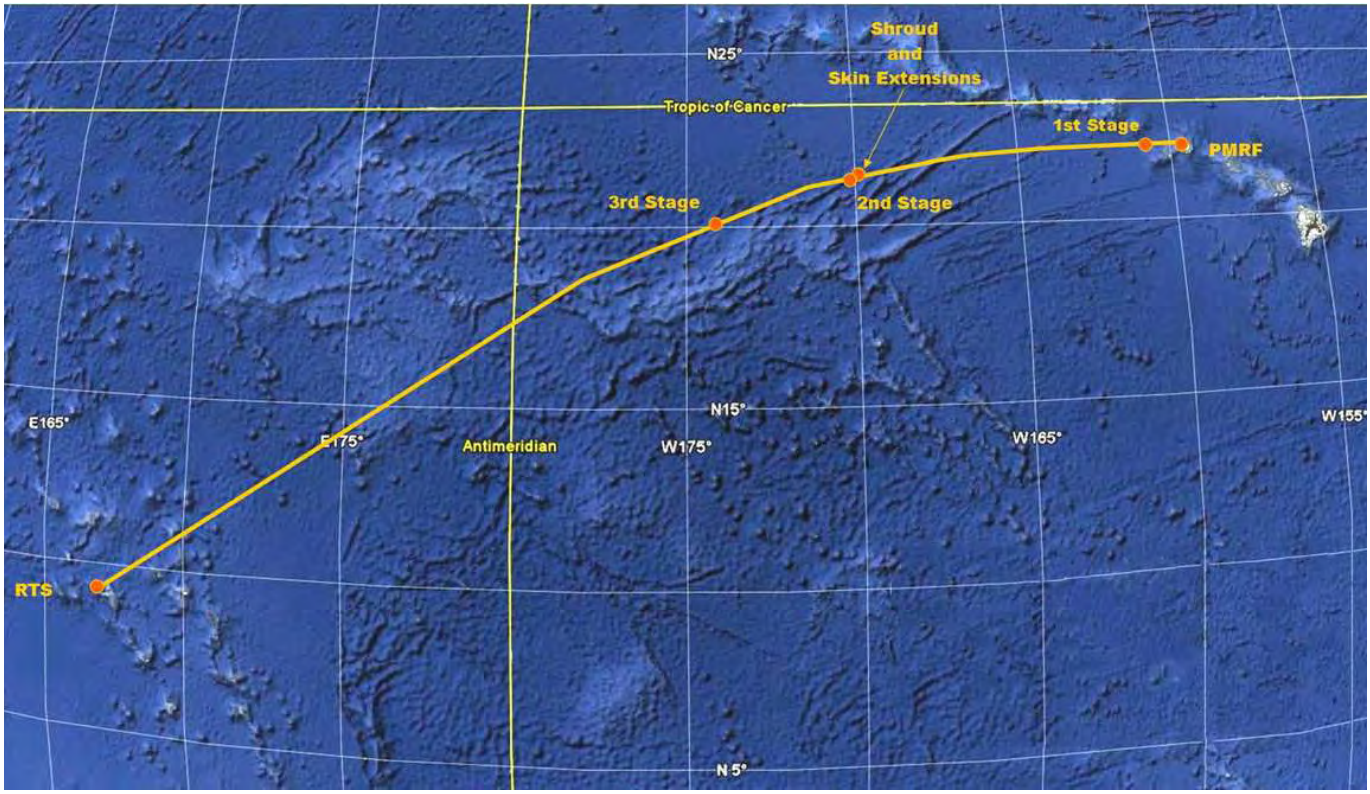
Other launch supporting activities would include the following:

- 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

As regular SNL routine operations for any launch at KTF, SNL personnel would also conduct various range responsibilities to ensure appropriate launch preparation, including range safety and coordination. Associated flight operations would include the support activities described in Section 2.1.4.

2.1.7 FLIGHT TEST SCENARIOS

At the launch location, 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 70 and 1,500 nautical miles from the launch pad. Figure 2.1.7-1 depicts the rocket motor drop zones for the launches from PMRF toward USAKA/RTS in the RMI.



Representative Drop Zones for Strategic Target System Boosters

Figure 2.1.7-1

Jettison of the shroud and skin extensions and HGB separation would occur outside the atmosphere at an altitude of several hundred thousand feet. Prior to HGB separation, the third stage cold gas Attitude Control System is used to orient the HGB for a safe separation. After separation, the HGB 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 HGB nears USAKA/RTS (the terminal end of flight), it would maneuver towards pre-designated target sites on Illeginni Islet or in the BOA.

If a malfunction were to occur during HGB flight, the onboard FTS system would be activated. This action would prevent active steering control and 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 U.S. range operation standards and practices. Flight tests would be programmed in accordance with U.S. range operation standards, to protect and ensure safety of the general public (Range Commanders Council, 2007).

2.1.7.1 Sensor Coverage

The flight path would be the same as that analyzed in the Strategic Target System EIS and the Hawaii Range Complex EIS. A series of sensors would overlap coverage of the flight from launch at KTF until impact at USAKA/RTS. The sensors would include:

- Ground based radars at PMRF
- Sea based sensors on the Mobile At Sea Sensor System out of PMRF, U.S. Motor Vessel *Worthy*, which is part of the Kwajalein Mobile Range Safety System, and other DoD assets, such as *Pacific Collector.*
- Airborne sensors on aircraft such as the Remote Area Support Aircraft or other military or commercial aircraft, such as *Cast Glance* or K-Tech.

All of these sensors are existing programs and would be scheduled for use based on availability.

2.1.8 TERMINAL PHASE PREPARATIONS AND OPERATIONS

USAKA/RTS has been a flight test impact area for more than 16 years. At USAKA/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 BOA near USAKA/RTS. These and other actions within the geographical scope of this EA have undergone environmental analysis and review, which is provided in Section 1.3, Related Environmental Documentation.

Upon reaching the terminal end of the flight, the HGB 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 (Figure 2.1.8-1) at USAKA/RTS. 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 unlikely.

Following launch over the Pacific Ocean, the HGB would separate from the booster and glide at hypersonic velocities in the upper atmosphere toward USAKA/RTS. If the flight test expends more energy earlier than planned, the HGB would impact in the BOA, northeast of Kwajalein Atoll (Figure 2.1.8-1).

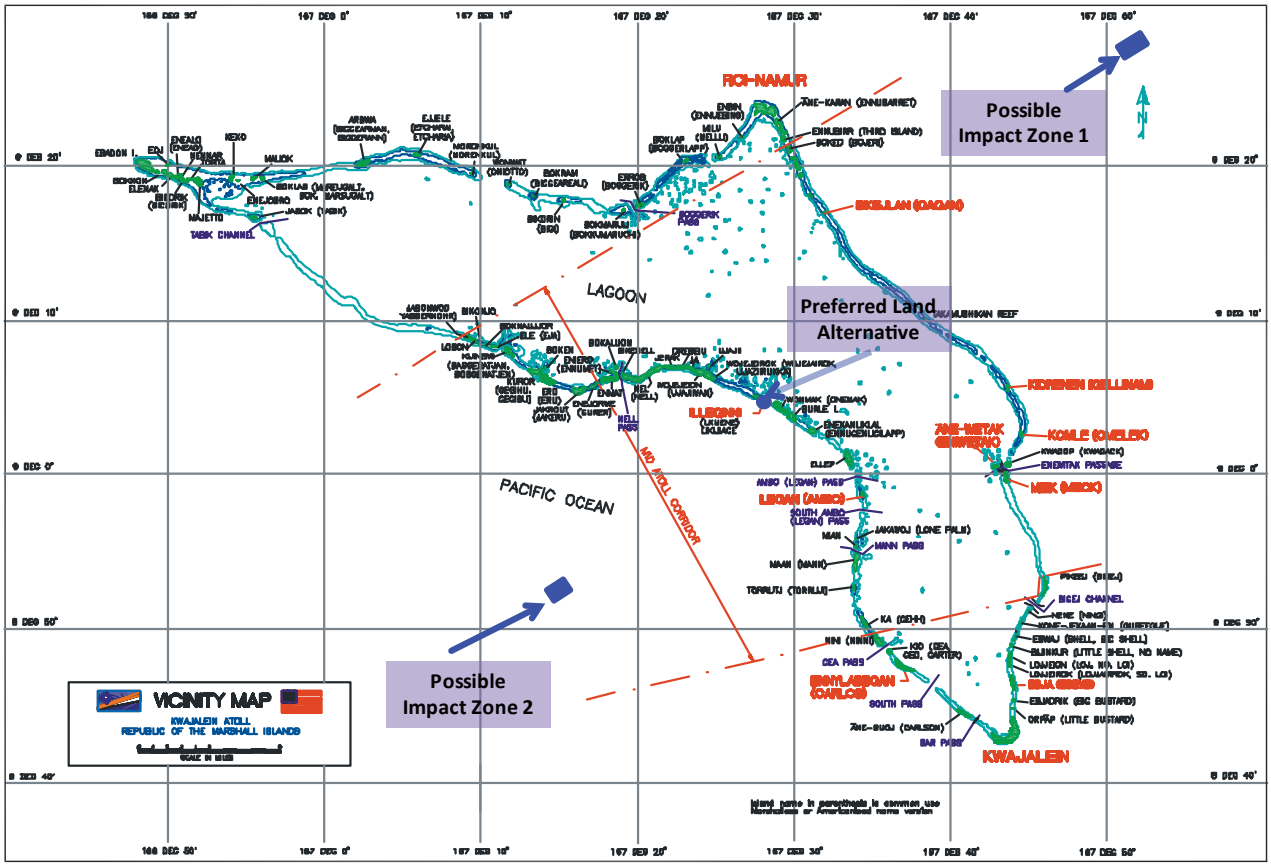
To ensure the safe conduct of this type of test, a Mid-Atoll Corridor Impact Area has been established across the mid section of the atoll. When a test is to occur in this area, a number of strict precautions are taken to protect personnel. Such precautions may consist of evacuating nonessential personnel 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.

Up to 16 Precision Scoring Augmentation Rafts with onboard optical and/or acoustical sensors (see Figure 2.1.8-2) may be placed near Illeginni Islet or in planned BOA impact areas. Within a day of the flight test, one or two of the range landing craft utility (LCU) 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 launch as safely practical, a qualified USAKA/RTS biologist would inspect the northwestern end of Illeginni Islet for sea turtles or sea turtle nests. They would report such sighting to the USAKA 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, a qualified USAKA/RTS biologist would conduct a helicopter or fixed-wing aircraft overflight of the islet vicinity as close to the proposed AHW test 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 USAKA 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 planned BOA impact southwest of Illeginni or northeast of the Atoll, USAKA/RTS personnel would conduct a helicopter or fixed-wing aircraft overflight of the impact vicinity as close to the time of the AHW launch as safely practical. If personnel observe marine

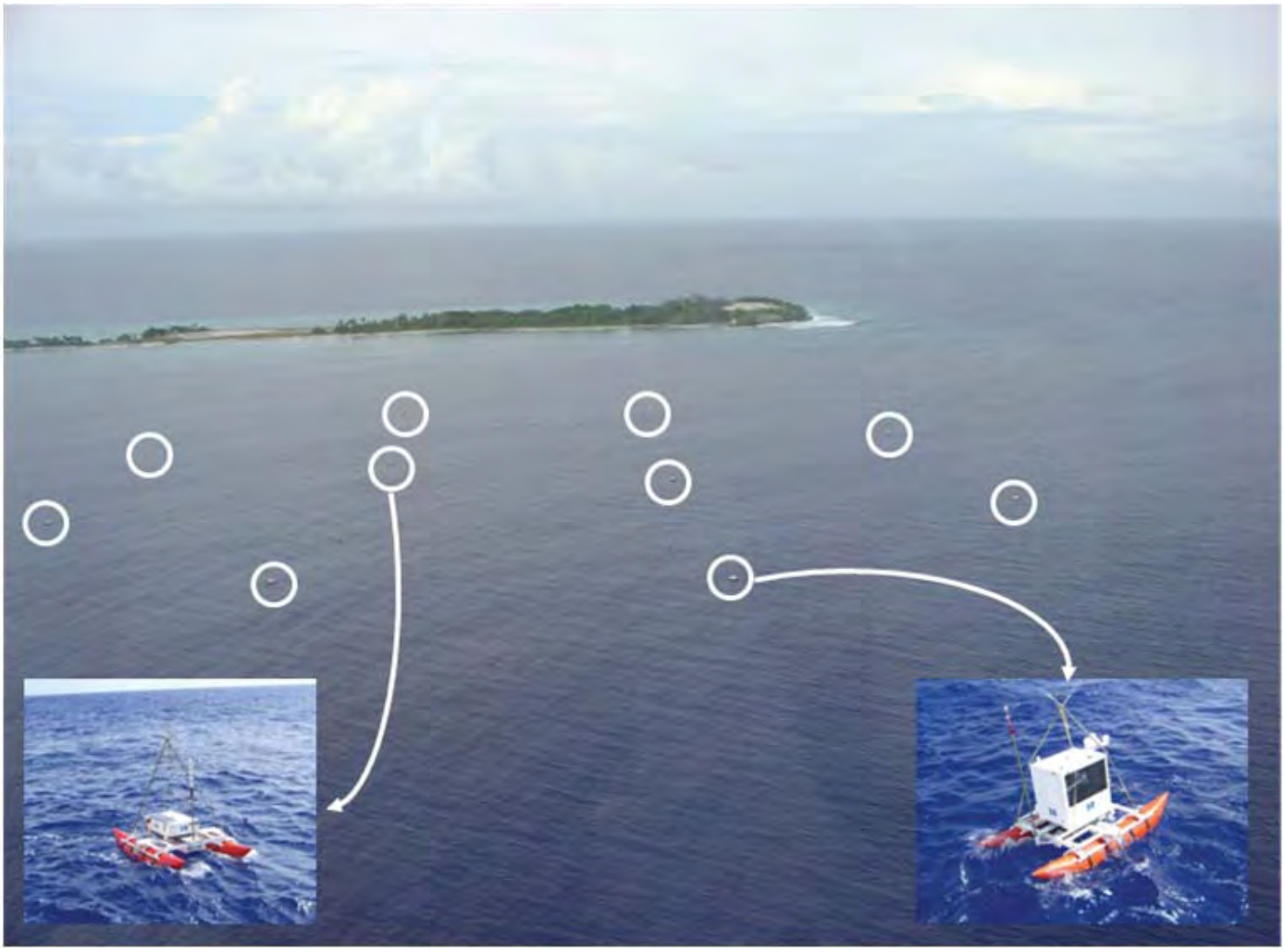


EXPLANATION

Notional Impact Area

Notional Impact Areas in the Vicinity of Illeginni

Figure 2.1.8-1



Precision Scoring Augmentation Rafts

Figure 2.1.8-2

mammals near the impact area, or moving towards the impact area, they would report such sightings to the USAKA Environmental Management Office, the RTS Range Directorate, and the Flight Test Operations Director. Sightings in the impact area would result in a launch delay.

2.1.9 POST-LAUNCH OPERATIONS

At the launch location on KTF, 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 HGB debris. As much HGB debris shall be recovered as reasonably prudent near the impact crater, to include collecting visible debris from the HGB 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 USAKA procedures involving screening and washing of material removed from the crater (U.S. Air Force, 2004).

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 from USAKA would inspect the impact site as soon as safely practical after the event to determine if there are any adverse affects to protected species or critical habitat. If so, representatives from the National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS) 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 USAKA/RTS, 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 from USAKA would inspect the impact site as soon as safely practical after the event. Representatives from the NMFS and USFWS would be invited to inspect the site. They would assess any damage to coral and other resources and, in coordination with USAKA/RTS, 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 HGB inadvertently impact in the deeper waters of the atoll lagoon (up to approximately 160 feet), a dive team from USAKA/RTS would be brought in to conduct underwater searches. Using a ship for recovery operations, a remotely operated vehicle would be used first to locate the debris field on the lagoon bottom. Divers in scuba gear would then be able to recover the debris manually.

In general, HGB recovery operations would not be attempted in the BOA, 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 AHW/HGB is planned to impact in the vicinity of Illeginni Islet (Figure 2.1.8-1). 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. It would be located west of the tree line to avoid affecting the bird habitat on the islet (Figure 2.2.1-1). The mission planning process would avoid to the maximum extent possible all potential risks to environmentally significant areas.

In preparation for the HGB land impact at USAKA/RTS, 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 USAKA/RTS, 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 RMI.

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 Utility (LCU) vessel based at USAKA/RTS. 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.

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 barge or LCU and transported back to Kwajalein Islet. Pending potential launch delays for the AHW flight test, the support equipment setup could remain in place on Illeginni Islet for up to 60 days.

EXPLANATION

Potential Impact Area

Potential Land Impact Area on Illeginni

NORTH

Figure 2.2.1-1

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 LCU and either be anchored or maintain position using onboard battery-powered electric motors.

2.2.2 FLIGHT TEST

HGB impacts on Illeginni Islet would form a crater. Information concerning the HGB's energy release on impact is currently unknown. However, the HGB's impact would be less than the previous Minuteman III (MMIII) 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.

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 LCU as part of operations to remove HGB debris and temporary support equipment and materials, and to assist with cleanup and repair activities. Any craters would be filled in as described above in Section 2.1.9 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/HGB test, 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. Targeted areas for the HGB would be 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 USAKA/RTS would provide most of the test support for the AHW program 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 AHW/HGB 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 AHW/HGB flight test and/or they would monitor the missions as targets of opportunity.

As described in Section 2.1.8, up to 16 free-floating rafts with onboard optical and/or acoustical sensors and telemetry equipment (Figure 2.1.8-2) would be placed in the vicinity of the BOA impact areas, in international waters, within a day of each test. One or two existing LCU vessels based at USAKA 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 USAKA 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. USAKA/RTS 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, USAKA/RTS would implement standard range safety procedures.

2.3.2 FLIGHT TEST

The HGB 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 2.1.8-1).

The second possible water impact zone would be in the BOA approximately 24 miles northeast of Kwajalein Atoll and would have an approximate area of 2,400 feet and 1,200 feet (Figure 2.1.8-1). 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 would also be 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 LCUs or other vessels. If HGB debris is found floating in the water during recovery operations, it would be collected for proper disposal in accordance with USAKA/RTS 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 USAKA Environmental Management Office, the RTS Range Directorate, and the Kwajalein Test Director at the launch facility, which would then inform the NMFS in Honolulu. USAKA/RTS 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 LCUs and other ships would return to their homeport at USAKA/RTS.

2.4 NO-ACTION ALTERNATIVE

Under the No-action Alternative, USASMDC/ARSTRAT would not pursue the AHW program. There would be no USASMDC/ARSTRAT role in the Office of the Secretary of Defense CPGS technology development and demonstration activity.

2.5 ALTERNATIVES CONSIDERED BUT NOT CARRIED FORWARD

Kodiak Launch Complex to the Broad Ocean Area North of Pacific Missile Range Facility

An alternative to the first flight test between the KTF and the islet of Illeginni would be to also launch the Strategic Target System from the Kodiak Launch Complex on the island of Kodiak, Alaska, with an impact in the BOA north of PMRF. This alternative would not meet the purpose of the Proposed Action because there is no existing instrumentation in the BOA to demonstrate CPGS capabilities of precision strike capability.

Kauai Test Facility to Farallon de Medinilla

Another alternative would be launching the Strategic Target System from the KTF at PMRF, with an impact in the Farallon de Medinilla in the Northern Mariana Islands. The Strategic Target System booster cannot provide sufficient velocity to deliver the HGB to the impact area. This alternative would also not meet the purpose of the Proposed Action because there is no existing instrumentation at Farallon de Medinilla to demonstrate CPGS capabilities of precision strike capability.

3.0 Affected Environment

3.0 AFFECTED ENVIRONMENT

This section describes the environmental characteristics that may be affected by the Proposed Action and Alternatives, including the No-action Alternative. To provide a baseline point of reference for understanding any potential impacts, the affected environment is concisely described; any components of potentially greater concern are described in greater detail. Available reference materials, including prior EAs and EISs were reviewed. Questions were directed to installation and facility personnel, and private individuals. Site visits were also conducted where necessary to gather the baseline data presented below.

Twelve areas of environmental consideration were initially evaluated to provide a context for understanding the potential effects of the Proposed Action and Alternatives 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. Each resource area is discussed at each proposed location unless the proposed activities at that location would not foreseeably result in an impact. Since no construction is planned for KTF, no ground disturbance would be required. Therefore the activities proposed for one AHW launch would not foreseeably result in impacts to cultural resources, geology and soils, land use, or socioeconomics at PMRF. No impacts are anticipated to air quality, geology and soils, land use, infrastructure, or socioeconomics at Illeginni.

3.1 KAUAI TEST FACILITY

Rationale for Environmental Resources Analyzed

The proposed AHW program activities at KTF could impact air quality, airspace, biological resources, hazardous materials and waste, health and safety, noise, and water resources; as such, only these environmental resource topics are discussed. Much of the information presented in this section was drawn from the Affected Environment chapter of the PMRF Intercept Test Support EA and Hawaii Range Complex EIS (Pacific Missile Range Facility, 2010; U.S. Department of the Navy, 2008, respectively). Pertinent new information was included where applicable to account for changes in the affected environment or the availability of updated data.

Some resource topics were not analyzed further at KTF because: (1) the Proposed Action requires limited ground-disturbing activities; thus, no impacts to cultural resources or geology and soils would be expected; (2) there would be little increase in personnel on base; thus, no socioeconomic concerns are anticipated; and (3) the proposed launches represent activities that are consistent with the mission and well within the limits of current operations of both PMRF and KTF. As a result, there would be no adverse effects on land use, utilities, or transportation.

3.1.1 AIR QUALITY—KAUAI TEST FACILITY

Air quality in Hawaii is defined with respect to compliance with primary and secondary National Ambient Air Quality Standards (NAAQS) (40 CFR Part 50) established by U.S. Environmental Protection Agency (USEPA) and adopted by the State of Hawaii. 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 and PM-2.5), sulfur dioxide, carbon monoxide, nitrogen oxides, lead, and 8-hour ozone (measured by its precursors, volatile organic compounds [VOCs] and nitrogen oxides).

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 airshed (the geographic area responsible for emitting 75 percent of the air pollution reaching a body of water) surrounding the various sites, which encompasses the KTF located on PMRF, Kauai, Hawaii.

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 (GHG) emissions is global.

Affected Environment

Climate

Weather is an important factor in the disbursement of air pollutants. PMRF is located just south of the Tropic of Cancer and has a mild and semi-tropical climate. Typical temperatures for the area are 80 to 84 degrees Fahrenheit (°F) during the day and 65 to 68°F during the night. The trade winds are from the northeast and are typically light—mean trade winds between 18 to 21 miles per hour. Precipitation in the area averages 41 inches annually. Most of the rain falls during the October through April wet season. Relative humidity is approximately 60 percent during the day throughout the year.

Regional Air Quality

Air quality data in Hawaii are collected by the Hawaii State Department of Health, Clean Air Branch. In 2008, the state maintained 14 air monitoring stations on 3 islands (none on Kauai). Between 2004 and 2008, none of the monitored ambient air concentrations in the State exceeded the annual average Ambient Air Quality Standards (AAQS) (Hawaii State Department of Health, Clean Air Branch, 2008). Therefore, Hawaii is in attainment for all NAAQSs.

USEPA's general air conformity rule applies to Federal actions occurring in nonattainment or maintenance areas when the total indirect and direct emissions of the subject air pollutant exceed specific thresholds. An air conformity analysis is not required for the Proposed Action because as of 2010, the State of Hawaii was in attainment for all NAAQS.

Existing Emission Sources

PMRF and KTF power is supplied by Kauai Island Utility Cooperative (KIUC) during non-testing times. KIUC currently relies on highly refined oil products (diesel and naphtha) for over 90 percent of its energy supply. The only major stationary sources of air emissions at PMRF are generators used by and permitted for PMRF/Main Base, KTF, and the Terminal High Altitude Area Defense (THAAD) missile programs during testing events and when electrical demand is high (Pacific Missile Range Facility, 2010)

Stationary emission sources at PMRF include three 320-kilowatt (kW) and the two 600-kW generators that serve as a backup to the KIUC power system. These generators are covered under the PMRF Title V Covered Source Permit. The Title V permit controls the nitrogen dioxide and sulfur dioxide emissions from each generator by restricting the hours of use and limiting the sulfur content of the diesel fuel supplied for the generators to 0.5 percent by weight.

Stationary emission sources at KTF include two standby 320-kW diesel engine generators that are permitted for operation by the State of Hawaii under a Non-covered Source Permit. (Pacific Missile Range Facility, 2010)

Mobile sources from PMRF-associated testing include aircraft, missile launches, diesel-fueled vehicles, and vehicular traffic. Aircraft are operated and supported at PMRF Airfield. Missile launches are a source of mobile emissions at PMRF. Currently, there are as many as 46 missile launches per year from PMRF and KTF, which includes launches of interceptor missiles and target launches. These systems use both solid and liquid propellants. The most common exhaust components for typical missiles include aluminum oxide, carbon dioxide, carbon monoxide, hydrogen, hydrogen chloride, nitrogen, water, ferric chloride, ferric oxide, nitric oxide, chlorine, and sulfur dioxide.

GHGs 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. According to the Kyoto Protocol and Hawaii's Global Warming Solution Act 234, there are six GHGs (United Nations Framework Convention on Climate Change, 2008):

- Carbon dioxide (CO_2)
- Nitrous oxide (N_2O)
- Methane (CH_4)
- Hydrofluorocarbons
- Perfluorocarbons
- Sulfur hexafluoride

Hawaii's 2007 Greenhouse Gas Emissions Inventory states that in both 1990 and 2007, emissions from transportation and electric power sources accounted for the vast majority (more than 85 percent) of GHG emissions in Hawaii. At 91 percent of the total in 2007, CO_2 is the largest single contributor to GHG emissions from in-state sources. Oahu accounts for 71 percent of Hawaii's GHG emissions; Kauai contributes 5 percent (Hawaii Department of Business, Economic Development & Tourism, 2008).

Since 1900, the earth's average surface air temperature has increased by about 1.2°F to 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 (U.S. Department of the Air Force, 2010). With this in mind, the Navy has established energy targets to reduce GHG by 2020. The targets of significance to this EA include: (1) by 2020, half of the Navy's energy consumption (ashore and afloat) will come from alternative sources; (2) by 2020, half of Navy installations will be net-zero energy consumers, using solar, wind, ocean, and geothermal power generated on base; (3) by 2015, the Navy will cut in half the amount of petroleum used in Government vehicles through phased adoption of hybrid, electric, and flex fuel vehicles; and (4) effective immediately, Navy contractors will be held contractually accountable for meeting energy efficiency targets.

3.1.2 AIRSPACE—KAUAI TEST FACILITY

Airspace, or that space which lies above a nation and comes under its jurisdiction, is generally viewed as being unlimited. However, it is a finite resource that can be defined vertically and horizontally, as well as temporally, when describing its use for aviation purposes. The time dimension is a very important factor in airspace management and air traffic control.

Under Public Law (PL) 85-725, *Federal Aviation Act of 1958*, the Federal Aviation Administration (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 U.S. 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

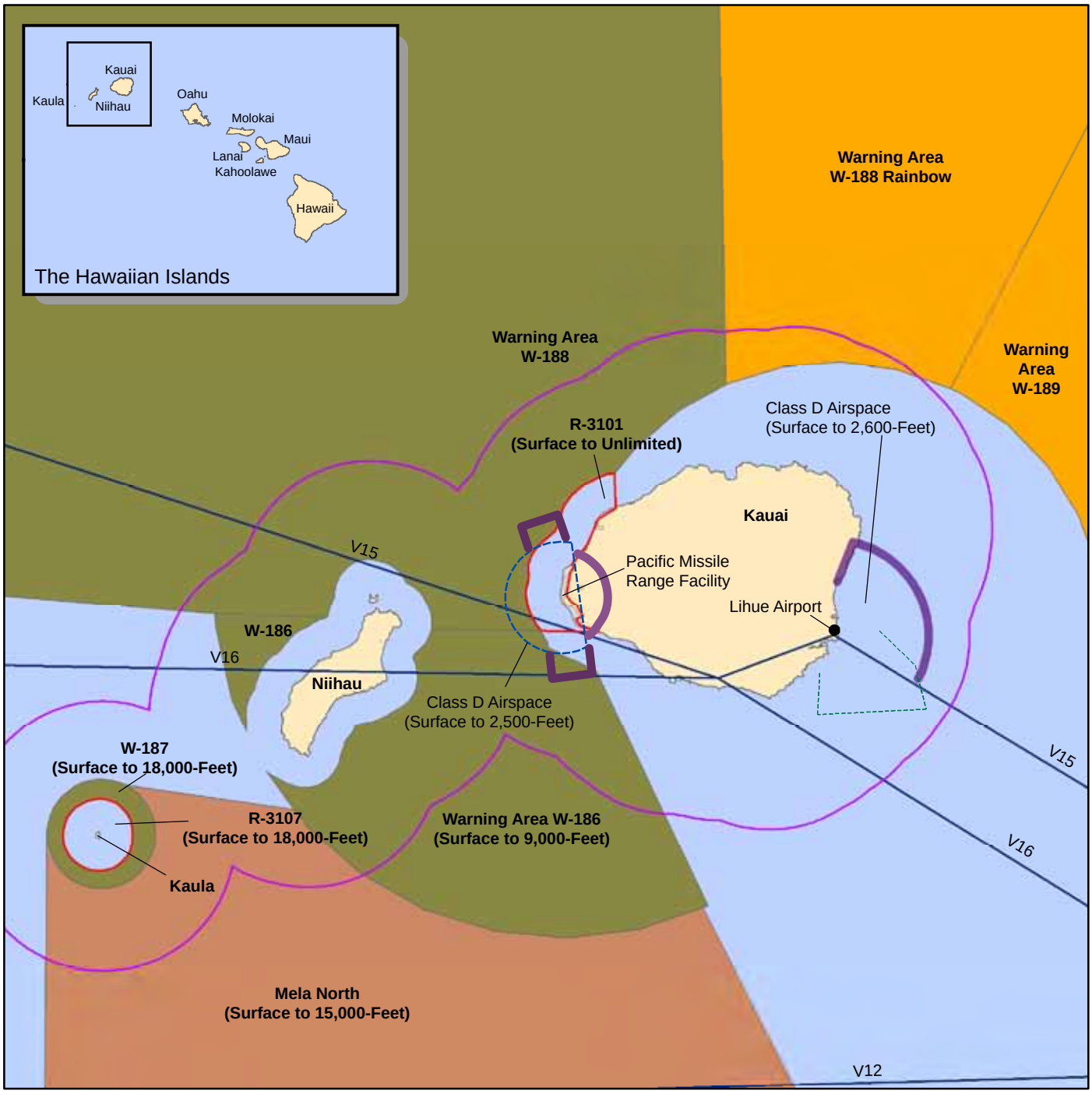
The region of influence for airspace includes the airspace over and surrounding the islands of Kauai and Niihau. Figure 3.1.2-1 shows a view of the airspace within the PMRF/Main Base region of influence, including the PMRF Aircraft Operational Areas, the R-3101 Restricted Area, and surrounding airspace off the western and northwestern coast of Kauai.

Affected Environment

The affected airspace use environment in the PMRF/KTF 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 airspace outside the special use airspace identified below is essentially international airspace controlled by the Honolulu Control Facility and Oakland Air Route Traffic Control Center (ARTCC). Class D airspace (generally that airspace surrounding those airports that have an operational control tower) surrounds the PMRF/Main Base airfield with a ceiling of 2,500 feet. It is surrounded to the north, south, and east by Class D airspace with a floor 700 feet above the surface (see Figure 3.1.2-1). Lihue Airport, located approximately 20 nautical miles (nm) east of PMRF, includes Class D, surface Class E (controlled airspace not in the other classes), and additional Class E airspace with a floor 700 feet above the surface.



EXPLANATION

- 12-Nautical Mile Line
- Airway
- Class E Airspace with Floor at the Surface
- Class E Airspace with Floor 700-Feet Above Surface
- Class D Airspace
- Restricted Airspace
- Oahu Warning Area
- Pacific Missile Range Facility (PMRF) Warning Area
- Air Traffic Control Assigned Airspace (ATCAA)
- Installation Area
- Land

NORTH 0 5 10 20 Nautical Miles

Airspace Over and Surrounding the Islands of Kauai and Niihau

Kauai, Niihau, and Kaula, Hawaii

Figure 3.1.2-1

There is no Class B (U.S. terminal control areas) airspace (which usually surrounds the nation's busiest airports) or Class C (operational control tower and radar approach control) airspace in the region of influence.

Special Use Airspace

A restricted area is airspace designated under Part 73 within which the flight of aircraft, while not wholly prohibited, is subject to restriction. A warning area is airspace of defined dimensions, extending from 3 nm outward from the coast of the United States that contains activity that may be hazardous to nonparticipating aircraft. The purpose of such warning areas is to warn nonparticipating pilots of the potential danger. A warning area may be located over domestic or international waters or both. (14 CFR Title 14 Part 1.1, 2006)

The special use airspace in the region of influence (see Figure 3.1.2-2) consists of Restricted Area R-3101, which lies immediately above PMRF/Main Base and to the west of Kauai, portions of Warning Area W-188 north of Kauai, and Warning Area W-186 southwest of Kauai, all controlled by PMRF. Restricted Area R-3107 over Kaula, a small uninhabited rocky islet 19 nm southwest of Niihau that is used for fixed- and rotary-wing aircraft gunnery practice, and which lies within the W-187 Warning Area, is also special use airspace within the region of influence. Restricted Area R-3107 and Warning Area W-187 are scheduled through the Navy Fleet and Area Control and Surveillance Facility Pearl Harbor (FACSFACPH). PMRF and FACSFACPH each coordinate with the FAA Honolulu Control Facility regarding special use airspace. The Honolulu Control Facility is the location in which the ARTCC, the Honolulu control tower, and the Combined Radar Approach Control are collocated.

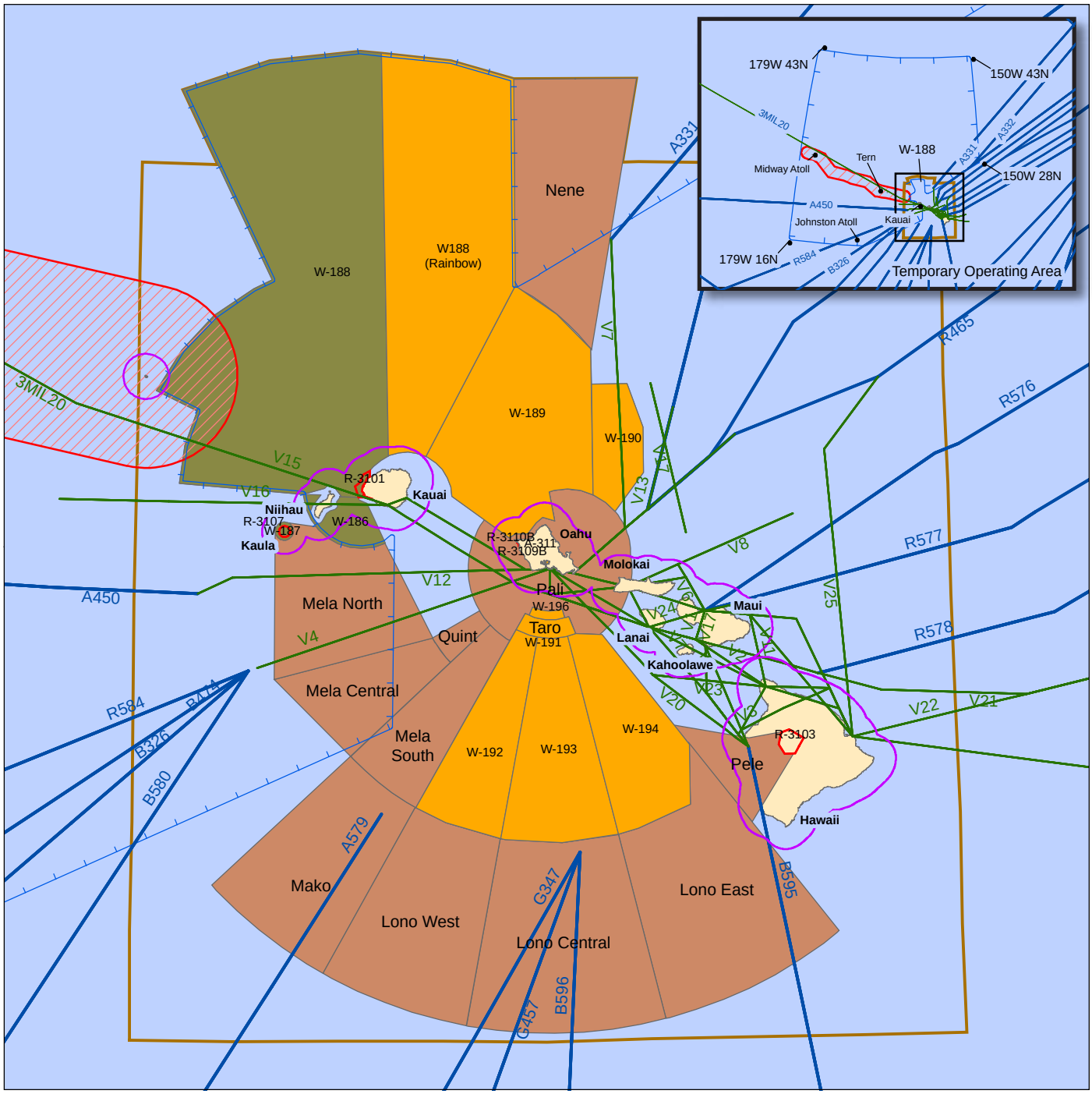
Table 3.1.2-1 lists the affected Restricted Areas and Warning Areas and their effective altitudes, times used, and their manager or scheduler. There are no Prohibited or Alert special use airspace areas in the PMRF airspace use region of influence.

Table 3.1.2-1. Special Use Airspace in the PMRF/Main Base Airspace Use Region of Influence

Number	Location	Altitude (Feet)	Time of Use		Controlling Agency
			Days	Hours	
R-3101	PMRF	To Unlimited	M-F	0600-1800	PMRF
W-186	Southwest of PMRF	To 9,000	Continuous	Continuous	PMRF
W-188	Northwest of PMRF	To Unlimited	Continuous	Continuous	PMRF/HCF

Source: National Aeronautical Charting Office, 2007

Notes:
R = Restricted, W = Warning
PMRF = Pacific Missile Range Facility
HCF = Honolulu Combined Facility, the location in which the Air Route Traffic Control Center (ARTCC), the Honolulu control tower, and the Combined Radar Approach Control are collocated.



EXPLANATION

- Air Traffic Services (ATS) Route
- Oceanic Route
- Temporary Operating Area (TOA)
- Hawaii Operating Area (OPAREA)
- Restricted Airspace
- Papahanaumokuakea Marine National Monument
- Air Traffic Control Assigned Airspace (ATCAA)
- Oahu Warning Area
- Pacific Missile Range Facility (PMRF) Warning Area
- Land

NORTH

0 50 100 200 Nautical Miles

Airways and Special Use Airspace

Hawaiian Islands

Figure 3.1.2-2

Special Airspace Use Procedures

Other types of airspace, and special airspace use procedures used by the military to meet its particular needs, include Air Traffic Control Assigned Airspace (ATCAA) and Altitude Reservation (ALTRV) procedures: (1) ATCAA, or airspace of defined vertical and lateral limits, is assigned by air traffic control to provide air traffic segregation between specified activities being conducted within the assigned airspace and other instrument flight rules (IFR) air traffic. ATCAAs are usually established in conjunction with Military Operations Areas, and serve as an extension of Military Operations Area airspace to the higher altitudes required. These airspace areas support high altitude operations such as intercepts, certain flight test operations, and air refueling operations; (2) ALTRV Procedures are used as authorized by the Central Altitude Reservation Function, an air traffic service facility, or appropriate ARTCC, under certain circumstances, for airspace utilization under prescribed conditions. An ALTRV receives special handling from FAA facilities. According to FAA Handbook 7610.4H, Chapter 3, ALTRVs are classified as either moving or stationary, with the latter normally defining the fixed airspace area to be occupied as well as the specific altitude(s) and time period(s) the area will be in use. ALTRVs may encompass certain rocket and missile activities and other special operations as may be authorized by FAA approval procedures.

To ensure safe operations, PMRF requests use of specific areas of airspace from the FAA during missile defense testing. The FAA issues a NOTAM to avoid specific areas of airspace until testing is complete. The NOTAM System is a telecommunication system designed to distribute unanticipated or temporary changes in the National Airspace System or until aeronautical charts and other publications can be amended. This information is distributed in the Notice to Airmen Publication.

To further ensure aircraft safety, if aircraft are seen in an impact area, 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 non-participating entrant has left the area or a thorough check of the suspected area has been performed. Models run sequentially or in parallel are designed to compute risks based on estimating both the probabilities and consequences of launch failures as a function of time into the mission. Databases include data on mission profile, launch vehicle specifics, local weather conditions, and the surrounding population distribution. Given a mission profile, the risks would vary in time and space. Therefore, a launch trajectory optimization is performed by the range for each proposed launch, subject to risk minimization and mission objectives constraints. The debris impact probabilities and lethality are then estimated for each launch considering the geographic setting, normal jettisons, failure debris, and demographic data to define destruct lines to confine and/or minimize the potential risk of injury to humans or property damage.

En Route Airways and Jet Routes

Although relatively remote from the majority of jet routes that crisscross the Pacific, the airspace use region of influence has two IFR en route low altitude airways used by commercial air traffic that pass through the region of influence: V15, which passes east to west through the southernmost part of Warning Area W-188, and V16, which passes east to west through the northern part of Warning Area W-186 and over Niihau (see Figure 3.1.2-1). An accounting of the number of flights using each airway is not maintained.

The airspace use region of influence, located to the west, northwest, and north of Kauai, is far removed from the low altitude airways carrying commercial traffic between Kauai and Oahu and the other Hawaiian islands, all of which lie to the southeast of Kauai. There is a high volume of island helicopter sightseeing flights along the Na Pali coastline and over the Waimea Canyon, inland and to the east of PMRF, particularly out of Port Allen near Hanapepe on Kauai's southern coastline and other tourist and resort towns on the island. However, these do not fly over PMRF or into Restricted Area R-3101 (National Aeronautical Charting Office, 2007).

Airports and Airfields

With the exception of the airfield at PMRF and the Kekaha airstrip approximately 3 miles to the southeast of PMRF and 2 miles northwest of Kekaha, there are no airfields or airports in the airspace use region of influence. Lihue Airport is located 20 nm east of PMRF, outside the region of influence. In addition to helicopter and fixed-wing aircraft landings associated with PMRF's mission, the PMRF airfield serves as a training facility for landings and takeoffs. The overall number of air operations was 13,395 for 2004. The 2009 air operations were estimated to be 25,486, an increase of about 90 percent. (U.S. Department of the Navy, Engineering Field Activity Chesapeake, 2006)

Air Traffic Control

Use of the airspace by the FAA and PMRF is established by a Letter of Agreement between the two agencies. Under this agreement, PMRF is required to notify the FAA by 2:00 p.m. the day before range operations would infringe on the designated airspace. Range Control and the FAA are in direct real-time communication to ensure safety of all aircraft using the airways and jet routes and the special use airspace. Within the special use airspace, military activities in Warning Areas W-186 and W-188 are under PMRF control, and the PMRF Range Control Officer is solely authorized and responsible for administering range safety criteria, the surveillance and clearance of the range, and the issuance of range RED (no firing) and GREEN (clearance to fire) status (Pacific Missile Range Facility, Barking Sands, Hawaii, 1991). Warning Area W-187 is scheduled through the FACSFACPH.

As Warning Areas are located in international airspace, the procedures of the International Civil Aviation Organization (ICAO), outlined in ICAO Document 444, *Rules of the Air and Air Traffic Services*, are followed. ICAO Document 444 is the equivalent air traffic control manual to FAA Handbook 7110.65, *Air Traffic Control*. The FAA acts as the U.S. agent for aeronautical information to the ICAO, and air traffic in the region of influence is managed by the Honolulu ARTCCs.

3.1.3 BIOLOGICAL RESOURCES—KAUAI TEST FACILITY

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), by the State of Hawaii, or by the RMI the first time they are mentioned in the text. Scientific names are also provided for species with no common name or a Hawaiian name to aid the reader.

Region of Influence

The region of influence is the area within the boundaries of KTF 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).

Affected Environment

Vegetation

Naupaka, beach morning glory, and `a`ali`i (*Dodonaea viscosa*) are common species at KTF. Coastal dune vegetation covers much of the dunes north of KTF, which is located in the northern portion of the base. Within PMRF and the KTF area of the complex, ruderal vegetation is present where the natural vegetation has been disturbed by man. Much of the ruderal vegetation is mowed on a regular basis, thus taller vegetation does not become established within the launch area (U.S. Department of the Navy, 2008).

Threatened and Endangered Vegetation

No threatened or endangered plants have been observed at KTF (Pacific Missile Range Facility, 2007). Two Federally listed plant species have been observed north of, but not on, PMRF (Table 3.1.3-1). Ohai (*Sesbania tomentosa*), a spreading shrub, is a Federally endangered species that has been observed in the sand dunes to the north of PMRF in Polihale State Park and could potentially occur on the installation, including KTF. Lau`ehu (*Panicum niihauense*), an endangered species of rare grass, has been observed near Queens Pond also north of PMRF/KTF. Additional discussion on these plants is found in the Environmentally Sensitive Habitat section below. (Pacific Missile Range Facility, 2001; U.S. Department of the Navy, 1998)

Table 3.1.3-1. Listed Plant Species Known or Expected to Occur in the Vicinity of PMRF/KTF

Scientific Name	Common Name	Federal Status
Plants[1]		
Panicum niihauense	Lau`ehu	E
Sesbania tomentosa	Ohai	E

Source: U.S. Fish and Wildlife Service, 2005a; b; 2007a; b; 2008a; U.S. Department of the Interior, Office of Environmental Policy and Compliance Pacific Southwest Region, 2007; Pacific Missile Range Facility, 2006a

Notes: [1] Critical habitat has been designated on the installation for these plants.

Key to Federal Status:
E = Endangered

Wildlife

Birds on KTF include resident species such as the red junglefowl, ring-necked pheasant, and northern mockingbird. Non-resident species identified include the State-listed short-eared owl *(Asio flammeus sandwichensis)*, brown noddy, and great frigate bird. The Laysan albatross has also been observed in the KTF area. (Pacific Missile Range Facility, 2001; 2006b)

Several species of migratory seabirds and shorebirds covered by the Migratory Bird Treaty Act (MBTA) are present during some portion of the year. Brown boobies, sanderlings, wandering tattlers, ruddy turnstones, and Pacific golden plovers are commonly observed at PMRF/Main

Base. The black-footed albatross, a seabird that is state-listed as threatened (Pacific Missile Range Facility, 2007), has also been observed on PMRF. Wedge-tailed shearwaters nest in the Nohili dunes area. A nesting colony of wedge-tailed shearwaters is also located near the beach cottages. Nesting colony restoration efforts begun in 2006 included removing non-native trees and planting naupaka seedlings and native beach vegetation (pohinahina), ilima, and akiaki seeds. The Navy built a fenced-in, 1-acre compound near the middle of PMRF to foster wedge-tailed shearwater nesting and to keep out unwanted "guests." There were an estimated 276 breeding pairs in the compound in 2006 (U.S. Navy NAVFAC Pacific Environmental Planning, 2007). The Navy also installed polyvinyl chloride (PVC) pipe segments into the compound to provide some artificial burrows that would not collapse. (Currents, 2007)

The Laysan albatross, also protected under the MBTA, uses ruderal vegetation areas on the base for courtship and nesting (Pacific Missile Range Facility, 2001; 2006b). The Laysan albatross is being discouraged from nesting at PMRF to prevent interaction between the species and aircraft using the runway. Albatross on the airfield are relocated to Kilauea National Wildlife Refuge in order to prevent bird/aircraft strikes. During the nesting season, PMRF staff in cooperation with the U.S. Department of Agriculture's Animal and Plant Health Inspection Service and the Kauai National Wildlife Refuge Complex relocates viable PMRF albatross eggs to Kilauea Point and other north shore nest sites, under a USFWS permit, to replace eggs that would never hatch. All of the resulting chicks are accepted by new surrogate parents and should now return to the north shore when old enough to mate. With no chicks to feed, the adult albatross return to the open sea. This surrogate parenting program continued through the 2009/2010 nesting season with continued improvements and fine-tuning, through coordination and discussion with all three engaged agencies. It is anticipated to continue as long as viable eggs are available at PMRF/Main Base. Twenty-three eggs were placed with surrogate parents during the 2009/2010 season (Naval Facilities Engineering Command Pacific, 2010a). (Burger, 2007a; U.S. Fish and Wildlife Service, 2005b; U.S. Department of the Navy, 1998; U.S. Army Space and Missile Defense Command, 2001)

Feral dogs and cats occur in the region and prey on native and introduced species of birds. Rodents including the Polynesian black rat, Norway or brown rat, and the house mouse are also known to occur in the region. (U.S. Department of the Navy, 1998; U.S. Army Space and Missile Defense Command, 2001) PMRF has an ongoing feral animal-trapping program to protect the albatross as well as the wedge-tailed shearwater and other birds on base (Burger, 2007a). However, in recent years the primary predation documented in the wedge-tailed shearwater colonies has been from barn owls. A total of 101 barn owls have been culled on PMRF since 2005—concentrated in the scrub in the vicinity of the Beach Cottage colony. (Burger, 2010b) Reptiles observed on PMRF/Main Base during recent surveys were the house gecko, mourning gecko, and snake-eyed skink. The only amphibian observed was the marine toad. (Pacific Missile Range Facility, 2006c; U.S. Department of the Navy, 1998; U.S. Army Space and Missile Defense Command, 2001)

Essential Fish Habitat

Essential Fish Habitat (EFH) occurs and is incorporated within Kauai's Exclusive Economic Zone (EEZ), the 200-mile limit around the island. EFH for adult and juvenile bottomfish includes the water column and all bottom habitats extending from the shoreline to a depth of 219 fathoms, which encompasses important steep drop-offs and high relief habitats. Shallow-water (0 to 328 feet) bottomfish species include grey snappers, thicklip trevallies, Hawaiian groupers, emperors, amberjacks, and bluestriped snappers. Deep-water (328 to 1,312 ft) species include

squirrelfish snapper, red snapper, pink snapper, and ironjaw snapper. (Western Pacific Regional Fishery Management Council, 2005)

Pelagic Habitat Areas of Particular Concern (HAPC) that include the offshore area are designated as the water column down to 3,280 feet from the shoreline to the EEZ that lies above all seamounts and banks shallower than 1,100 fathoms. Marketable pelagic species include striped marlin, bluefin tuna, swordfish, albacore, skipjack, sailfish, tuna, and various sharks. Banks with summits less than 16.3 fathoms have been designated as HAPC for crustaceans. Crustacean species include spiny lobsters, slipper lobsters, and Kona crabs. (Western Pacific Regional Fishery Management Council, 2005)

Common animals found in rocky intertidal habitats include limpets, periwinkles, littorine snails, rock crabs, gastropods, and rock urchins. Adjacent to rocky shoreline, offshore waters are possible feeding areas for the threatened green turtle (*Chelonia mydas*). (U.S. Department of the Navy, 2005)

Spinner dolphins are the most commonly recorded cetaceans observed within 12 nm of the PMRF coastline. The spinner dolphin inhabits bays and protected waters, often in waters less than 40 feet deep (Pacific Missile Range Facility, 2001). Spinner dolphins are expected to occur in shallow water resting areas (about 162 feet deep or less) throughout the middle of the day, moving into deep waters offshore during the night to feed.

Threatened and Endangered Wildlife

Listed species of wildlife are provided in Table 3.1.3-2. Green and hawksbill (*Eretmochelys imbricata*) turtles are the most common sea turtles in offshore waters around the Main Hawaiian Islands, as they prefer reef-type environments that are less than about 55 fathoms in depth (U.S. Department of the Navy, 2005). Green turtles have been observed offshore of Nohili Ditch, the only area where basking/haul-out activity on PMRF is observed. The PMRF Natural Resources Manager monitors sea turtle activity at PMRF. Security patrol reports include a record of the presence and locations of turtles. Any records of green turtle sitings are maintained by the PMRF Environmental Office. (Pacific Missile Range Facility, 2001)

Green sea turtles have not nested anywhere along the beachfront on PMRF in the last 10 years. In the past 3 years only one apparent “false nesting” had been observed. (Burger, 2007b) However, in 2010 two green sea turtles nested for the first time in more than a decade, and the turtles hatched successfully from both nests in August (MidWeek Kauai, 2010).

In March of 2000, an endangered juvenile short-tailed albatross (*Phoebastria albatrus*) was observed at PMRF, resting in the grass on the mountain side of the PMRF runway (U.S. Fish and Wildlife Service, 2004). The black-footed albatross (*P. nigripes*) is a seabird that has been observed on and offshore of PMRF, and has been proposed for listing as threatened or endangered (U.S. Fish and Wildlife Service, 2007b). The proposed site for the AHW launch is in the northern section of PMRF at the KTF Pad 42. This area lacks suitable habitat for the endangered Hawaiian goose, which can be found on other areas of PMRF (*Branta sandvicensis*) (U.S. Fish and Wildlife Service, 2011a). The endangered Hawaiian coot (*Fulica alai*), Hawaiian black-necked stilt (*Himantopus mexicanus knudseni*), Hawaiian common moorhen (*Gallinula chloropus sandvicensis*), and Hawaiian duck (*Anas wyvilliana*) are potentially present or confirmed within or near the KTF area. These four bird species are

endangered waterbirds that have been observed in the drainage ditches and ponds on PMRF. The Hawaiian coot, black-necked stilt, and common moorhen (U.S. Fish and Wildlife Service, 2006) nest on Kauai year-round. (U.S. Department of the Navy, 1998; Pacific Missile Range Facility, 2001; 2007)

Table 3.1.3-2. Listed Wildlife Species Known or Expected to Occur in the Vicinity of PMRF/KTF

Scientific Name	Common Name	Federal Status
Reptiles		
Caretta caretta	Loggerhead turtle*	E
Chelonia mydas	Green turtle	T
Dermochelys coriacea	Leatherback turtle	E
Eretmochelys imbricata	Hawksbill turtle	E
Lepidochelys olivacea	Olive ridley turtle	T
Birds		
Anas wyvilliana	Koloa maoli (Hawaiian duck)	E
Branta sandvicensis	Nene (Hawaiian goose)	E
Fulica alai	`Alae ke`oke`o (Hawaiian coot)	E
Gallinula chloropus sandvicensis	`Alae `ula (Hawaiian common moorhen)	E
Himantopus mexicanus knudseni	Ae`o (Hawaiian black-necked stilt)	E
Oceanodroma castro	Band-rumped storm-petrel	C
Phoebastria albatrus	Short-tailed albatross**	E
Phoebastria nigripes	Black-footed albatross	P
Pterodroma phaeopygia sandwichensis	`Ua`u (Hawaiian petrel)	E
Puffinus auricularis newelli	`A`o (Newell's Townsend's shearwater)	T
Mammals		
Lasiurus cinereus spp. *semotus*	Hawaiian hoary bat	E
Megaptera noveangliae	Humpback whale	E
Monachus schauinslandi	Hawaiian monk seal	E

Source: U.S. Fish and Wildlife Service, 2005a; b; 2007a; U.S. Department of the Interior, Office of Environmental Policy and Compliance Pacific Southwest Region, 2007; National Oceanic Atmospheric Administration, 2010; Conant, et al., 2009

Notes:

* Designated as North Pacific Ocean Discrete Population Segment (Endangered) in 2010

** Observed in May 2000

Key to Federal Status:
C = Candidate
T = Threatened
E = Endangered
P = Proposed for listing as threatened or endangered

The threatened Newell's shearwater (*Puffinus auricularis newelli*), endangered Hawaiian dark-rumped petrel (*Pterodroma phaeopygia sandwichensis*), and the band-rumped storm-petrel (*Oceanodroma castro*) that has recently been listed as a candidate species are the three seabirds most likely to be affected by the Proposed Action.

Newell's Shearwater

The Newell's shearwater is a member of the genus *Puffinus* and uses the open tropical seas and offshore waters near its breeding grounds. Kauai provides the majority of Hawaii's habitat for the threatened Newell's shearwater. The Newell's shearwater is approximately 12 to 14 inches long, with a wingspan of 30 to 35 inches, and weight of approximately 14 ounces. It has a glossy black top, a white bottom, and a sharply hooked black bill. Its claws are well adapted for burrow excavation and climbing. (U.S. Fish and Wildlife Service, 2011a)

The most recent population estimate from 1995 estimates the total population to be roughly 84,000 birds, with approximately 75 percent occurring on the island of Kauai. Recent ornithological radar surveys, combined with returns of downed birds to the Save Our Shearwater program have shown an estimated decline of 75 percent between 1993 and 2008. Depletion of available nesting habitat for this species is one of the main threats to this species. The introductions of the mongoose, black rat, and Norway rat have also played a primary role in the reduction of ground-nesting seabirds. Predation by feral cats and barn owls has also been observed. In addition, feral pigs are known to collapse burrows as well as consume or prey on shearwaters. Another major threat is the species' attraction to light. (U.S. Fish and Wildlife Service, 2011a)

The Newell's shearwater nests from April to November in burrows under ferns on forested slopes in the interior mountains of Kauai. Burrows are most commonly placed at the base of trees, where the substrate may be easier for the birds to excavate. A single egg is laid in late May or early June which both sexes incubate for approximately 45 days. Daily flights to and from the colonies occur only at night. Fledglings leave the nesting grounds at night in October and November and head for the open ocean. They may become temporarily blinded by lights when flying near brightly lit urban areas or street lights, and some may collide with trees, utility lines and light poles, buildings, and automobiles. Since 1979 the Kauai District of Hawaii's Division of Forestry and Wildlife has supported a program called Save our Shearwaters to collect Newell's shearwaters and Hawaiian petrels that have either collided with structures or fallen out, or have been injured or killed due to exhaustion caused by light attraction. (U.S. Fish and Wildlife Service, 2011a)

PMRF personnel have retrofitted their outdoor lighting with hoods that direct the lights downward to prevent confusing the seabirds, which can be disoriented by upward- and outward-shining lights (Honolulu Advertiser, 2006). (Telfer et al. 1987; Day et al. 2003; Poot et al. 2008; Audubon, 2006; Hawaii Department of Land and Natural Resources, no date) In an increasing effort to protect shearwaters, this program is under review. PMRF has implemented the green light bulb program; green shielded lights were installed in the fall of 2010. PMRF is exploring additional programs such as reduction of wattage used in lightbulbs, hoods and deflectors, as well as turning off all but the most mission-critical lighting during the fledging season (Burger, 2009; 2010b; U.S. Fish and Wildlife Service, 2011a).

Hawaiian Petrel

The endangered Hawaiian petrel (previously known as the dark-rumped petrel) is a medium-sized seabird in the family Procellariidae (shearwaters, petrels, and fulmars). The Hawaiian petrel is a large petrel, approximately 16 inches long with a wing span of 3 feet. The Hawaiian petrel has a dark gray head, wings, and tail, and a white forehead and belly. Hawaiian petrels have stout grayish-black bills that are hooked at the tip, and feet that are pink and black.

Based on pelagic observations, the total population including juveniles and subadults in 1995 was estimated at 20,000 with a breeding population of 4,500 to 5,000 pairs. Kauai populations are difficult to assess, but potentially a large portion of the population nests on the island. (U.S. Fish and Wildlife Service, 2011a)

Hawaiian petrels are colonial and nest in burrows, crevices in lava, or under ferns. The Hawaiian petrels arrive in their colonies in late February and may traverse the area from their nesting grounds to the sea. After a period of burrow maintenance and social activity they return to sea until late April, when egg-laying begins. Non-breeding birds visit the colony from February until late July. Hawaiian petrels are nocturnal over land and are active from about 1 hour after sunset until about 1 hour before sunrise. Chicks begin hatching in late June and fledge between late September to late November, slightly earlier than that of the Newell's shearwater. On rare occasion, grounded Hawaiian petrel fledglings have been collected as part of the Newell's shearwater recovery program on Kauai. Most birds have been found near the mouth of Waimea Canyon, indicating that some birds still breed in the vicinity. (Audubon, 2006; U.S. Fish and Wildlife Service, 2011a; Virginia Tech Conservation Management Institute, 1996)

The Hawaiian petrel faces severe threats from non-native predators including rats, cats, mongoose, and introduced barn owls. Other significant anthropogenic sources of Hawaiian petrel mortality are light attraction and collision with communications towers, power transmission lines and poles, fences, and other structures. (U.S. Fish and Wildlife Service, 2011a)

Band-rumped Storm-Petrel

The band-rumped storm-petrel has recently been listed as a candidate species. It is a small seabird about 8 inches long. It is an overall blackish-brown bird with a white rump. Sexes are alike in size and appearance. The species is long-lived (15-20 years) and probably does not breed until its third year. In Hawaii, band-rumped storm-petrels are currently known to nest only in remote cliff locations on Kauai and Lehua Islet, and in high-elevation lava fields on Hawaii. (U.S. Fish and Wildlife Service, 2011a)

Band-rumped storm-petrels nest in burrows or natural cavities in a variety of high-elevation, inland habitats, and breed on Kauai at elevations around 1,950 feet. In Hawaii the breeding population is unknown, but likely very small. The population on Kauai is estimated at between 171 and 221 breeding pairs. Historically, the species was abundant and widespread throughout the Main Hawaiian Islands. Adults establish nesting sites in April or May (U.S. Fish and Wildlife Service, 2011a). Like most seabirds this storm-petrel lays a single egg per season, between May and June, and nestlings fledge in October. When not at nesting sites, adults spend their time foraging on the open ocean. (Hawaii Department of Land and Natural Resources, 2005)

Introduced predators (rats, cats, dogs, mongoose, and barn-owls) are believed to be the most serious threats facing the band-rumped storm-petrel on land in Hawaii. The band-rumped storm-petrel, like the other seabirds discussed above, lacks effective anti-predator behavior, and has a lengthy incubation and fledgling period; thus adults, eggs, and young are highly vulnerable to predation by introduced mammals. Another impact to the band-rumped storm petrel is the attraction to artificial lights on fledgling young and, to a lesser degree, adults. Artificial lighting of roads, resorts, ballparks, residences, and other development in lower elevation areas both attracts and confuses night-flying band-rumped storm-petrel fledglings,

resulting in fall-out and collisions with buildings and other objects. (U.S. Fish and Wildlife Service, 2011a)

Hawaiian Hoary Bat

The Hawaiian hoary bat (*Lasiurus cinereus* spp. *semotus*) is listed as a Federal and State endangered species. The subspecies is the only land mammal endemic to Hawaii. Hawaiian hoary bats generally occur in or near forest habitat, and apparently use native vegetation more frequently than non-native vegetation. Their diet consists of flying insects. Hawaiian hoary bats have been observed to forage over open fields, over open ocean near the mouths of river or stream outlets, and over streams and ponds. The current population size of Hawaiian hoary bats is unknown, but the greatest threats to populations are thought to be habitat loss, use of pesticides, and predation. It has been recorded at PMRF; a group of four was observed foraging around the sewage treatment ponds, and another separate group of five bats was seen just offshore of northern PMRF (Pacific Missile Range Facility, 2007). It has also been observed at the Polihale State Park north of the base. (Naval Facilities Engineering Command Pacific, 2010b; Pacific Missile Range Facility, 2001)

Due to a lack of clear knowledge of the current status of bats at PMRF, the Navy has contracted U.S. Geological Survey (USGS) Pacific Island Ecosystem Research Center biologists to survey for bats at PMRF from June 2010 through May 2011. During the week of 30 June to 7 July 2010, USGS biologists deployed four Anabat detectors on the southern half of PMRF Main Base: one along the west side of the private shrimp farm located east of the base, one at the PMRF sewage treatment pond, one at the Hawaii Air National Guard site, and one along the Kini Kini Ditch just southeast of the PMRF runway. During this one-week Anabat deployment, one bat was detected for approximately 30 seconds at the PMRF sewage treatment pond. No bats were detected at the Hawaii Air National Guard site, nor at the other two sites. During the week of 8 to 15 July 2010, Anabat detectors were deployed along Nohili Ditch (approximately 150 yards from the ocean) and the Aegis Ashore Interceptor Launch Area (detectors were also placed at two locations at Kamokala Magazines, a PMRF site east of the Main Base). During this 1-week deployment, no bats were detected at these sites. (Naval Facilities Engineering Command Pacific, 2010b)

Hawaiian Monk Seal

The Hawaiian monk seal (*Monachus schauinslandi*) and humpback whale (*Megaptera noveangliae*) are the most likely marine mammals to be observed within 12 nm of the PMRF coastline. The endangered Hawaiian monk seal is an indigenous mammal that has been observed at PMRF. The primary occurrence of Hawaiian monk seals within the region of influence is expected to be in a continuous band between Nihoa, Kaula, Niihau, and Kauai. This band extends from the shore to around 273 fathoms (1,638 feet) and is based on the large number of sightings and births recorded in this area (Westlake and Gilmartin, 1990; Ragen and Finn, 1996; Marine Mammal Commission, 2003; Baker and Johanos, 2004). The closest observed Hawaiian monk seal haul out area is approximately 1 mile south of Launch Pad 42. At Pad 42 Hawaiian monk seals nearby on the beach are unlikely based on historic observations and the condition of the surf zone with sharp limestone outcroppings. (Burger, 2011)

Humpback Whale

The humpback whale peak abundance around the Hawaiian Islands is from late February through early April (Mobley et al., 2001; Carretta et al., 2005). During the fall-winter period, primary occurrence is expected from the coast to 50 nm offshore, including the areas off PMRF.

Environmentally Sensitive Habitat

Wetlands

Wetlands are associated with (1) the Mana base pond located outside the industrial area of the facility boundaries; (2) Kawaiele wildlife sanctuaries that include a State Waterbird Refuge for Hawaii's four endangered waterbird species, created at Mana during a sand removal program; and (3) agricultural drains from the Nohili and Kawaiele ditches within PMRF (National Wetlands Inventory, 2007). The freshwater discharge at Nohili Ditch appears to be at least partially responsible for the preferred turtle foraging habitat since it stimulates filamentous algae growth on the nearshore reef bench (Commander, Navy Region Hawaii, 2007).

Two marine system, subtidal subsystem, reef class, coral subclass, subtidal wetlands exist along part of the coastline west of KTF (Pacific Missile Range Facility, 2001).

Critical Habitat

A proposed rule to designate critical habitat for 76 listed plant species on the islands of Kauai and Niihau published in November 2000 (U.S. Fish and Wildlife Service, 2000) included land in the northwestern end of PMRF near Polihale Park as critical habitat for the endangered ohai and lau`ehu. In January 2002, the USFWS proposed critical habitat for additional plant species on Kauai and Niihau, revising the total number of plants to 83, which included additional land in the southern portion of PMRF for protection of lau`ehu. (U.S. Fish and Wildlife Service, Pacific Region, 2002; U.S. Fish and Wildlife Service, 2002) The USFWS reevaluated the dune habitat on PMRF and determined that these lands were not essential for the conservation of ohai. Although lau`ehu does not grow on PMRF/Main Base, the USFWS has determined that land on PMRF adjacent to Polihale State Park and dune areas along the southern portion of the range contain primary constituents necessary for the recovery of lau`ehu because not enough areas exist outside of PMRF (Figure 3.1.3-1). The USFWS designated these areas as unoccupied critical habitat because there are not enough other areas outside the base that contain the elements to achieve the USFWS's goal of 8 to 10 populations. (U.S. Fish and Wildlife Service, 2003)

Coastal Zone Management

All Federal development projects in a coastal zone and all Federal activities which directly affect a coastal zone must be consistent to the maximum extent practicable with the Coastal Zone Management Program as authorized by the Coastal Zone Management Act of 1972. The entire State of Hawaii is included in Hawaii's Coastal Program and Coastal Zone. Federally owned, leased, or controlled facilities and areas are excluded from the State's Coastal Zone Management Plan, and are thus outside of the Coastal Zone. The Proposed Action requires a determination evaluating the consistence of the PMRF activities with the policies of the Hawaii Coastal Act. The proposed activities are incremental increases in activities that already occur at PMRF and which were previously found to be consistent to the maximum extent possible with the Hawaii Coastal Act in the 1998 PMRF Enhanced Capability Final EIS (U.S. Department of the Navy, 1998).

EXPLANATION

- Road
- Land
- Critical Habitat
- Wetland Area
- Kauai Test Facility
- Installation Area

NORTH 0 0.5 1 2 Miles

Critical Habitat - Western Kauai, Hawaii

Kauai, Hawaii

Figure 3.1.3-1

In December 2007 the Kauai County Council passed a science-based shoreline setback ordinance. The law mandates a 40-foot minimum setback plus 70 times the annual coastal erosion rate as recommended in the Hawaii Coastal Hazard Mitigation Guidebook. The law preserves beaches and protects property owner's coastal assets. (The Garden Island, 2007, Hawaii Revised Statutes, 2007) Federally owned, leased, or controlled facilities are not subject to such requirements, but the Navy will remain consistent to the maximum extent possible or practicable.

3.1.4 HAZARDOUS MATERIALS AND WASTE—KAUAI TEST FACILITY

In general, hazardous materials and wastes are defined as those substances that, because of their quantity, concentration, or physical, chemical, or infectious characteristics, would present substantial danger to public health and welfare or to the environment when released into the environment.

As defined by the Department of Transportation, a hazardous material is a 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 by the USEPA as any solid waste not specifically excluded in 40CFR261.2 of the Resource Conservation and Recovery Act regulations, which meets specified concentrations of chemical constituents or has certain toxicity, ignitability, corrosivity, or reactivity characteristics.

Region of Influence

The region of influence for hazardous materials and hazardous waste would be limited to areas of PMRF, including KTF, to be used for launch preparation, launch, and post-launch activities and in areas where hazardous materials are stored and handled.

Affected Environment

Hazardous Materials

PMRF manages hazardous materials through the Navy's Consolidated Hazardous Materials Reutilization and Inventory Management Program (CHRIMP). CHRIMP mandates procedures to control, track, and reduce the variety and quantities of hazardous materials in use at facilities. The CHRIMP concept established Hazardous Materials Minimization Centers as the inventory controllers for Navy facilities. All departments, tenant commands, and work centers must order hazardous materials from the Hazardous Materials Minimization Centers, where all such transactions are recorded and tracked. The exception to this is KTF, which obtains its hazardous materials through Department of Energy channels. Hazardous materials on PMRF are managed by the operations and maintenance contractor through CHRIMP. Hazardous materials managed through the CHRIMP program other than fuels are stored in Building 338. Typical materials used on PMRF/Main Base and stored at Building 338 include cleaning agents, solvents, and lubricating oils.

PMRF has management plans for oil and hazardous materials outlined in the *PMRF Spill Prevention Control and Countermeasures Plan* and the *Installation Spill Contingency Plan.* These plans regulate both PMRF/Main Base as well associated sites and tenant organizations, including KTF.

PMRF has developed programs to comply with the requirements of the Superfund Amendments and Reauthorization Act Title III and Emergency Planning and Community Right-to-Know Act. This effort has included submission to the State and local emergency planning committees of annual Tier II forms, which are an updated inventory of chemicals or extremely hazardous substances in excess of threshold limits. These chemicals at PMRF include jet fuel, diesel fuel, propane, gasoline, aqueous fire fighting foam, chlorine, used oil, paint/oils, and paint.

Hazardous Waste

PMRF/Main Base is a large-quantity hazardous waste generator with a USEPA identification number. Hazardous waste on PMRF is not stored beyond the 90-day collection period. PMRF/Main Base has two storage areas on base for hazardous wastes: Building 392 and Building 419. Building 392 stores all base waste except for OTTO (torpedo) fuel, a liquid monopropellant. Building 419 is the torpedo repair shop. At present, both buildings are not used at their maximum hazardous waste storage capacity.

KTF is a small-quantity hazardous waste generator and has a USEPA identification number. There is one hazardous waste storage area on KTF.

PMRF outlines management and disposal procedures for used oils and fuels in the Hazardous Waste Management Plan. PMRF maintains a Used Oil transporter/Processor Permit through the Hawaii Department of Health. Additionally, degraded jet fuel is used in crash-fire training events. The majority of wastes are collected and containerized at PMRF/Main Base for direct offsite disposal through the Defense Reutilization and Marketing Office (DRMO) at Pearl Harbor within 90 days. The DRMO provides for the transportation and disposal of the wastes to the final disposal facility.

Pollution Prevention/Recycling/Waste Minimization

PMRF has a pollution prevention plan in place for the Main Base and all sites on Kauai, which follows CHRIMP procedures for controlling, tracking, and reducing hazardous materials use and waste generation. PMRF/Main Base currently has three hazardous waste elimination programs in place. These involve recycling toner cartridges, mercury from mercury lamps, and acid/lead batteries.

Installation Restoration Program

KTF has no Environmental Restoration sites. Three Environmental Restoration sites were identified in 1995 and were given a No Further Action determination by USEPA in 1996 (Sandia National Laboratories, 2006).

Underground and Aboveground Storage Tanks

There is one underground storage tank and one 10,000-gal aboveground fuel tank at KTF. KTF complies with PMRF's management plans for oil and hazardous materials outlined in the *PMRF Spill Prevention Control and Countermeasures Plan* and the *Installation Spill Contingency Plan.* (Sandia National Laboratories, 2006)

Asbestos, Lead-Based Paint, and Polychlorinated Biphenyls

PMRF manages asbestos in accordance with the base asbestos management plan. Prior to any construction projects, areas to be disturbed are surveyed for asbestos, and any asbestos is removed, before disturbance, by a certified asbestos contractor. The handling of hazardous materials and the potential generation and disposal of hazardous wastes follow ongoing, standard, and applicable regulations and procedures at PMRF.

All facilities associated with PMRF follow its lead-based paint management plan. The exception is KTF, which follows Department of Energy plans for the removal of lead-based paint wastes. The transformers on the KTF site have been tested and are free of polychlorinated biphenyls, and there are no asbestos issues at the site (Sandia National Laboratories, 2006).

Liquid Fuels and Other Toxic Fuels

PMRF uses gasoline and diesel fuels to power range trucks and equipment. Aircraft at PMRF use jet fuel and Jet-A. Jet-A is available at the fuel farm near the airfield. Both aircraft fuels are delivered to the flight line in refuelers.

3.1.5 HEALTH AND SAFETY—KAUAI TEST FACILITY

Health and safety includes consideration of any activities, occurrences, or operations that have the potential to affect one or more of the following:

The well-being, safety, or 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, or 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.

Region of Influence

The region of influence for potential impacts related to the health and safety of workers includes work areas associated with AHW/HGB launch operations. The population of concern includes the workers employed at PMRF, including KTF, but also other personnel directly involved with range operation and training activities currently occurring at PMRF/KTF.

The region of influence for potential impact related to public health and safety also includes the areas of Kauai County adjacent to KTF that could be affected by the proposed launch. These areas include the PMRF overwater training areas. The population of concern consists of visitors to Kauai and permanent residents living in Kauai County.

Affected Environment

PMRF takes every reasonable precaution during the planning and execution of the range operations training and test activities to prevent injury to human life or property. In addition to explosive, physical impact, and electromagnetic hazards, potential hazards from chemical

contamination, ionizing and non-ionizing radiation, radioactive materials, and lasers are studied by PMRF Range Safety Office to determine safety restrictions.

KTF

KTF is a launch facility operated by Sandia National Laboratories for the Department of Energy on PMRF/Main Base through Inter-Service Support Agreements (U.S. Department of the Navy, 1998). KTF notifies PMRF Operations, Security, Fire Department, and Ordnance/Explosive Disposal as required prior to launch and other hazardous operations. (Sandia National Laboratories, 2006)

All hazardous operations at KTF are performed under strict adherence to existing SOPs. A site SOP provides general requirements and guidance for all range operations at KTF, including ordnance safety, pre-launch and hazardous operations control, ordnance handling and storage facilities, liquid fuels storage and handling, and launch pad operations.

KTF rocket motors and other ordnance components are stored in explosive storage magazines by PMRF, except when needed by KTF for processing, assembly, and launch. The movement of explosives and other hazardous materials between PMRF and KTF is conducted in accordance with PMRF procedures and DoD Explosives Safety Standards.

PMRF provides fire protection and fire fighting services to KTF, and enforces base safety regulations and programs on KTF.

Range Safety

Range Safety at PMRF is controlled by Range Control, which is responsible for hazard area surveillance and clearance and control of all PMRF operational areas. Range Control maintains real time surveillance, clearance, and safety at all PMRF areas including KTF. PMRF sets requirements for minimally acceptable risk criteria to occupational and non-occupational personnel, test facilities, and non-military assets during range operations. For all range operations at PMRF, the Range Control Officer requires a safety plan. A Range Safety Operation Plan is generated by PMRF Range Safety personnel prior to range operations.

The PMRF Range Safety Office is responsible for establishing Ground Hazard Areas and Launch Hazard Areas over water beyond which no debris from early flight termination is expected to fall. The Ground and Launch Hazard Areas for missile launches are determined by size and flight characteristics of the missile, as well as individual flight profiles of each flight test. Data processed by ground-based or onboard missile computer systems may be used to recognize malfunctions and terminate missile flight. Before a launch is allowed to proceed, the range is determined cleared using input from ship sensors, visual surveillance from aircraft and range safety boats, radar data, and acoustic information.

All range users must: (1) provide a list of project materials, items, or test conditions that could present hazards to personnel or material through toxicity, combustion, blast, acoustics, fragmentation, electromagnetic radiation (EMR), radioactivity, ionization, or other means; (2) describe radiation, toxic, explosive, or ionization problems that could accumulate as a result of their tests; (3) provide aerodynamic and flight control information, and destruct system information and parameters; (4) submit plans, specifications, and procedural or functional steps

for events and activities involving explosives to conform to criteria in the PMRF instruction; and (5) provide complete operational specifications of any laser to be used and a detailed description of its planned use. (U.S. Department of the Navy, 1998; 2008)

Missile Flight Analysis

PMRF conducts missile flight safety in accordance with Naval Air Warfare Center Weapons Division Instruction. Missile flight safety includes analysis of missile performance capabilities and limitations, of hazards inherent in missile operations and destruct systems, and of the electronic characteristics of missiles and instrumentation. It also includes computation and review of missile trajectories, launch azimuths, kinetic energy intercept debris impact areas, and hazard area dimensions, review and approval of destruct systems proposals, and preparation of the Range Safety Operation Plan required of all programs at PMRF. These plans are prepared by the PMRF Safety Office for each mission and must be approved by the Commanding Office prior to any launch. Launch is only allowed when the risk levels are less than the acceptable risk criteria in PMRF Instruction 8020.16, which are equivalent to the criteria developed by the Range Commanders Council (RCC) (e.g., RCC 321).

Ground Safety

The Range Control Officer using PMRF assets is solely responsible for determining range status and setting RED (no firing – unsafe condition due to a fouled firing area) and GREEN (range is clear and support units are ready to begin the event) range firing conditions. The Range Safety Approval and the Range Safety Operation Plan documents are required for all weapons systems using PMRF (U.S. Department of the Navy, 1998). PMRF uses RCC 321, *Common Risk Criteria for National Test Ranges*. RCC 321 sets requirements for minimally-acceptable risk criteria to occupational and non-occupational personnel, test facilities, and non-military assets during range operations. Under RCC 321, the general public shall not be exposed to a probability of casualty greater than 1 in 10 million for each individual during any single mission and a total expectation of casualty must be less than 30 in 1 million. (Range Commanders Council, Range Safety Group, 2002)

To ensure the protection of all persons and property, Standard Operating Procedures (SOPs) have been established and implemented for the Ground Hazard Areas. These SOPs include establishing road control points and clearing the area using vehicles and helicopters (if necessary). Road control points are established 3 hours prior to launches. This allows security forces to monitor traffic that passes through the Ground Hazard Areas. At 20 minutes before a launch, the Ground Hazard Area is cleared of the public to ensure that, in the unlikely event of early flight termination, no injuries or damage to persons or property would occur. After the Range Safety Officer declares the area safe, the security force gives the all-clear signal, and the public is allowed to reenter the area. (U.S. Department of the Navy, 1998) No inhabited structures are located within the off-base sections of the Ground Hazard Area. The potential for launch-associated hazards are further minimized through the use of the PMRF Missile Accident Emergency Team. This team is assembled for all launches from PMRF facilities and on-call for all PMRF launches in accordance with PMRF Instruction 5100.1F.

Ordnance Management and Safety

Ordnance safety includes procedures to prevent premature, unintentional, or unauthorized detonation of ordnance. Any program using a new type of ordnance device for which proven safety procedures have not been established requires an Explosive Safety Approval before the

ordnance is allowed on PMRF or used on a test range. This approval involves a detailed analysis of the explosives and of the proposed test activities, procedures, and facilities for surveillance and control, an adequacy analysis of movement and control procedures, and a design review of the facilities where the ordnance items will be handled.

Ordnance management procedures are found in PMRFINST 8020.5, *Explosive Safety Criteria for Range Users Ordnance Operation*s. The Range Control Branch of the Range Programs Division is responsible for: (1) providing detailed analysis of all proposals concerning missiles or explosives and their proposed operation on the range; (2) establishing procedures for surveillance and control of traffic within and entering hazard areas; (3) reviewing the design of facilities in which ordnance items are to be handled to ensure that safety protection meets the requirements of Naval Sea System Command Publication (NAVSEAOP) -5, *Ammunition and Explosives Ashore; Safety Regulations for Handling, Storing, Production, Renovation, and Shippin*g, Chapter 4; (4) training, certifying, and providing Launch Control Officers, Safety Monitors, and Ordnance personnel for activities involving explosive ordnance; (5) assuming responsibility for the control of all emergency facilities, equipment, and personnel required in the event of a hazardous situation from a missile inadvertently impacting on a land area; (6) providing positive control of the ordering, receipt, issue, transport, and storage of all ordnance items; and (7) ensuring that only properly certified handling personnel are employed in any handling of ordnance.

Ordnance is either delivered to PMRF/Main Base by aircraft to the on-base airfield or by ship to Nawiliwili Harbor, and then over land by truck transport along Highway 50 to the base. The barges carrying explosives are met at Nawiliwili Harbor by trained ordnance personnel and special vehicles for transit to and delivery at PMRF/Main Base. All ordnance is transported in accordance with U.S. Department of Transportation regulations. The Strategic Target System is stored in a specially constructed facility on KTF. No mishaps involving the use or handling of ordnance have occurred at PMRF.

PMRF/Main Base has defined explosive safety-quantity distance (ESQD) arcs. The arcs are generated by launch pads, the Kamokala Magazine ordnance storage area, the Interim Ordnance Handling Pad, and the Missile Assembly/Test Buildings 573, 590, and 685. Only the ESQD arcs generated by the Interim Ordnance Handling Pad and Building 573 are covered by a waiver or exemption. The Sandia Launcher site and Missile Assembly Buildings (647 and 685) can accommodate a 1,250-foot ESQD arc.

Ocean Area Clearance

Range Safety officials manage operational safety for projectiles, targets, missiles, and other hazardous activities into PMRF operational areas. The operational areas consist of two Warning Areas (W-186 and W-188) and one Restricted Area (R-3101) under the local control of PMRF. The Warning Areas are in international waters and are not restricted; however, the surface area of the Warning Areas is listed as “HOT” (actively in use) 24 hours a day. PMRF publishes dedicated warning NOTMARs and NOTAMs 1 week before hazardous operations. In addition, a 24-hour recorded message is updated on the hotline daily by Range Operations to inform the public when and where hazardous operations will take place.

Prior to a hazardous operation proceeding, the range is determined to be cleared using inputs from ship sensors, visual surveillance of the range from aircraft and range safety boats, radar

data, and acoustic information from a comprehensive system of sensors and surveillance from shore.

Transportation Safety

PMRF transports ordnance by truck from Nawiliwili Harbor to PMRF along Highway 50. The barges carrying explosives are met at Nawiliwili Harbor by trained ordnance personnel and special vehicles for transit to and delivery at PMRF. All ordnance is transported in accordance with U.S. Department of Transportation regulations. PMRF has established PMRFINST 8023.G, which covers the handling and transportation of ammunition, explosives, and hazardous materials on the facility.

In addition, liquid fuels (e.g., nitrogen tetroxide and unsymmetrical dimethylhydrazine) are transported to KTF. These fuels can be shipped to the site by truck, aircraft or barge, which do not affect transportation routes on the island of Kauai. Transportation of these materials is conducted in accordance with U.S. Department of Transportation regulations and specific safety procedures developed for the location.

Range Control and the FAA are in direct communication in real time to ensure the safety of all aircraft using the airways and the Warning Areas. Within the Special Use Airspace, military activities in Warning Areas W-186 and W-188 are under PMRF control. Warning Areas W-189, W-187, and W-190 are scheduled through the Fleet Area Control and Surveillance Facility.

Because the Warning Areas are located in international airspace, the procedures of the ICAO are followed. The FAA acts as the U.S. agent for aeronautical information to the ICAO, and air traffic in the region of influence is managed by the Honolulu Control Facility and Oakland ARTCC.

Fire and Crash Safety

The Navy has developed standards that dictate the amount of fire/crash equipment and staffing that must be present based on the number and types of aircraft stationed on base, and the types and total square footage of base structures and housing. PMRF Crash/Fire is located in the base of the Air Traffic Control Tower, Building 300. Personnel are trained to respond to activities such as aircraft fire fighting and rescue in support of airfield operations, hazardous material incidents, confined space rescue, and hypergolic fuel releases, plus structure and brush fire fighting, fire prevention instruction, and fire inspections.

Ambulance and Class II Emergency Medical Technician services are provided by Emergency Medical Technicians assigned to Crash/Fire. These contractor-operated services are available to military, civil service, and non-government personnel at PMRF, 24 hours a day, 7 days a week. More extensive emergency medical services are available from the West Kauai Medical Center in Waimea, 10 miles from the Main Gate at Barking Sands.

3.1.6 NOISE—KAUAI TEST FACILITY

Region of Influence

The region of influence for noise analysis is the area within and surrounding PMRF/Main Base in which humans and wildlife may suffer annoyance or disturbance from noise sources at KTF. This would include areas on PMRF, KTF, and the city of Kekaha.

Affected Environment

Primary sources of noise on PMRF/Main Base include airfield and range operations and missile, rocket, and drone launches. Airfield operations include take-offs and landings of high-performance and cargo/passenger aircraft, as well as helicopter operations. Range operations include training and research and development activities support. Ambient noise levels from natural sources include wind, surf, and birds.

Noise generated at the PMRF airfield stem from one active runway, four helicopter operating spots, and maintenance operations. Noise levels produced by airfield operations tend to have a continuous impact on PMRF/Main Base. Existing noise levels near the runway may average as high as 75 A-weighted decibels (dBA). Buildings in this area are insulated to achieve a noise reduction of up to 35 dBA. Noise levels farther away from the runway are more characteristic of a commercial park, with levels not exceeding 65 dBA. Airfield noise zones have been established to safeguard the public and all station personnel from the effects of noise from air operations. The *Final Noise and Accident Potential Zone Study for the Pacific Missile Range Facility Barking Sands* determined that noise levels around the airfield are low due to the relatively few annual air operations, 13,395 for 2004. The noise study determined that 1 acre of land was affected by 75-decibel (dB) noise levels and that no housing units or populations are impacted. (U.S. Department of the Navy, Engineering Field Activity Chesapeake, 2006)

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 missiles, rockets, and drones. These launches result in high-intensity, short-duration sound events. Typical launches at PMRF/Main Base (including KTF launch sites) include the Strategic Target System, Terminal High Altitude Area Defense, and Strypi missile launches and have resulted in no public noise complaints. Table 3.1.6-1 lists the noise levels monitored for previous Strategic Target System launches at PMRF/Main Base.

Table 3.1.6-1. Noise Levels Monitored for Strategic Target System Launches at PMRF/Main Base

Launch Vehicle	Distance (feet)	Measured Average Peak (decibel)
Strategic Target System	575	125.3
	800	123.0
	881	121.8
	1,222	118.2
	1,584	115.3
	10,000 (approx. 2 miles)	97.1
	35,000 (approx 6.5 miles)	54.0

Source: U.S. Army Strategic Defense Command, 1992

The nearest on-base housing area is located approximately 5 miles south of the northern KTF and PMRF launch areas. The nearest off-base residential area is Kekaha, which is approximately 8 miles south of the northern KTF and PMRF launch areas.

KTF supports a variety of sounding rocket missions; therefore, occasional rocket, missile, or drone launches produce high-intensity, short-duration sound events. Data collected in the nearest town of Kekaha indicated that levels were no louder than noise generated from passing vehicles on a nearby highway. No noise-sensitive land uses are affected by existing noise levels. (Sandia National Laboratories, 2006)

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 uprange boundary of the sonic boom carpet forms a parabola pointing downrange. Most of the region subjected to any sonic boom from launches at PMRF is the surface of the ocean. Thus, land based population centers are not affected. Under suitable atmospheric conditions and depending on the trajectory of the missile, low level sonic booms may reach the northern portion of Niihau, as is the case for current operations from PMRF. (ACTA, 2009)

Noise impacts on wildlife receptors at the KTF and PMRF/Main Base area are discussed in the Biological Resources section.

3.1.7 WATER RESOURCES—KAUAI TEST FACILITY

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 PMRF/Main Base includes the area within and surrounding the PMRF property boundaries, including KTF and the restrictive easement. The Mana Plain and the Ground Hazard Area are also included.

Affected Environment

Surface Water

The surface water within the PMRF boundary is in the canals that drain the agricultural areas east of PMRF. Apart from these drainages, no surface drainage has been established because the rain sinks into the permeable sand. There are numerous drains and several irrigation ponds in the agricultural land.

The waters in the irrigation ponds generally do not meet drinking water standards for chloride salts, but have near neutral to slightly alkaline pH. A surface water quality study for chloride was conducted in the Mana Plain/KTF area. The chloride levels do not indicate residual hydrochloric acid effects of the past launches at KTF (U.S. Army Program Executive Office, 1995). Because the drainage ditches are designed to move water away from the agricultural fields during irrigation and rainfall, and to leach salts from the soil, no residual effects of past launches are expected. (U.S. Army Program Executive Office, 1995)

Surface water in the area of the restrictive easement on the Mana Plain is restricted to drains and agricultural irrigation ponds. Within the restrictive easement boundary, the surface water and storm water runoff drain onto Amfac Sugar-Kauai lands and agricultural ponds below the Mana cliffs. The Mana Plain is drained by canals that flow seaward. Typically, the water from the canals that drain from the sugar cane fields is brackish. (U.S. Army Space and Strategic Defense Command, 1993b)

The waters in the agricultural ponds along the Mana cliffs generally do not meet drinking water standards for chloride salts but are near neutral to slightly alkaline. The highest chloride salt levels, near those of seawater, were observed in water from the Mana Pond Wildlife Sanctuary near the north gate of PMRF. This may be due to the infiltration of brackish to saline groundwater into the pond basin or excessive evaporation to a low surface level. (U.S. Army Space and Strategic Defense Command, 1993b)

Water quality along the PMRF shoreline was within Department of Health standards, with the exception of two locations where sugar cane irrigation water, pumped from the sugar cane fields, is discharged to the ocean (Belt Collins Hawaii, 1994). In these areas, Department of Health water quality criteria are exceeded within 164 feet of the shoreline. Mixing processes are sufficient to dilute the drainage water to near background levels within 164 to 328 feet of the shoreline (Belt Collins Hawaii, 1994). These outfall locations are currently monitored under a National Pollutant Discharge Elimination System Permit that is held by the Agribusiness Development Co-Operative (Burger, 2010a).

Groundwater

Bedrock, alluvium, and sand dunes make up hydraulically connected aquifers within the region of influence. The bedrock (basement volcanics, primarily basalt) is highly permeable, containing

brackish water that floats on seawater. (U.S. Army Space and Strategic Defense Command, 1993b)

The overlying sediments are saturated, but they are not exploitable as an aquifer because of unfavorable hydraulic characteristics. The groundwater in the sediments originates as seepage from irrigation percolation and rainfall in the basalt aquifer, especially where the sediments are thin near the inland margin of the Mana Plain.

The dune sand aquifer on which PMRF/Main Base lies has a moderate hydraulic conductivity and moderate porosity of about 20 percent. It consists of a lens of brackish groundwater that floats on seawater and is recharged by rainfall and by seepage from the underlying sediments. The only record of an attempt to exploit this groundwater is of a well drilled for the Navy in 1974, 4 to 5 miles south of KTF. The well was drilled to a depth of 42 feet, and tested at 300 gallons per minute. In 1992, the water was too brackish for plants and animals to consume; consequently, the well is not used. (U.S. Army Program Executive Office, 1995)

The nearest fresh groundwater sources are in the Napali formation at the inland edge of the coastal plain along the base of the Mana cliffs. Groundwater in the region is generally considered to be potable at the base of the cliffs, increasing in salinity closer to the coast. (U.S. Army Space and Strategic Defense Command, 1993b)

Sampling for perchlorate was initiated at PMRF in 2006. USEPA adopted an oral reference dose for perchlorate in 2009, following a National Academy of Sciences recommendation that it not exceed 15 parts per billion in drinking water. Until USEPA promulgates standards for perchlorate, the DoD has established 15 parts per billion as the current level of concern for managing perchlorate (Office of the Under Secretary of Defense, 2009). This level has also been adopted in the Navy Perchlorate Sampling and Management Policy.

As part of the implementation of the Navy policy, perchlorate sampling has been conducted at two drinking water supply locations. One location is the “Mana well,” which is the former Kekaha Sugar/AMFAC well from which PMRF obtains drinking water, referenced as “BS 335,” and supplies the “north end” of PMRF. It is a hand-dug well, now concrete-lined, approximately 90 feet deep, and is located at the base of the ridge near the Kamokala Caves. The pumps and electric motors are down in the well. The other location is the water tank at the southern end of the base identified as reference code “BS 820.” Water in the tank comes from the County of Kauai. Perchlorate concentrations at both sites were less than the initial screening level of 4.0 parts per billion. Based on guidance PMRF received from Navy Region Hawaii, since the two consecutive samples were less than 4 parts per billion, no further analysis was required.

Flood Hazard Areas

The primary flood hazard is from overflow of the ditches that drain the Mana Plain. Extended periods of heavy rainfall have resulted in minor flooding of low-lying areas of PMRF/Main Base. In addition, most of PMRF/Main Base is within the tsunami evacuation area.

3.2 U.S. ARMY KWAJALEIN ATOLL

Rationale for Environmental Resources Analyzed

The proposed AHW program activities at USAKA/RTS within the Marshall Islands could impact airspace, biological resources, cultural resources, hazardous materials and waste, health and safety, and noise; as such, only these environmental resource topics are discussed. Much of the information presented in this section was drawn from the Affected Environment chapter of the PMRF Intercept Test Support EA, CSM Demonstration EA, and the Hypersonic Technology Vehicle 2 EA (Pacific Missile Range Facility, 2010; U.S. Department of the Air Force, 2010; and Defense Advanced Research Projects Agency, 2009, respectively). Pertinent new information was included where applicable to account for changes in the affected environment or the availability of updated data.

Some resource topics were not analyzed further at USAKA/RTS because: (1) the AHW/HGB would not emit hazardous components such as uranium at reentry, thus no impacts to air resources would be expected; (2) there would be little increase in personnel on base, thus no socioeconomic concerns are anticipated; (3) the proposed launches represent activities that are consistent with the mission and well within the limits of current operations of USAKA/RTS. As a result, there would be no adverse effects on land use, utilities, or transportation; and (4) Illeginni has no surface or groundwater.

3.2.1 AIRSPACE—U.S. ARMY KWAJALEIN ATOLL

Region of Influence

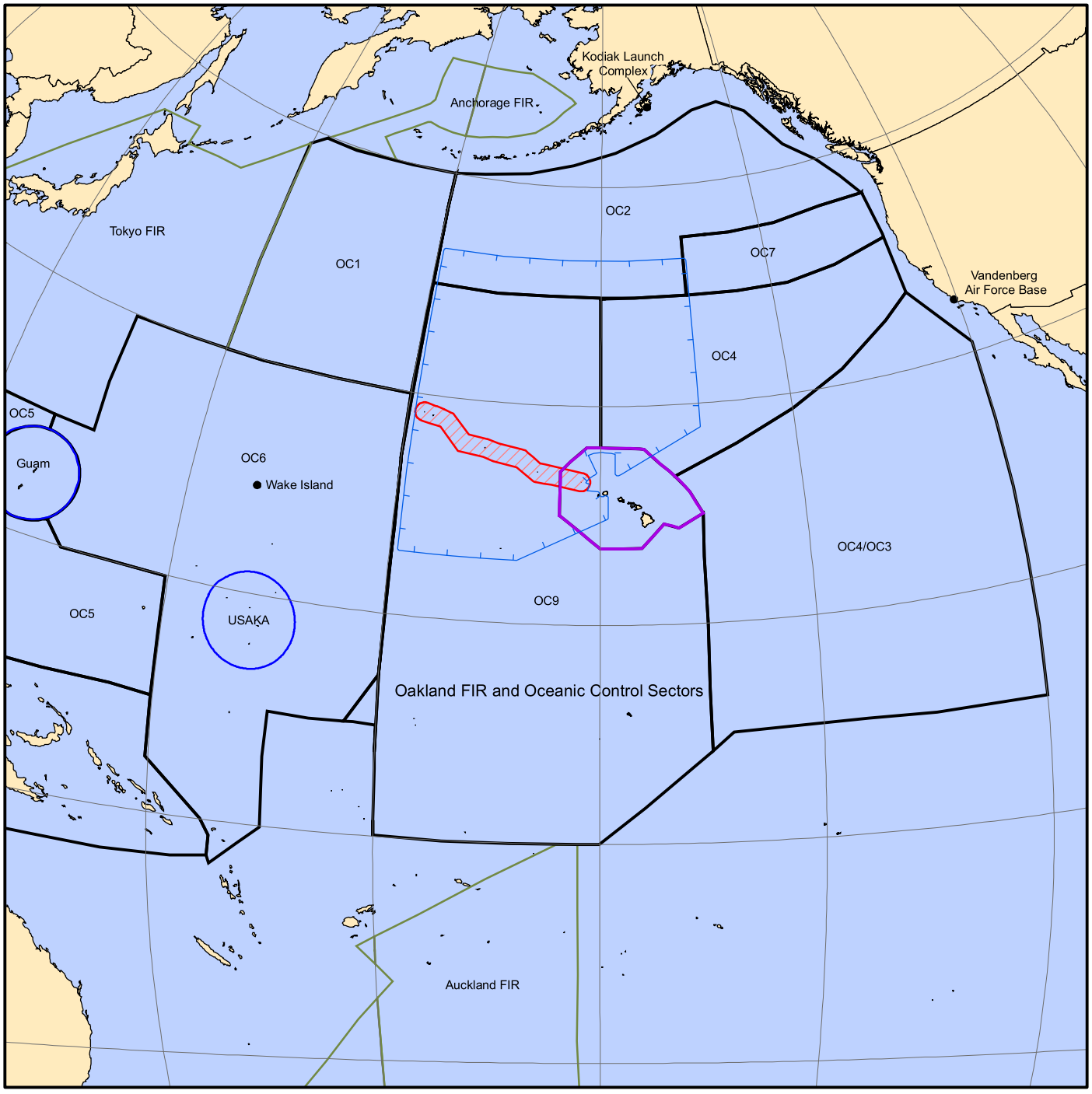
The region of influence for airspace at USAKA/RTS includes the airspace over and surrounding the debris containment corridor, potential regional radiation hazard areas, and airspace over and surrounding Kwajalein and Illeginni.

Affected Environment

Controlled and Uncontrolled Airspace

USAKA/RTS is located in international airspace. It is also considered within Class C airspace. The ceiling of Class C airspace is 4,000 ft above ground level. The dimensions of the airspace are contained within two circular areas, the first 5 nm from the center of the airfield and the second 10 nm. 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 U.S. agent for aeronautical information to the ICAO, and air traffic in the region of influence is managed by the Oakland ARTCC in its Oceanic Control-6 Sector, the boundaries of which are shown in Figure 3.2.1-1.



EXPLANATION

- Temporary Operating Area (TOA)
- Radar Control Area
- Oakland FIR and Oceanic Control (OC) Sector
- Flight Information Region (FIR)
- Honolulu Control Facility
- Papahānaumokuākea Marine National Monument
- Land

Note:
USAKA = U.S. Army Kwajalein Atoll
ARTCC = Air Route Traffic Control Center

NORTH 0 500 1,000 2,000 Nautical Miles

Airspace Managed by Oakland Air Route Traffic Control Center and Honolulu Control Facility

Pacific Ocean

Figure 3.2.1-1

Special Use Airspace

There is no special use airspace in the region of influence. USAKA/RTS 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, USAKA/RTS and vicinity have two jet routes above Kwajalein, R-584 and A-222 (Figure 3.2.1-2). An accounting of the number of flights using each jet route is not maintained.

Although not depicted on either the North Pacific Route Chart Southwest Area or Composite, there are low altitude, propeller driven aircraft carrying 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

Bucholz Army Airfield has had a reported maximum of 1,674 operations per month, an average of over 55 per day. Many of the 55 flights per day were aircraft and helicopter flights to other USAKA islands. In 2004, flight activity through Bucholz Army Airfield was about 25 flights per day (Sims, 2004). Bucholz Army Airfield has received over 3,000 flights in the past 12 months, which is relatively low density compared to most military airfields in the United States. The majority of these flights are daily intra-atoll fixed wing (Metroliners) and helicopters (UH-1) which are run directly by USAKA and their contractors. Commercial flights are much less frequent. Dyess Army Airfield on Roi-Namur provides service to a variety of aircraft and helicopters. (U.S. Army Kwajalein Atoll, 2009)

3.2.2 BIOLOGICAL RESOURCES—U.S. ARMY KWAJALEIN ATOLL

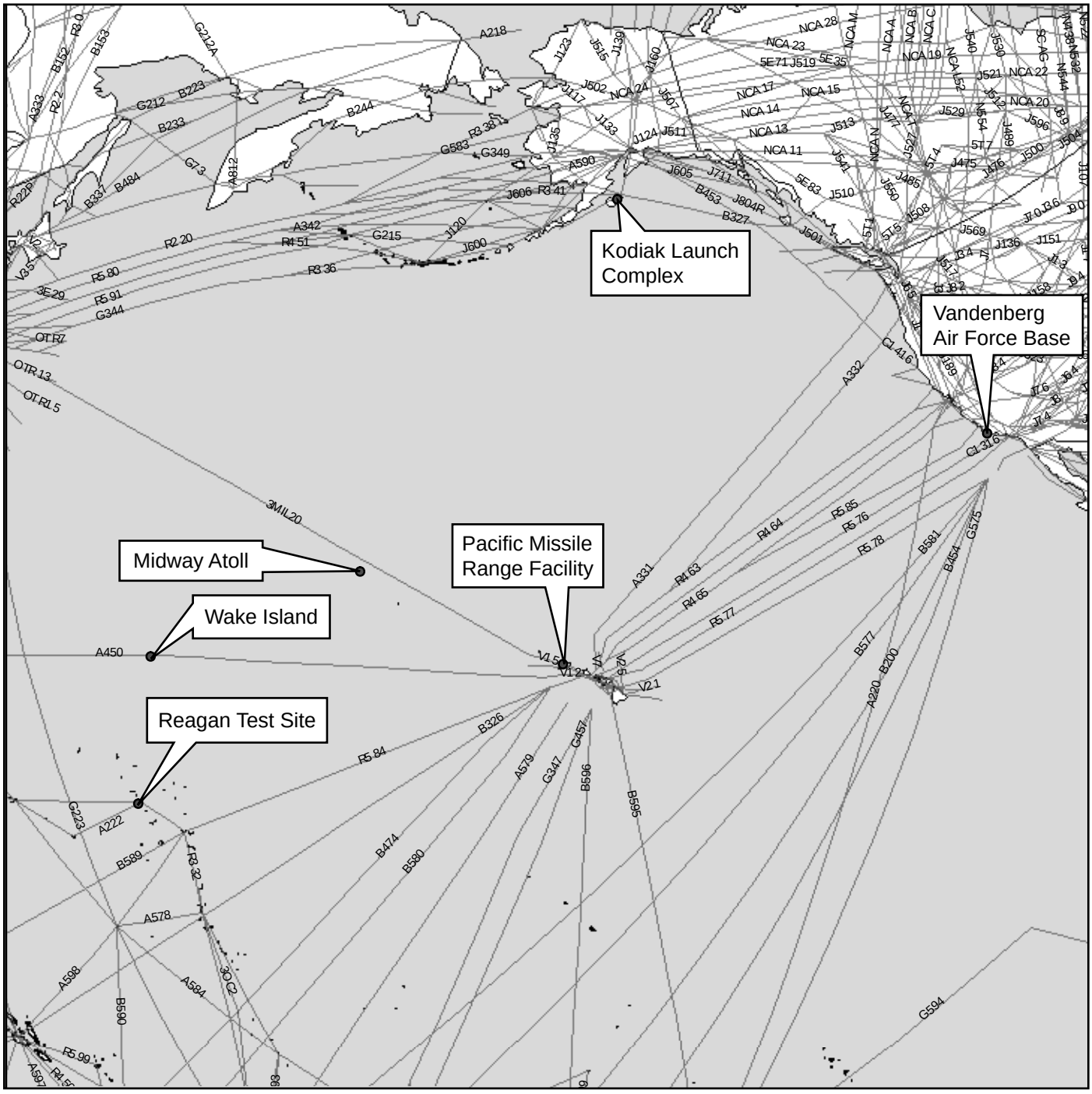
Region of Influence

The region of influence for biology includes the area on Illeginni Islet where the AHW/HGB could impact and the surrounding waters that may be affected by the proposed activities.

Affected Environment

The USAKA Environmental Standards (UES) provides protection for a wide variety of marine mammals, sea turtles, fish, coral species, migratory birds, and other terrestrial and marine species, listed in Section 3-4 of the UES (U.S. Army Space and Missile Defense Command/Army Forces Strategic Command, 2006; 2009). This protection applies to all of the following categories of biological resources occurring within the Marshall Islands, including RMI territorial waters:

- Any threatened or endangered species listed under the U.S. ESA (as amended)
- Any species proposed for designation, candidates for designation, or petitioned for designation to the endangered species list in accordance with the U.S. ESA (as amended)



EXPLANATION

High Altitude Jet Routes

High Altitude Jet Routes

NORTH

Pacific Ocean

Figure 3-2.1-2

- All species designated by the RMI under applicable RMI statutes, such as the RMI Endangered Species Act of 1975, Marine Mammal Protection Act of 1990, Marine Resources (*Trochus*) Act of 1983, and the Marine Resources Authority Act of 1989
- Marine mammals designated under the U.S. Marine Mammal Protection Act of 1972
- Bird species pursuant to the Migratory Bird Conservation Act
- Species protected by the Convention on International Trade in Endangered Species, or mutually agreed on by USAKA/RTS, USFWS, NMFS, and the RMI Government as being designated as protected species (U.S. Army Space and Missile Defense Command/Army Forces Strategic Command, 2006; 2009)

For purposes of this analysis, the region of influence focused on: (1) the RMI atolls, islands, and BOA that could be affected by the AHW/HGB sonic booms; and (2) the alternative impact sites for the AHW/HGB at USAKA/RTS (on Illeginni Islet and within the BOA). The following subsections describe biological resources for marine and terrestrial environments within the region of influence according to the environmental setting, important habitats, and the threatened, endangered, or other protected species that might be present.

Kwajalein Atoll

Kwajalein Atoll consists of 93 coral islands with a total land area of 6.3 square miles that enclose a large lagoon (Republic of the Marshall Islands Embassy to the United States, 2005). Lagoon depths are typically 120 to 180 feet, although numerous coral heads approach or break the surface (U.S. Air Force, 2004). While the larger islands have been almost completely altered by development and a variety of exotic species introduced, many of the smaller islets remain relatively undisturbed with native forest. Up to 36 species of migratory seabirds, shorebirds, and other birds have been reported on the atoll, and seabird nesting activity has been observed on many of the islands. Several threatened and endangered species of sea turtles are in the lagoon and ocean waters surrounding the atoll, and sea turtle nesting has occurred on several of the islands occurring at Kwajalein Atoll.

No designated essential fish habitat is identified at Kwajalein Atoll or elsewhere in the Marshall Islands; however, approximately 250 species of reef fish are found in the atolls. Because food cultivation on the islands is limited, fish and other sea life are important dietary sources for 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 (U.S. Air Force, 2004).

In accordance with requirements specified in the UES, USAKA/RTS must conduct a natural resource baseline survey every 2 years to identify and inventory protected or significant fish, wildlife, and habitat resources (U.S. Department of the Army Space and Missile Defense Command, 2006). In providing support to USAKA/RTS, USFWS and NMFS personnel normally conduct the biennial biological resource inventories at all islets leased from the RMI, which includes those areas on and adjacent to Illeginni Islet. These surveys were initiated in 1996 and continue to be conducted on a regular basis every 2 years. The last surveys were conducted in 2006 and in 2008. The descriptions of biological resources provided in the paragraphs that

follow are based these surveys conducted by the USFWS and NMFS and comments provided from the agencies on other regional programs.

Illeginni Islet

Illeginni islet is one of 11 islets within Kwajalein Atoll leased to the United States for USAKA/RTS operations. Illeginni Islet 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 Islet also has terrestrial and marine habitats of significant biological importance, as defined in the UES and shown on Figure 3.2.2-1. Islet vegetation is managed on much of the western end of the islet and around buildings/facilities. Native vegetation present on the islet consists of one patch of herbaceous strand and three patches of littoral (near shore) forest areas made up primarily of *Pisonia*, *Intsia*, *Tournefortia*, and *Quettarda* trees. Some littoral shrub land can also be found mostly on the western end of the islet (U.S. Department of the Army Space and Missile Defense Command, 2006; U.S. Army Space and Strategic Defense Command, 1993a).

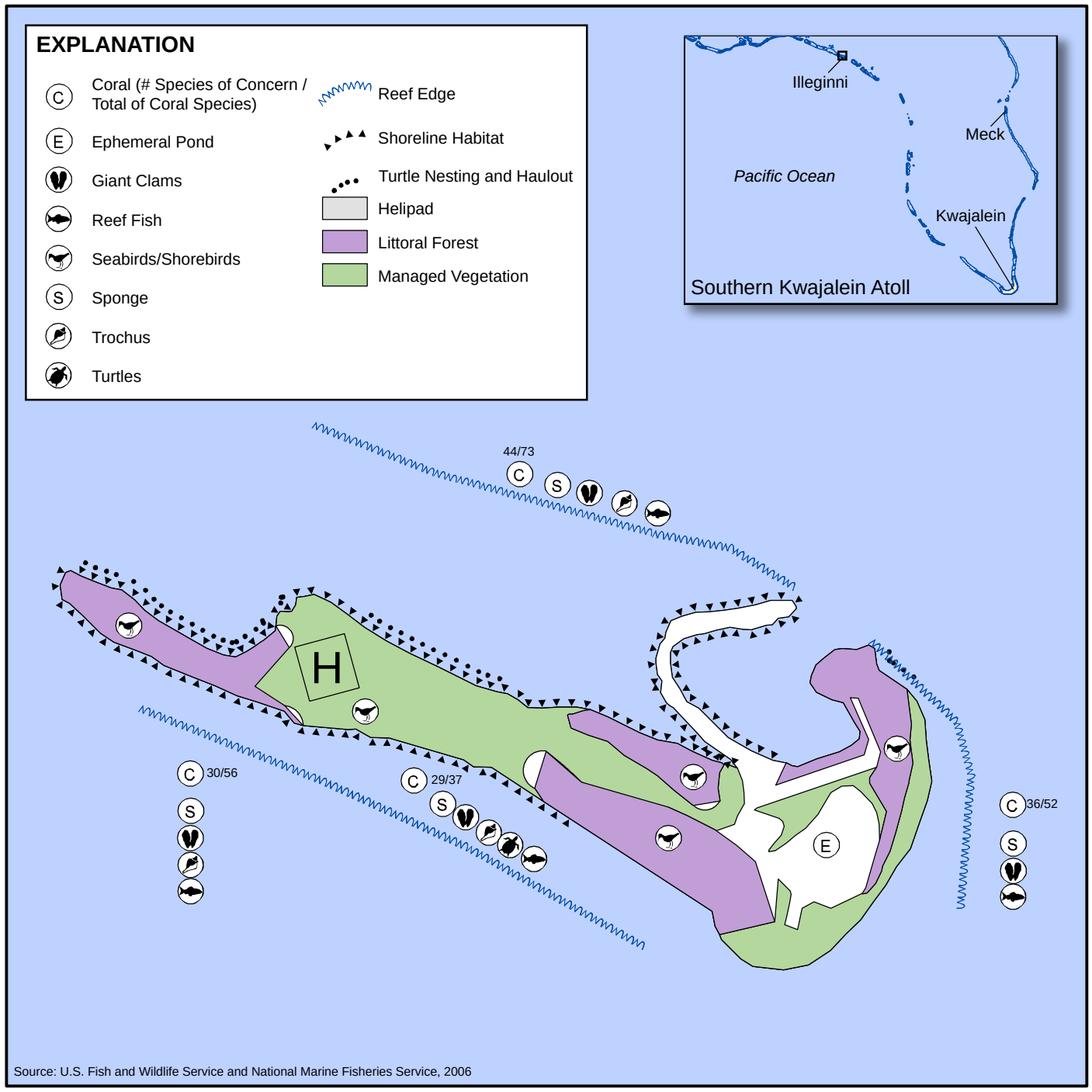
The marine environment surrounding Illeginni supports a diverse community of corals, fish, and invertebrates, including the following protected species: mollusks, such as giant clams and top-snail shell; sponges; and species of hard corals. Figure 3.2.2-1 shows areas where sensitive marine habitats and protected species generally occur at Illeginni Islet. Based on prior surveys conducted around the islet, coral cover is moderate to high off the north and east sides of the islet, and lower off the west side. South of the islet, coral diversity and abundance is low. Marine life in general is abundant and diverse on the ocean side south of the island. Towards the southwestern side of the island, 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 (Robison et al., 2005; U.S. Air Force, 2004; U.S. Department of the Army Space and Missile Defense Command, 2002; 2006).

Vegetation

Illeginni is covered with mainly grassy lawns surrounding buildings and other facilities, and four relatively large patches of native vegetation (see Figure 3.2.2-1). 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 the islet. (U.S. Department of the Army Space and Missile Defense Command, 2006; U.S. Air Force, 2004)

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. (U.S. Department of the Army Space and Missile Defense Command, 2002; 2006; 2011)



Biological Resources at Illeginni Islet

NORTH

0 500 1,000 2,000 Feet

Kwajalein Atoll, Marshall Islands

Figure 3.2.2-1

3-5_illeginni_bio.mxd

A number of protected migratory seabirds and shorebirds have been seen breeding, roosting, or foraging on Illeginni Islet. Between 1998 and 2004, biological inventories conducted on the islet 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 the islet's interior (Figure 3.2.2-1). 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 the islet. 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 the islet, which supports the second largest nesting colony of black noddies recorded on the USAKA/RTS-leased islets; nearly 150 nests were identified in 2000. There are also signs of black-naped tern nesting on the western tip of the islet (U.S. Air Force, 2004; U.S. Department of the Army Space and Missile Defense Command, 2006; 2011).

Terrestrial species observed on Illeginni include rats and three species of ants (U.S. Department of the Army Space and Missile Defense Command, 2002, 2006). These non-native species were accidentally introduced to the islet some years earlier (U.S. Air Force, 2004; U.S. Department of the Army Space and Missile Defense Command, 2006). The azure-tailed skink and another big dark, lateral-striped skink were observed in 2008 (U.S. Department of the Army Space and Missile Defense Command, 2011).

Threatened, Endangered, and Other Protected Species

Within the area of Kwajalein Atoll, the UES provide protection for the following:

- Any threatened or endangered species that may be present
- Any species proposed for designation, candidates for designation, or petitioned for designation to the endangered species list that could be affected by USAKA activities
- All species designated by the RMI under applicable RMI statutes, such as the RMI Endangered Species Act of 1975, Marine Mammal Protection Act of 1990, Marine Resources (*Trochus*) Act of 1983, and the Marine Resources Authority Act of 1989
- Marine mammals designated under the U.S. Marine Mammal Protection Act of 1972 that may be affected by USAKA activities
- Bird species pursuant to the Migratory Bird Conservation Act that are potentially present in the RMI
- Species in the RMI that are protected by the Convention on International Trade in Endangered Species, or mutually agreed on by USAKA, USFWS, NMFS, and the RMI Government as being designated as protected species. (U.S. Army Space and Missile Defense Command, 2006; 2009)

The Kwajalein Atoll lagoon, reefs, and surrounding ocean waters are home to a number of threatened, endangered, and other protected species. 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 [*Balaenoptera musculus*], finback whale [*Balaenoptera physalus*], humpback whale, and sperm whale [*Physeter catodon*]). 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 Islet.

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 the islet, 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. Although 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. (U.S. Department of the Army Space and Missile Defense Command, 2006) More recently, in April 2009, an estimated four sperm whales were sighted a few miles southeast of Illeginni (U.S. Department of the Air Force, 2010). On July 2, 2009 a pod of 28 sperm whales, including a calf, was seen between Legan and Illeginni on the ocean side (The Kwajalein Hourglass, 2009).

On November 20, 2010 at about 4:00 pm, biologists from the USFWS and NMFS observed a large adult whale or whales, approximately 2 to 3 miles due west of Illeginni Islet in the open ocean area 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. (U.S. Fish and Wildlife Service, 2011b)

Several threatened and endangered species of sea turtles can be found in the lagoon and ocean waters surrounding USAKA. These include the hawksbill sea turtle and green sea turtle. As shown in Figure 3.2.2-1, 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 Islet. 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 islet in 2002 and 2004, while an adult green sea turtle was seen on the seaward side of the islet in 1996. (U.S. Air Force, 2004; U.S. Department of the Army Space and Missile Defense Command, 2006)

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-snail shell (*Trochus niloticus*); sponges; and coral (two Candidate species: Blue Coral [*Heliopora coerulea*] and Pore Coral [*Montipora caliculata*]) (U.S. Department of the Army Space and Missile Defense Command, 2006). Table 3.2.2-1 provides a list of coral and sponge species of concern known to occur around Illeginni Islet. Figure 3.2.2-1 shows areas where various protected species can be found at Illeginni Islet.

Table 3.2.2-1. Coral and Sponge Species of Concern Known to Occur in the Vicinity of Illeginni

Corals		
Ocean-Side Species		
Scientific Name	**Common Name**	**Federal Status**
Acropora digitifera	Table Coral	–
Acropora nana	None	–
Alveopora spp.	Daisy or Flowerpot Coral	–
Leptastrea purpurea	Crust Coral	–
Millepora spp.	Fire Coral	–
Montastrea curia	Stony Coral	–
Pocillopora eydouxi	Antler Coral	–
Pocillopora meandrina	Cauliflower Coral	–
Pocillopora verrucosa	Cauliflower Coral	–
Porites lobata	Hump Coral	–
Sinularia spp.	Leather Coral	–
Lagoon-Side Species		
Scientific Name	**Common Name**	**Federal Status**
Acanthastrea echinata	Starry Cup Coral	–
Acropora abrotanoides	Staghorn Coral	–
Acropora austera	Staghorn Coral	–
Acropora cytherea	Table Coral	–
Acropora formosa	Branching Coral	–
Acropora gemmifera	Finger Coral	–
Acropora latistella	Table Top Coral	–
Acropora nasuta	Branching Staghorn Coral	–
Acropora palifera	Cat's Paw Coral	–
Acropora spp.	Staghorn Coral	–
Acropora tenuis	Finger Coral	–
Alveopora spp.	Daisy or Flowerpot Coral	–
Astreopora myriophthalma	Starflower Coral	–
Cyphastrea serailia	Lesser Knob Coral	–
Cyphastrea spp.	Ocellated Coral	–
Favia matthaii	Knob Coral	–
Goniastrea edwardsi	Lesser Star Coral	–
Heliopora coerulea	Blue Coral	Candidate
Leptastrea purpurea	Crust Coral	–
Millepora spp.	Fire Coral	–
Montipora aequituberculata	Encrusting Pore Coral	–
Montipora caliculata	Pore Coral	Candidate
Montipora hoffmeisteri	Pore Coral	–
Montipora tuberculosa	Cabbage Coral	–

Table 3.2.2-1 Coral and Sponge Species of Concern Known to Occur in the Vicinity of Illeginni (Continued)

Corals (Continued)		
Lagoon-Side Species (Continued)		
Scientific Name (Continued)	**Common Name**	**Federal Status**
Pavona varians	Leaf Coral	–
Platygyra pini	Lesser Valley Coral	–
Pocillopora eydouxi	Antler Coral	–
Porites lobata	Lobe Coral	–
Sinularia spp.	Leather Coral	–
Stylophora pistillata	Hood Coral	–
Sponges		
Ocean-Side Species		
Scientific Name	**Common Name**	**Federal Status**
Aka sp.	None	–
Axinyssa sp.	None	–
Dysidea granulosa	None	–
Plakortis sp.	None	–
Lagoon-Side Species		
Axinyssa sp.	None	–
Dysidea avara	None	–
Dysidea granulosa	None	–
Hippospongia sp.	None	–
Katiba milnei	None	–
Plakortis sp.	None	–
Stylotella sp.	None	–

Source: U.S. Department of the Army Space and Missile Defense Command, 2011

Note:
- =Not listed

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 (U.S. Air Force, 2004). 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. (U.S. Department of State, 2002)

Illeginni Islet 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 islet. The marine habitats considered biologically important are the lagoon-facing reef slope and reef flat, the inter-islet 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. (U.S. Army Space and Missile Defense Command, 2006)

Based on prior surveys conducted around the islet, coral cover is moderate to high in most areas. Mollusks are abundant in the lagoon north of the islet, while marine life in general is abundant and diverse on the ocean side south of the islet. Towards the southwestern side of the islet, 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. (U.S. Department of the Army Space and Missile Defense Command, 2006)

Islet surveys have shown shorebirds to use the managed vegetation throughout the islet's interior. Pooled water on the helipad attracts both wintering shorebirds and some seabirds. White terns have been observed in trees at the northwest corner and southwest quadrant of the islet. 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 islet's southeast quadrant where the littoral forest supports the second-largest nesting colony of black noddies in the USAKA islets; nearly 150 nests were identified in 2000. There are also signs of black-naped tern nesting on the western tip of the islet. (U.S. Department of the Army Space and Missile Defense Command, 2006)

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 the islet since 1996. (U.S. Department of the Army Space and Missile Defense Command, 2006)

3.2.3 CULTURAL RESOURCES—U.S. ARMY KWAJALEIN ATOLL

Region of Influence

The region of influence is the area on Illeginni Islet where the AHW/HGB could impact.

Affected Environment

Buildings and 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 USAKA (U.S. Army Space and Missile Defense Command, 2001).

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 (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 (U.S. Air Force, 2004)

3.2.4 HAZARDOUS MATERIALS AND WASTE—U.S. ARMY KWAJALEIN ATOLL

Region of Influence

The region of influence is the area on Illeginni Islet where the AHW/HGB would impact, especially when located near existing contaminated sites.

Affected Environment

Regulations governing hazardous material and hazardous waste management at USAKA/RTS are specified in the UES (U.S. Army Space and Missile Defense Command/Armed Forces Strategic Command, 2009). The UES classify all materials as either general-use, hazardous, petroleum products, or prohibited. The objective of the standards for material and waste management is to identify, classify, and manage in an environmentally responsible way all materials imported or introduced for use at USAKA/RTS.

Although there are several abandoned buildings on Illeginni Islet, the USAKA/RTS has removed all remaining hazardous materials and wastes (e.g., asbestos, polychlorinated biphenyls in old light ballasts, and cans of paint) from these facilities (U.S. Air Force, 2004). Range personnel using the unexploded ordnance (UXO) burn pit on the far west side of the islet also ensure that all UXO is consumed with each burn operation.

Residual concentrations of beryllium and DU remain in the soil near the helipad on the west side of Illeginni Islet—a result of prior reentry vehicle tests. In 2005, Lawrence Livermore National Laboratory analyzed over 100 soil samples collected around the helipad to determine concentrations of beryllium and DU in the soil (Robison et al., 2006). Table 3.2.4-1 summarizes the concentration results.

Table 3.2.4-1. Concentrations of Beryllium and Uranium in Soil at Illeginni Islet, USAKA/RTS

Concentration	**Beryllium** (*μ*g/g)	**Uranium** (*μ*g/g)
Median	0.22	6.5
Mean	1.6	24
Standard Deviation	3.4	6.6
Standard Error	0.32	6.1

Source: Robison et al., 2006
*μ*g/g = Micrograms per gram(s)

Based on the soil analysis conducted by Lawrence Livermore National Laboratory, concentrations of beryllium and uranium on Illeginni Islet are statistically similar to the natural background concentrations found in soils on other coral atolls in the northern Marshall Islands and at other global locations (Robison et al., 2005, 2006). The observed soil concentrations of beryllium and DU (as uranium) on Illeginni Islet thus are well within compliance with USEPA Region 9 Preliminary Remediation Goals as outlined in the UES. For beryllium, the goal is set at 150 milligrams/kilograms (residential). For DU (as uranium), the goal is set at 200 milligrams/kilograms (industrial) (U.S. Army Space and Missile Defense Command/Army Forces Strategic Command, 2009).

As a requirement of the UES, the Army has prepared the Kwajalein Environmental Emergency Plan (KEEP) for responding to releases of oil, hazardous material, pollutants, and other contaminants into the environment. The KEEP is substantively similar to the spill prevention, control, and countermeasure plan often required in the United States. As part of the KEEP, a Hazardous Materials Management Plan (HMMP) has been prepared to address USAKA's import, use, handling, and disposal of hazardous materials. This Plan includes maintaining an inventory of hazardous materials routinely imported and used at USAKA. As part of pollution prevention, recycling, and waste minimization activities, each revision of the HMMP includes both a description of the steps taken to reduce the volume and toxicity of the generated waste, and a description of the changes in volume and toxicity of waste achieved since the last revision (U.S. Air Force, 2010).

Commonly used hazardous materials (e.g., cleaning solvents, paints, and petroleum products) are managed and distributed through the base supply system. Tenants, construction contractors, program offices, and other recipients importing activity-specific hazardous materials into USAKA are required to submit— within 15 days of receiving the material or before actual use, whichever comes first—a separate Hazardous Materials Procedure to the Commander, USAKA, for approval. Such procedures outline requirements for material storage, use, transportation, and eventual disposal.

Hazardous or toxic waste treatment or disposal is not allowed at USAKA under the UES. Hazardous waste, whether generated by USAKA activities or by range users, is handled in accordance with the procedures specified in the UES. Hazardous wastes are collected at individual work sites in waste containers. Containers are kept at the point of generation accumulation site until they are full, or until a specified time limit is reached. Containers are then collected from the generation point and transported to the USAKA Hazardous Waste 90-Day Storage Facility on Kwajalein Island. Wastes are then shipped off-island by barge for treatment and disposal in the continental United States.

Training programs play an integral and active part in the USAKA environmental management program to ensure that the installation complies with all environmental requirements. The installation contractor continually updates training programs so employees are fully aware of procedures and policies associated with the following topics:

- Hazardous waste management/reduction
- Methods of testing and ensuring proper operation of equipment
- Hazardous materials handling
- Spill prevention, control, and response
- Countermeasures to contain, clean up, and mitigate the effects of a spill or discharge.

3.2.5 HEALTH AND SAFETY—U.S. ARMY KWAJALEIN ATOLL

Region of Influence

USAKA/RTS would provide range support for the terminal phase of flight during the AHW/HGB demonstration flight test. There would be no requirements or issues related to launch safety, launch hazards, or rocket propellant handling at USAKA/RTS and elsewhere within the RMI. Thus, the region of influence for health and safety at USAKA includes all areas where the reentry vehicles impact on Illeginni Islet and in the ocean waters near USAKA—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

USAKA/RTS has the unique mission of serving as the target area for various missile launch operations from PMRF in Hawaii. All program operations must first receive approval from the Safety Office at USAKA/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 USAKA/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 USAKA/RTS 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 USAKA/RTS Commander. (U.S. Army Space and Missile Defense Command/Armed Forces Strategic Command, 2009).

Range safety provides protection to USAKA/RTS 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 like the AHW/HGB. 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 (U.S. Army Space and Missile Defense Command/Armed Forces Strategic Command, 2009). Criteria used at USAKA/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 PMRF, 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. USAKA/RTS 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 USAKA/RTS (see Figure 2.1.8-1)—such as for the AHW Program—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 (U.S. Air Force, 2004; U.S. Army Space and Missile Defense Command/Armed Forces Strategic Command, 2009).

Since USAKA 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 RV impact area safety.

USAKA has the unique mission of serving as the target for a wide variety of missile launch operations from PMRF in Hawaii. These missions are conducted with the approval of the USAKA Commander. A specific procedure is established to ensure that such approval is granted only when the safety requirements for proposed test activities have been adequately addressed.

All program operations must receive the approval of the USAKA Safety Directorate. This is accomplished through presentation of the proposed program to the Safety Directorate. All safety analyses, standard operating procedures, and other safety documentation applicable to those operations affecting the USAKA must be provided, along with an overview of mission objectives, support requirements, and schedule. The Safety Directorate evaluates this information and ensures that all USAKA safety requirements specified in the UES, and supporting regulations, are followed. (U.S. Army Space and Strategic Defense Command, 1995)

Prior to operations that may involve missile impacts within the range, an evaluation is made to ensure that populated areas, critical range assets, and civilian property susceptible to damage are outside predicted impact limits (i.e., the hazard area). A NOTMAR and a NOTAM are published and circulated in accordance with established procedures to provide warning to personnel, including residents of the Marshall Islands, concerning any potential hazard area that should be avoided. Radar and visual sweeps of hazard areas are accomplished immediately prior to operations to assist in the clearance of non-critical personnel. Only mission-essential personnel are permitted in hazard areas. (U.S. Army Space and Strategic Defense Command, 1995)

In operations that involve the potential for reentry vehicle debris near inhabited islands, precautions are taken to protect personnel. In hazard areas, where an island has an unacceptably high probability of impact by debris, personnel are evacuated. In caution areas, where the chance of debris impact is low, precautions may consist of evacuating nonessential personnel and sheltering remaining inhabitants. Sheltering is required for reentry vehicle missions impacting the Mid-Atoll Corridor at USAKA. The Mid-Atoll Corridor is declared a caution area when it contains a point of impact. Remaining inhabitants of Kwajalein Atoll islands in this corridor are required to seek shelter. (U.S. Army Space and Strategic Defense Command, 1995)

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. (U.S. Army Space and Strategic Defense Command, 1995)

3.2.6 NOISE—U.S. ARMY KWAJALEIN ATOLL

Region of Influence

During terminal flight and impact at USAKA/RTS, the AHW/HGB 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. (U.S. Air Force, 2010)

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 USAKA/RTS 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 (U.S. Air Force, 2010).

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, USAKA/RTS 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.

3.3 BROAD OCEAN AREA

Rationale for Environmental Resources Analyzed

The proposed AHW program activities in broad ocean areas could impact air quality, biological resources, and water resources; as such, only these environmental resource topics are discussed. Much of the information presented in this section was drawn from the Affected Environment chapter of the PMRF Intercept Test Support EA, CSM Demonstration EA, and the Hypersonic Technology Vehicle 2 EA (Pacific Missile Range Facility, 2010; U.S. Department of the Air Force, 2010; and Defense Advanced Research Projects Agency, 2009, respectively). Pertinent new information was included where applicable to account for changes in the affected environment or the availability of updated data.

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 USAKA/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 USAKA/RTS. 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 AHW/HGB have the potential to affect air quality in the global upper atmosphere.

Affected Environment

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 (World Meteorological Organization, 2006).

Greenhouse Gases and Global Warming

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, there are six GHGs:

- CO_2
- N_2O
- CH_4

- Hydrofluorocarbons
- Perfluorocarbons
- Sulfur hexafluoride

(United Nations Framework Convention on Climate Change, 2008).

Although the direct GHG (CO_2, CH_4, and N_2O) occur naturally in the atmosphere, human activities have changed GHG atmospheric concentrations. From 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 (U.S. Air Force, 2010).

Since 1900, the earth's average surface air temperature has increased by about 1.2°F to 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 (U.S. Air Force, 2010).

3.3.2 BIOLOGICAL RESOURCES—BROAD OCEAN AREA

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

Ocean depths in this region of the RMI generally range between 6,560 and 16,400 feet (Hein et al., 1999). There is a wide variety of pelagic and benthic communities in the BOA. 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 described in Section 3.2.2.1, 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 BOA species includes the areas of the Pacific Ocean beyond 12 nm from the shore where planned booster drops and the AHW/HGB may impact.

Affected Environment

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 (Defense Advanced Research Projects Agency, 2009).

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 (re to 1 µPa). A passing supertanker can generate up to 190 dB (re to 1 µPa) of low frequency sound. For marine mammals, dolphins are known to produce brief echolocation signals over 225 dB (re to 1 µPa), while mature sperm whale clicks have been calculated as high as 232 dB (re to 1 µPa) (Defense Advanced Research Projects Agency, 2009).

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 3.3.2-1 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 3.2.2, Biological Resources—U.S. Army Kwajalein Atoll. Table 3.3.2-1 lists threatened and endangered species in the Open Ocean region of influence.

Table 3.3.2-1: Protected Marine Mammal and Sea Turtle Species Occurring within the North Pacific Over-the-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
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

Table 3.3.2-1: Protected Marine Mammal and Sea Turtle Species Occurring within the North Pacific Over-Ocean Flight Corridor (Continued)

Common Name	Scientific Name	Federal Status
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; U.S. Department of the Air Force, 2006

Notes:
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/HGB 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 (U.S. Army Space and Missile Defense Command, 2004).

4.0 Environmental Consequences

4.0 ENVIRONMENTAL CONSEQUENCES

This chapter presents the potential environmental consequences of the Proposed Action and No-action Alternative, described in Chapter 2.0 of this EA, when compared to the affected environment resources described in Chapter 3.0. The amount of detail presented in each section of the analysis is proportional to the potential for impact. Both *direct* and *indirect* impacts are addressed where applicable. In addition, *cumulative* effects that might occur are identified in Section 4.4. Appropriate environmental management and monitoring actions and requirements are also included in this chapter, where necessary, and summarized in Section 4.4. A list of all agencies, organizations, and personnel consulted as part of this analysis is provided in Chapter 7.0.

Mitigation measures consist of general descriptions of the steps required to mitigate the adverse impacts of the No-action Alternative and Proposed Action. The EA will identify measures already committed to as part of current, ongoing activities, and those additional mitigations (if any) which could reasonably be expected to reduce impacts if Alternative 1 or 2 is implemented.

The following subsections describe the potential environmental consequences of implementing the Proposed Action at PMRF/KTF, at USAKA/RTS in the Marshall Islands, and within the over-ocean flight corridor. Environmental issues associated with the proposed AHW/HGB flight test vary widely at each location, and as such, the resources analyzed at each location also vary. A breakdown of the resources analyzed in detail, by location, is shown in Table 4-1, along with the section numbers where the respective discussions are found.

Table 4-1. Resources Analyzed in Detail by Location

Location	Air Quality	Airspace	Biological Resources	Cultural Resources	Hazardous Materials	Health and Safety	Noise	Water Resources
Pacific Missile Range Facility	Sect. 4.1.1	Sect. 4.1.2	Sect. 4.1.3	N/A	Sect. 4.1.4	Sect. 4.1.5	Sect. 4.1.6	Sect. 4.1.7
USAKA/RTS	N/A	Sect. 4.2.1	Sect. 4.2.2	Sect. 4.2.3	Sect. 4.2.4	Sect. 4.2.5	Sect. 4.2.6	N/A
Broad Ocean Area	Sect. 4.3.1	N/A	Sect. 4.3.2	N/A	N/A	N/A	N/A	N/A

N/A = Not Applicable

4.1 KAUAI TEST FACILITY

4.1.1 AIR QUALITY—KAUAI TEST FACILITY

4.1.1.1 Site Preparation Activities

Existing facilities at KTF and PMRF would be used. No construction is planned. Thus, minimal impacts to air quality (machinery required to receive and prepare the Strategic Target System for launch) at KTF would be anticipated from site preparation activities.

4.1.1.2 Launch Activities

The testing of the AHW/HGB would include one launch of a Strategic Target System booster from KTF. The Strategic Target System booster (Orbus 1) has been previously launched at KTF, and it is anticipated that the testing of the AHW/HGB with the new booster (Orbus 1a) configuration at the same site would have the same or a similar air quality impact as described in the *Final Environmental Impact Statement for the Strategic Target System (*U.S. Army Strategic Defense Command, 1992). The AHW tests would be similar to a ballistic missile test, and the potential impacts on air quality would be similar to that described for missile launches.

Each launch is a discrete event, and the addition of the AHW/HGB launch would not result in exceeding the limit on launches being performed annually at PMRF. Missile and rocket launches are characterized by intense combustive reactions over a short period, which result in exhaust streams of varying sizes, depending on the size of the launch vehicle.

Analysis of launch-related impacts is covered in the 1992 Strategic Target System EIS, 1998 PMRF Enhanced Capability Final EIS, and most recently in the Hawaii Range Complex EIS/Overseas EIS (U.S. Army Strategic Defense Command, 1992; U.S. Department of the Navy, 1998; and 2008, respectively). Analysis of typical launch vehicles at PMRF determined that exhaust emissions will not produce short-term exceedances of either the NAAQS or health-based guidance levels in areas to which the general public would have access. The ground hazard area used to support the Strategic Target System launch program—10,000 feet—is evacuated of all personnel before any launch. Also, personnel remaining outdoors within the launch hazard area will wear appropriate safety equipment, such as respirator masks. Therefore, no air quality impacts in the lower troposphere (earth's surface to 6.2 miles) are anticipated due to the continued use of the 10,000-foot ground hazard area at its current level (U.S. Department of the Navy, 1998*)*.

Table 4.1.1.2-1 shows the total quantity of air emissions, including ozone-depleting gases and GHGs, from a Strategic Target System launch.

Table 4.1.1.2-1. Estimated Emissions from a Typical Strategic Target System Launch at PMRF/Main Base (tons per launch)

Missile	Aluminum Oxide (Al_2O_3) (2)	Carbon Monoxide (CO)	Carbon Dioxide (CO_2) (3)	Hydrogen	Water	Hydrochloric Acid (Hydrogen Chloride) (2)	Nitrogen (NOx) (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:
(1) Exhaust products are total for all three stages
(2) Ozone-depleting Substances
(3) Greenhouse Gas

Emissions from licensed launches analyzed in the Department of Transportation Programmatic EIS for Licensing Launches do contribute to the creation of "holes" in the stratospheric ozone layer as the launch vehicle passes through, although these "holes" tend to "fill back in" rapidly following a launch (U.S. Department of Transportation, Federal Aviation Administration 2001). In comparison, the Strategic Target System missiles are smaller than those analyzed in the Programmatic EIS. Therefore, ozone depletion from launch exhaust is limited spatially and temporally, and these reactions do not have a globally significant impact on ozone depletion. Greenhouse gas emissions from the proposed launch would not meet the test of "meaningful" as defined by the Council on Environmental Quality. See further discussion of ozone-depleting substances and greenhouse gases under the air quality resources for the broad ocean area, Section 4.3.2.

4.1.1.3 Post-launch Activities

Post launch activities would consist of removing any temporary equipment and vehicles from the launch site. This is a common event on KTF, and minimal air quality impacts are anticipated.

4.1.2 AIRSPACE—KAUAI TEST FACILITY

4.1.2.1 Site Preparation Activities

Site preparation activities (airlift delivery of Strategic Target System stages, AHW/HGB, and related hardware), could involve additional flights in and out of the PMRF airfield. 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 PMRF airfield would not be affected. All arriving and departing aircraft and all participating military aircraft are under the control of the PMRF Air Operations; thus, there would be no airport conflicts in the region of influence under the Proposed Action, and no impact.

Prior to missile launches requiring the Navy to exercise closure of the hazard area, Range Safety officials must determine that the areas are 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

Special Use Airspace

The AHW/HGB launch would be conducted within the existing special use airspace in Warning Area W-188 and W-186 controlled by PMRF. The launch represents precisely the kind of activities for which special use airspace was created: namely, to accommodate national security and necessary military activities, and to confine or segregate activities considered to be hazardous to non-participating aircraft.

Due to the coordination and planning procedures that are in place, the proposed missile testing activities would represent only a minimum impact on special use airspace and minimal conflict with any airspace use plans, policies, and controls. PMRF/KTF personnel would continue to ensure the protection of the public from any missile debris through the application of standard range safety procedures and risk standards, including RCC Standard 321.

The AHW/HGB launch would be scheduled at a time that would avoid periods of high numbers of air traffic based on FAA approval. PMRF Flight Safety would conduct an analysis of the risk associated with the AHW program activity 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 Honolulu Control Facility in Honolulu, and the PMRF/Main Base airfield control tower. The acceptable level of risk to aircraft and the persons on board would continue to follow the RCC 321 standard; only the location of the requested airspace would change.

PMRF would continue to coordinate with the Honolulu Control Facility or Oakland ARTCC military operations specialist assigned to handle such matters using 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 Honolulu Control Facility or Oakland ARTCC requesting airspace. When approval of the request of the airspace is received, PMRF 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 PMRF Warning Areas.

Use of these low altitude airways comes under the control of the Honolulu 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 non-participating entrant has left the area or a thorough check of the suspected area has been performed. The AHW/HGB 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" (DoD Directive 4540.1, § E5). 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 Honolulu Control Facility and 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/HGB launch would not restrict access to, or affect arriving and departing flights at existing area airfields and airports in the region of influence. Access to the PMRF airfield, Lihue Airport, Princeville Airport, and Port Allen Airport would not be affected. 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 intercept have settled) would not restrict access to, nor affect the use of, existing airfields in the region of influence. 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 PMRF Air Operations; thus, there would be no airfield conflicts in the region of influence, and no impact.

4.1.3 BIOLOGICAL RESOURCES—KAUAI TEST FACILITY

4.1.3.1 Site Preparation Activities

Vegetation

Compliance with relevant Navy policies and procedures limits the potential for introduction of invasive weed plant species. Inbound flights carrying cargo from the mainland and landing at PMRF are advised to inspect and secure their cargo prior to shipment to ensure it is free of invasives. Equipment flown in to the PMRF airfield is either via Honolulu, and inspected there, or direct from the mainland. Equipment (specifically missile defense test components) flown directly to PMRF from the Mainland is primarily packaged or containerized by the manufacturer in virtually sterile conditions with regard to the potential for invasive plants or animals. On the very rare occasion that equipment is introduced from the mainland directly to PMRF's airfield via U.S. Air Force transport (C-5A or C-17), it is required to be cleaned of any soil/debris and inspected prior to loading, and it is also inspected on the PMRF airfield when the cargo arrives.

Threatened and Endangered Plant Species

Although ohai and lau`ehu have been observed north of PMRF/KTF, 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.

No new construction would be required. Launch Pad 42 has previously been retrofitted with green shielded lights, which have been shown to minimize passerine, shorebird, and waterbird attraction and thus would lessen the chance of bird impacts of facilities at the launch pad. Lighting will be minimized and will not be used where it is determined that it is unnecessary for AT/FP. Motion activated lighting will be used to the highest extent possible.

The combination of increased noise levels and human activity 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 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

Personnel would be instructed to avoid all contact with monk seals and sea turtles or turtle nests that might occur within the area. If turtle nests are discovered, then KTF and AHW personnel would contact PMRF Environmental, who would perform any required consultation with appropriate agencies. There are no known records of hawksbills coming ashore or nesting within or adjacent to PMRF; however, in 2010 two green sea turtles nested successfully for the first time in more than a decade. Threatened and endangered marine mammals would not be affected since no site preparation activities would take place offshore.

AHW activities that involve the use of night lighting, and base infrastructure consisting of tall, narrow-profile structures such as towers, have the potential to affect nocturnal seabirds during their flights between inland breeding colonies in the mountains of Kauai and their at-sea foraging areas (Telfer et al., 1987; Day et al., 2003). Night lighting can lead to the fallout of nocturnally active birds, a situation in which birds are attracted to the light, become disoriented, and fall toward the ground. Such fallout can cause collisions with structures, particularly those with tall, narrow profiles. Standard white night lighting poses a risk to nocturnally active birds due to interference with their magnetic orientation. Birds require light from the blue-green portion of the spectrum for orientation, and this orientation is disrupted by red wavelengths and white light (Wiltschko and Wiltschko, 2001; U.S. Fish and Wildlife Service, 2010). Birds often continue to be disoriented on the ground, with fallout potentially leading to injury or death due to collision trauma or exposure to predators (Naval Facilities Engineering Command Pacific, 2010b; Telfer et al., 1987).

In October 2009, five Newell's shearwaters fell out at missile launch pad areas at PMRF Main Base. These fallouts appeared to be due to AT/FP lighting at the launch pads, as missiles on launch pads and in assembly buildings were lit overnight during the October–November launch exercise per AT/FP requirements (Appendix I; Naval Facilities Engineering Command Pacific, 2010b). Two of the five Newell's shearwater fallouts resulted in mortality. A wedge-tailed shearwater, protected under the MBTA, was also found to have fallen out at the launch pad area during this period of AT/FP lighting.

During the past 3 years, no Hawaiian petrels have been observed to have fallen out at PMRF Main Base. Because of their lower mean flight altitudes and their tendency to fly to and from the sea during complete darkness, Newell's shearwaters may have a greater likelihood than Hawaiian petrels of becoming disoriented by artificial lighting and subsequently striking objects within their paths. Whether because of the location of PMRF Main Base on Kauai, the relative numbers of overflights of Newell's shearwaters and Hawaiian petrels, the flight habits of these two species, or some other factor, Newell's shearwater fallout has occurred at the installation, while Hawaiian petrel fallout has not been observed to occur. A band-rumped storm-petrel, protected by the MBTA and an ESA candidate species, was found to have fallen out in the central portion of PMRF on 18 November 2009. This fallout did not appear to be associated with AT/FP lighting at missile launch pads, but launch pad lighting may have the potential to impact band-rumped storm-petrels. (Naval Facilities Engineering Command Pacific, 2010b)

In 2010, the U.S. Navy initiated a program to replace all of the white lighting at KTF. That program was completed before the 2010 fledging season. All lighting now consists of full cut-off shielded green lights. Although the new lighting has only been in place for one season, it appears to have significantly improved the bird fall-out problems on the installation. During the 2010 season there was a total of 39 nights with lights on at one or more launch pads. No fall-outs were reported on KTF during that period. Only one Newell's shearwater fell out during the 2010 season. This occurred just north of the THAAD Launch Pad but south of KTF. It is not clear if this fall out was due to collision with towers or other infrastructure. (Naval Facilities Engineering Command Pacific, 2010b)

Even though the new green shielded lighting has been installed at Launch Pad 42, the U.S. Army is sensitive to the effects it may have on nocturnal seabirds. As a result, the Army has determined that its activities may adversely affect these species and has initiated consultation

with the USFWS. As a minimum the following mitigation measures will be in effect during AHW activities at PMRF:

- ***Will avoid unnecessary nighttime lighting***

  Launch Pad 42 (and all of KTF) has already been retrofitted with full cut-off green shielded lights, which have been shown to minimize passerine, shorebird, and waterbird attraction and thus lessen the chance of bird impacts with facility structures at the launch pad. For up to 8 days before the launch, these lights may be turned on to assist personnel who may be working on the launch pad during some hours of darkness. Most daily work will be completed by approximately 0100 each morning. Any additional lighting brought in for this purpose will also be green shielded lighting. When workers are not present, lighting will be minimized and will not be used where it is determined that it is unnecessary for AT/FP. Motion activated lighting will be used to the highest extent possible. If the launch is delayed for technical or weather reasons, the launch pad could be lighted for an additional 3 days. Total potential lighted nights would be 11.

- ***Will try to overlap the full moon period***

  Fall out tends to increase during darker (new moon and newly waxing and waning moon) lunar periods and decrease during lighter (full moon) periods. Pre-launch activities would begin about 8 days prior to the proposed launch date and continue until launch on 7 November 2011. The full moon will occur on 10 November 2011. Therefore, proposed pre-launch and launch activities, plus a potential 3-day launch delay contingency, are scheduled to occur when nighttime ambient light will be close to its highest during the lunar cycle.

- ***Will conduct lethal control of predators on nocturnal seabirds***

  PMRF will continue their program of lethal control of owls, feral cats, and rats at PMRF Main Base through contract with U.S. Department of Agriculture's Animal and Plant Health Inspection Service Wildlife Services.

- ***Will conduct monitoring for avian tower strikes at the two Aegis Ashore Test Center boresight towers and three Launch Area lighting and instrumentation towers***

  PMRF will continue monitoring for nocturnal seabird strikes at all towers greater than 26 feet at PMRF Main Base. Carcass searches will be also be conducted during the earlier part of the Newell's shearwater breeding season (April through September) to detect potential fallouts by adult shearwaters during commuting flights between nesting and at-sea foraging areas. This monitoring program will include Launch Pad 42 where AHW activities will occur. During the scheduled AHW launch period, visual monitoring for seabirds flying near Launch Pad 42 lighting will be conducted each night by base security personnel during normal nighttime security patrols. Searches for fallen seabirds at Launch Pad 42 will be conducted each morning. If any birds are found, the USFWS Pacific Islands Office in Honolulu will be notified and the birds will be turned over to the Save Our Seabirds program on Kauai. Personnel conducting nighttime and morning monitoring will be trained in proper monitoring and downed bird handling techniques by qualified PMRF environmental staff.

In addition, the USASMDC/ARSTRAT is in the process of consulting with the USFWS to determine what additional mitigations or permits will be required for AHW activities at PMRF.

Environmentally Sensitive Habitat

Although lau`ehu does not grow on PMRF, the USFWS has determined that dune areas along the southern portion of the range contain primary constituents necessary for the recovery of lau`ehu because not enough areas exist outside of PMRF. Site preparation activities would not affect these areas 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. Analysis provided in the Strategic Target System EIS (U.S. Army Strategic Defense Command, 1992) concluded that although vegetation near the Strategic Target System launch pad can suffer some temporary distress from the heat generated at launch and from hydrogen chloride or aluminum oxide emissions, there is no evidence of any long-term adverse impact on vegetation from two decades of launches at PMRF. The continued presence of the adder's tongue, a species removed from the list of Federal candidate species, indicates that emissions from the four Strategic Target System missiles launched from 1993 through 1996 as well as those from launches since 1996 of missiles similar in size and composition to the Strategic Target System have not had a significant impact on sensitive vegetative species.

Threatened and Endangered Plant Species

Although ohai and lau`ehu have been observed north of PMRF/KTF, no threatened or endangered vegetation is located within the launch site boundary or in the offshore area, and thus no adverse effects are anticipated. The missile launch would not adversely modify lau`ehu critical habitat, nor would it affect green turtles or monk seals, since Launch Pad 42 occurs inland of beach and dune habitats on the base (approximately 0.5 mile from the nearest lau`ehu critical habitat, and 0.25 mile from the nearest beach). Security patrols would be conducted along the PMRF beachfront prior to the missile launch, but patrol vehicles are driven only on permanent, designated roads when traveling between inland areas and beach habitat, such that these vehicles do not adversely modify lau`ehu critical habitat.

Environmentally Sensitive Habitat

Although lau`ehu does not grow on PMRF/KTF, the USFWS has determined that dune areas along the southern portion of the range contain primary constituents necessary for the recovery of lau`ehu because not enough areas exist outside of PMRF. Nominal launch activities would not affect these areas of critical 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. (Larkin, 1996) 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, helicopters, and landing craft 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 activities are usually short in duration and occur within regularly used range areas.

The probability for a launch mishap is very low. However, an early flight termination or mishap would cause missile 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 missile 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 Hawaiian water birds (e.g., Hawaiian duck, Hawaiian moorhen, Hawaiian coot, and Hawaiian stilt) 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. Finally, proposed activities should have no effect on the short-tailed albatross. Although this species is highly endangered throughout its breeding range in the western Pacific, it is a rare visitor to the Main Hawaiian Islands, with a single juvenile having been observed at PMRF in March 2000. The potential for impacts to listed nocturnal birds from nighttime lighting and the mitigations currently in place or under consideration are described in Section 4.1.3.1, Site Preparation Activities.

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 Pad 42 is set back behind Nohili Dune, and far from areas of Hawaiian monk seal and green turtle haul-out areas. Although the event would be loud, it would also be a very short-lived noise event. The SOP for day shots at PMRF has been to hold a launch if a monk seal is within the ESQD arc. In the case of Launch Pad 42, their presence is highly unlikely based on historic observations and the condition of the surf zone; sharp limestone outcropping. Combined with the sheltering created by the Nohili Dunes, noise attenuation and reflection away from the beach would combine to lessen the sound pressure level. (Burger, 2011)

The activities would incorporate procedures to avoid threatened or endangered wildlife that are foraging, resting, or hauled out, such as threatened green turtles or endangered Hawaiian monk seals. If humpback whales, monk seals, or sea turtles are observed in the offshore launch safety zone, the launch will be delayed (U.S. Department of the Navy, 1998; 2008). 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 PMRF.

Threatened and Endangered Plant Species

No threatened or endangered vegetation has been identified at KTF.

Environmentally Sensitive Habitat

Although lau`ehu does not grow on PMRF/KTF, the USFWS has determined that dune areas along the southern portion of the range contain primary constituents necessary for the recovery of lau`ehu because not enough areas exist outside of PMRF. Post flight activities would not affect these areas of critical habitat.

Wildlife

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

Threatened and Endangered Wildlife Species

The activities would incorporate procedures to avoid threatened or endangered wildlife that are foraging, resting, or hauled out, such as threatened green turtles or endangered Hawaiian monk seals. If humpback whales, monk seals, or sea turtles are observed in the offshore launch safety zone, the launch would be delayed (U.S. Department of the Navy, 1998; 2008).

4.1.4 HAZARDOUS MATERIALS AND WASTE—KAUAI TEST FACILITY

4.1.4.1 Site Preparation Activities

PMRF/KTF 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. Any hazardous or nonhazardous wastes produced during site preparation activities would be containerized and properly disposed of in accordance with existing PMRF/KTF SOPs. Impacts to the environment are not anticipated from the presence of potentially hazardous materials and the generation of wastes during site preparation activities.

All components of the AHW program would be transported, handled, and stored at PMRF/KTF in accordance with applicable existing PMRF/KTF SOPs, as well as Federal, State, U.S. Army, U.S. Navy, and USAF safety regulations. Strategic Target System components would be transported to PMRF as usual for temporary storage, pre-flight assembly and checkout, and flight preparation. The components would be shipped to PMRF as finished products that require only final assembly onsite.

4.1.4.2 Flight Activities

Hazardous Material Management

The solid propellants associated with the Proposed Action would be similar to past missile systems launched from PMRF and KTF, and would follow the same hazardous materials and hazardous waste handling procedures developed under existing plans described in the affected environment. The types of hazardous materials used and hazardous waste generated would be similar to current materials and would not result in any existing procedural changes to the hazardous materials and hazardous waste management plans currently in place.

Hazardous Waste Management

During launches of the Strategic Target System there is the potential for a mishap to occur, resulting in potentially hazardous debris and propellants falling within the ground hazard area. As addressed for previous launch programs on KTF, the hazardous materials that result from a flight termination or mishap would be cleaned up, and any contaminated areas would be remediated in accordance with existing PMRF/KTF emergency response plans and hazardous materials and hazardous waste plans. All hazardous waste generated in such a mishap would be disposed of in accordance with appropriate State and Federal regulations. Overall, no adverse impacts would result from hazardous materials used or hazardous waste generated 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 in coordination with PMRF. The Strategic Target System would be sufficiently downrange that debris would be unlikely to reach back to the launch site. At the conclusion of launch activities, PMRF/KTF and AHW program 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 U.S. Navy's CHRIMP.

4.1.5 HEALTH AND SAFETY—KAUAI TEST FACILITY

An impact would be considered if it involved materials or operations that posed a potential 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

Activities required for the AHW program would comply with the Navy Occupational Safety and Health Program Manual, OPNAVINST 5100.23E. Launch preparation activities are routinely accomplished for both military and civilian operations and should not result in impacts related to health and safety to workers.

PMRF would be used as the storage location for all materials that would be used during the launches. The primary hazard related to transport and storage operations of rocket components is injury due to packaging and movement of components and the potential for explosion/fire. 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.

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 used by PMRF during transportation and handling of rocket components. ESQDs are established along transportation corridors.

On arrival at PMRF, 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 PMRF/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 unprotected personnel. The ground hazard area includes the area that may be at risk from a vehicle failure very early in flight. It is a region 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 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). Teams are available for fire suppression, hazardous materials emergency response, and emergency medical response during launch activities. PMRF/KTF personnel take every reasonable precaution during the planning and execution of range operations and launch activities to prevent injury to human life and property.

4.1.5.2 Flight Activities

Many procedures are in place to mitigate the potential hazards of an accident during the flight of one of the rockets. Operation of the AHW program would comply with the PMRF Range Safety Operation Plan, which is generated by PMRF Range Safety personnel prior to range operations. Launches would not be permitted to occur without review and agreement by the Range Safety Officer. Ground hazard areas based on payload, rocket (Strategic Target System), and launch azimuth were established for each launch. The rocket would be sufficiently downrange 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 by PMRF as part of their routine operations through NOTAMs 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 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, Ship Exclusion Zones for ocean areas, and Restricted Airspace and ALTRVs for airspace. In addition, launch times and trajectories are cleared with United States Space Command to prevent impacts on satellites (both manned and unmanned); this process is called Collision Avoidance. For some missions, no FTS is needed. This occurs when the vehicle properties are such that all potential debris from accidents is contained within the hazard area.

The FTS provides a mechanism to protect the public with very high reliability, even in the unlikely case of a 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 a Destruct Limit. 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.

4.1.5.3 Post Flight Activities

At the conclusion of testing activities, AHW program personnel would remove all mobile equipment/assets brought to the range. No adverse health and safety impacts are expected from these activities.

Debris from a launch may impact the ground or open ocean (either from stage 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 in shallow water) and disposed of in accordance with applicable State, Federal, and range hazardous waste requirements and operating procedures.

4.1.6 NOISE—KAUAI TEST FACILITY

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 noise impacts from site preparation activities and the AHW/HGB 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 pre-flight activities would include noise from mechanical equipment, including transportation of the Strategic Target System boosters to the launch site. The increase in noise levels would be temporary.

4.1.6.2 Flight Activities

Noise would include transport vehicles, maintenance equipment, generators, and the launching and detonation of test missiles. KTF supports a variety of sounding rocket missions; therefore,

occasional rocket, missile, or drone launches produce high-intensity, short-duration sound events. Noise monitoring was conducted in February 1993 during the Strategic Target System FTU-1 launch at KTF to confirm the determination made in the Strategic Target System EIS (U.S. Army Strategic Defense Command, 1992) that noise produced from the largest launch would be below maximum acceptable levels. Data collected in the nearest town of Kekaha indicated that levels were no louder than noise generated from passing vehicles on a nearby highway (Sandia National Laboratories, 2005). Mathematical modeling provided in the Strategic Target System EIS (U.S. Army Strategic Defense Command, 1992) predicted a peak noise level of about 91 dBA at 2 miles, which is slightly beyond the ground hazard area. When compared to some common noise levels, that is equivalent to the noise of a power lawn mower at 3 feet from the source or a jackhammer at 10 feet from the source (Cowan, 1994).

The nearest on-base housing area is located approximately 5 miles south of KTF launch areas. The nearest off-base residential area is Kekaha, which is approximately 8 miles south of KTF launch areas. Due to the low test frequency, and the short duration of the proposed AHW/HGB launch, local populations would not be adversely affected.

4.1.6.3 Post Flight Activities

Noise generated during post flight test activities would have minimal impact to off-base areas.

4.1.7 WATER RESOURCES—KAUAI TEST FACILITY

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 KTF Launch Complex area and would be in compliance with PMRF/KTF regulations and would not impact water resources.

4.1.7.2 Flight Activities

Under nominal 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 the Hazardous Materials Contingency Plan and the Hazardous Waste Management Plan.

4.1.7.3 Post Flight Activities

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

4.2 U.S. ARMY KWAJALEIN ATOLL

4.2.1 PREFERRED ALTERNATIVE

4.2.1.1 Airspace—U.S. Army 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.

Site Preparation Activities

Operations at the USAKA/RTS 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.

Flight Activities

Illeginni is located under international airspace and, therefore, has no formal airspace restrictions governing it. Commercial and private aircraft would be notified in advance of the AHW/HGB launch by USAKA/RTS 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 USAKA/RTS Range, particularly in the vicinity of Kwajalein or Roi-Namur when their radars are transmitting.

Operations at the USAKA/RTS 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.

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.

4.2.1.2 Biological Resources—U.S. Army 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

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 noisemakers (e.g., propane cannons, sirens, and recorded distress calls) and visual deterrents (e.g., scarecrows, Mylar flags, helium-filled balloons, and strobe lights) would be implemented to discourage birds from nesting in the intended impact area. The USAKA Environmental Management Office would initiate such actions several weeks prior to the beginning of any setup 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.

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 AHW/HGB hitting the islet, but no long-term effects are expected since the AHW/HGB launch is a short-term, discrete event.

No direct or indirect effects to turtles or marine mammals are expected to occur from the AHW/HGB 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 launch as safely practical, a qualified USAKA/RTS biologist would inspect the northwestern end of Illeginni Islet for sea turtles or sea turtle nests. They would report such sighting to the USAKA 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.

Although the HGB contains no heavy metals or hazardous materials, there is potential for the impact on Illeginni to redistribute trace amounts of beryllium and DU that is in the soil. Should it be required, one method of determining the amount of beryllium and DU that may be affecting terrestrial wildlife is Rodent Sperm Analysis (RSA). The U.S. Army Public Health Command recommends conducting a modification of the Army's patented, direct health status assessment method, RSA, and the developing methodology for addressing female reproduction in mammals, Wild Rodent Ovarian Follicle Counting (WROF-C). RSA provides immediate benefits to the Army in evaluating the health status of animals exposed to contaminated soil at installations, and it also holds great potential to serve as a tool that screens for reproductive effects in humans (civilians and Soldiers) who may be exposed to soils contaminated from Army operations.

RSA at Illeginni would involve collecting a minimum of 15 adult male rodents of a species that occurs at both a contaminated property and a relatively nearby, habitat-matched (non-contaminated) reference location. For this study, two conventionally evaluated sperm parameters (count, morphology) would be assessed in order to determine if reproductive compromise is evident in the site's maximally-exposed mammalian receptor. The determination made (that is as definitive a determination as is possible) could be used to extrapolate to the human condition. WROF-C would involve collecting 10 adult female rodents of a species that occurs at both a contaminated property and the relatively nearby, habitat-matched reference location. Four developmental stages of ovarian follicles would be counted in one ovary of each animal to identify instances, should there be any, of lesser follicles in site-exposed rodents, an assumed barometer of reproductive compromise. (Tannenbaum, 2010)

With RSA, corroborative information would also be collected. This would include population information (relative trapping success, sex ratio, age distribution) and somatic information (organ-to-body weight ratios, histology on four organs: liver, spleen, kidney, testis). WROF-C's corroborative information includes the above mentioned population information and organ-to-body weight ratios.

HGB impacts on Illeginni Islet or in the shallow coral reefs would form a crater. Information concerning the HGB's energy release on impact is currently unknown. However, the HGB's impact would be less than the previous Minuteman III (MMIII) 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, MMIII 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 an HGB impact 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. 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 (U.S. Department of the Army Space and Missile Defense Command, 2002; 2011).

Post Flight Activities

Prior to test implementation, AHW program personnel would consult with the RMI Environmental Protection Authority (EPA), USFWS, and NMFS in the preparation of a detailed recovery/cleanup plan that outlines all post-test recovery activities and procedures for operations at Illeginni Islet. In all cases, recovery and cleanup operations would be conducted in a manner to minimize further impacts on biological resources.

The proposed impact point for the AHW/HGB 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 first survey the impact site for any residual explosive materials. Following completion of the target damage assessment, personnel would recover all visible HGB 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 disposal.

Targeted areas for the HGB 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/HGB launch is a short-term, discrete event. No impacts to nearshore 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 HGB 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. The RMI EPA, USFWS, and NMFS would be invited to observe the shallow reef area as soon as the area is cleared by AHW security. Visible debris would be removed following any unintentional shallow water impact. In addition to the crater of up to 10 to 15 feet in diameter, observations made by Lawrence Livermore National Laboratory personnel at Illeginni have identified damage to the coral base up to 5 feet beyond the rim of the crater in certain rare instances (U.S. Air Force, 2004). 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. However, 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 (U.S. Fish and Wildlife Service/National Marine Fisheries Service, 2002).

4.2.1.3 Cultural Resources—U.S. Army Kwajalein Atoll

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 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 AHW program activities.

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.

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/HGB 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 program activities.

4.2.1.4 Hazardous Materials and Hazardous Waste—U.S. Army Kwajalein Atoll

Site Preparation Activities

Illeginni Islet where the AHW/HGB 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.

Flight Activities

Illeginni Islet where the AHW/HGB 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.

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 Laboratories 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.

4.2.1.5 Health and Safety—U.S. Army Kwajalein Atoll

Site Preparation Activities

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

Flight Activities

USAKA/RTS would provide range support for the terminal phase of flight. USAKA/RTS has the unique mission of serving as the target area for a wide variety of missile launch operations from Vandenberg AFB, CA, and from PMRF in Hawaii. All program operations must first receive the approval of the Safety Office at USAKA/RTS. This step is accomplished through presentation of the proposed program to the Safety Office. All safety analyses, SOPs, and other safety documentation applicable to those operations affecting USAKA/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 USAKA/RTS 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 USAKA/RTS Commander (U.S. Army Space and Missile Defense Command/Army Forces Strategic Command, 2007).

Range safety provides protection to USAKA/RTS 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 AHW/HGB. 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 (U.S. Army Space and Missile Defense Command/Army Forces Strategic Command, 2007). Criteria used at USAKA/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 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. USAKA/RTS 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 USAKA/RTS (see Figure 2.1.8-1)—such as for the Preferred Alternative—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 (U.S. Air

Force, 2004; U.S. Army Space and Missile Defense Command/Army Forces Strategic Command, 2007).

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.

4.2.1.6 Noise—U.S. Army Kwajalein Atoll

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.

Flight Activities

Terminal flight of the AHW/HGB 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 AHW/HGB nears the intended impact site, a more focused sonic boom would occur.

As the AHW/HGB nears USAKA/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 (Defense Advanced Research Projects Agency, 2009).

Within Kwajalein Atoll, Kwajalein and Roi-Namur islets are the only populated islets under USAKA/RTS 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, a focused boom would occur over a wide area of the ocean, similar to that of the HTV-2 flight tests previously analyzed in the HTV-2 EA (Defense Advanced Research Projects Agency, 2009). Noise from the focused boom would be at the same levels as described for the land impact at USAKA/RTS, but would occur entirely within international waters. During the flight test, USAKA/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.

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.

4.2.2 BROAD OCEAN AREA ALTERNATIVE

4.2.2.1 Air Quality—Broad Ocean Area

No site preparation or post flight activities would occur in the BOA that would impact air quality.

Flight Activities

Stratospheric Ozone Layer

Exhaust emissions from the rocket motors contain both chlorine compounds and free chlorine, produced primarily as hydrogen chloride (HCl) at the nozzle. A typical Strategic Target System launch would release approximately 1.9 tons of HCl (see Table 4.1.1.2-1). The chlorine and HCl 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 HCl and chlorine) 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 (Missile Defense Agency, 2007)

Both aluminum oxide aluminum oxide (Al_2O_3) and nitrogen oxides (NO_x) 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 NO_x (see Table 4.1.1.2-1). 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. NO_x, like certain chlorine compounds, also contributes to catalytic gas phase ozone depletion. The production of NO_x 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 NO_x is formed. Because diffusion and winds would disperse the NO_x species generated, no significant effect on ozone levels is expected (U.S. Department of the Air Force, 2010).

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

CO_2 is the only GHG identified in the Kyoto Protocol or the Hawaii rule that would be emitted during launch of the Strategic Target System rocket. Because of the solid propellant used, the launch would release only 0.4 ton of CO_2. This does not include a small number of support ocean vessels, aircraft, and other equipment that would be used at USAKA/RTS 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 assumed 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 (Council on Environmental Quality, 2010). 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.

4.2.2.2 Airspace—Broad Ocean Area

Site Preparation, Flight, and Post Flight Activities

Activities would be the same as those discussed above under the Preferred Alternative.

4.2.2.3 Biological Resources—Broad Ocean Area

Site Preparation Activities

Activities would be the same as those discussed above under the Preferred Alternative.

Flight Activities

As a precaution to minimize potential impacts on marine mammals and sea turtles, USAKA/RTS personnel would conduct a helicopter or fixed-wing aircraft overflight of the BOA impact areas 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. Personnel observing marine mammals or sea turtles in the vicinity, or moving to the vicinity, would report such findings to the USAKA Environmental Management Office, the RTS Range Directorate, and the Flight Test Operations Director at PMRF/KTF. Sightings in the BOA impact areas would result in a launch delay for any BOA impact scenarios.

As shown in Figure 2.1.7-1, the three Strategic Target System spent rocket motors would impact in deep ocean waters, well away from coastal areas. The nose shroud and skin extensions would also impact in the same general area as the stage-2 motor. During their descents, each motor would hit the ocean surface at speeds of approximately 195 to 230 ft per second. The expended motors—each weighing up to 9,431 lb—would have considerable kinetic force. Upon impact, this transfer of energy to the ocean water would cause a shock

wave (low-frequency acoustic pulse) similar to that produced by explosives. (U.S. Department of the Air Force, 2010)

If a portion of the launch vehicle were to strike a protected marine mammal or sea turtle near the water surface, the animal would most likely be killed. In addition, the resulting underwater shock/sound wave radiating out from the impact point could potentially harm other animals. Close to the impact point, the shock/sound wave might cause Permanent Threshold Shift (PTS), injure internal organs and tissues, or prove fatal to the animals. Slightly further away, Temporary Threshold Shift (TTS) effects might occur, but with increasing distance away from the impact point, pressure levels would decrease, as would the risk for injury. (U.S. Department of the Air Force, 2010)

Research shows that an underwater sound level of approximately 240 dB (re 1 µPa) is the baseline criterion for defining unavoidable injury or death in marine mammals (Ketten, 1998). Such effects would occur within several feet or yards of each rocket motor impact point. For TTS and PTS effects on marine mammals and sea turtles, this EA used a dual-exposure criteria approach based on recent studies conducted by the U.S. Department of the Navy for underwater detonations and ship-shock trials (U.S. Navy, 2008). The criteria use both peak pressure levels in dB (re 1 µPa) and energy flux density values, which are a measure of the sound energy flow per unit area expressed in dB (re 1 µPa2-s) for underwater sound. Energy flux density criteria result in much larger radial distances, when compared to peak pressure criteria. (U.S. Department of the Air Force, 2010)

Within the region of influence, population estimates and migratory routes for most marine mammal species are not available; thus, calculating probabilities for impacts based on animal densities is currently not possible. Assuming a low density of species, the potential for marine mammals to be impacted is extremely low because: (1) there are only four Strategic Target System component impact points along 2,500 miles of open ocean, and (2) each impact point would affect a relatively small area. During recent consultations for the HTV-2 and CSM programs as described above, the NMFS determined that their missile component impacts in the North Pacific would be discountable for protected marine mammal and sea turtle species. (U.S. Department of the Air Force, 2010)

Because of 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, splashdown of AHW components in the over-ocean flight corridor is also expected to have discountable impacts on marine mammals or sea turtles.

Post Flight Activities

Following launch over the Pacific Ocean, the HGB would separate from the booster and glide at hypersonic velocities in the upper atmosphere toward USAKA/RTS. Upon reaching the terminal end of the flight, the HGB could impact in the BOA northeast of Kwajalein Atoll or southwest of Illeginni Islet. If the flight test expends more energy than planned, the HGB would impact in the BOA, northeast of Kwajalein Atoll.

Fly-overs of BOA impact areas would be conducted to determine if any debris from the HGB may be floating on the surface. Only floating debris would be recovered for a BOA impact. Although unlikely, any dead or injured marine mammals or sea turtles sighted during fly-overs

would be reported to the USAKA Environmental Management Office, which would then inform the USFWS or NMFS in Honolulu. USAKA/RTS aircraft pilots operating in the vicinity of the impact and test support areas near Roi-Namur Islet would also report any opportunistic sightings of dead or injured animals. Because the Proposed Action consists of one flight test, a limited area of effects, implementation of precautionary measures during pre-test preparations, and low animal-densities in the BOA, no significant impacts to protected marine species are expected to occur during the AHW/HGB deep water impact.

4.2.2.4 Water Resources—Broad Ocean Area

Site Preparation Activities

The movement of vessels to and from the proposed BOA impact locations would not significantly impact the general composition of the affected areas of seawater.

Flight Activities

By the time the spent rocket motors impact in the ocean, all of their solid propellants would be consumed. The residual aluminum oxide and burnt hydrocarbon coating the inside of the motor casings would not present any toxicity concerns. Although the nickel-cadmium batteries carried onboard the launch vehicle would be discharged by the time they impact in the ocean, small quantities of electrolyte material would remain in the batteries. The battery materials, along with several gallons of hydraulic fluid, could mix with the seawater causing temporary localized contamination. The release of such contaminants could potentially harm marine life that comes in contact with, or ingests, toxic levels of these solutions. (U.S. Department of the Air Force, 2010)

However, previous studies of missile tests concluded that the release of hazardous materials carried onboard rocket systems would not be significant (U.S. Department of the Navy, 2008). Materials would be rapidly diluted in the seawater and, except for the immediate vicinity of the debris, would not be found at concentrations identified as producing adverse effects. Ocean depths in the region of influence reach thousands of feet and, consequently, any impacts from hazardous materials are expected to be insignificant. The area affected by the dissolution of hazardous materials onboard would be relatively small because of the size of the rocket components and the minimal amount of residual materials they contain. Such components would immediately sink to the ocean bottom, out of reach of marine mammals, sea turtles, and most other marine life. It is possible for deep-ocean, benthic species to be adversely affected by any remaining contaminants, but such impacts would be localized to within a short distance of rocket debris deposited on the ocean floor. A BOA impact of one Strategic Target System and the AHW/HGB would not significantly impact the composition of the surrounding seawater or biological diversity of marine life present.

Post Flight Activities

The movement of vessels to and from the proposed BOA impact locations after impact activities are complete would not significantly impact the general composition of the affected areas of seawater.

4.3 CUMULATIVE IMPACTS

Air Quality

Pacific Missile Range Facility

Each launch is a discrete event, and the addition of the AHW/HGB launch would not result in exceeding the limit on launches being performed annually at PMRF. Missile and rocket launches are characterized by intense combustive reactions over a short period, which result in exhaust streams of varying sizes, depending on the size of the launch vehicle. Analysis of typical launch vehicles at PMRF has determined that exhaust emissions will not produce short-term exceedances of either the NAAQS or health-based guidance levels in areas to which the general public would have access. No cumulative impacts are anticipated.

U.S. Army Kwajalein Atoll

The Proposed Action would not occur at the same time as other regional programs such as Aircrew Training Missions, Ground-Based Midcourse Defense launches, SpaceX Falcon launches, launches as part of the CSM and HTV-2 programs, or Minuteman III. No other projects in the region of influence have been identified that would have the potential for cumulative impacts to air quality.

Airspace

Pacific Missile Range Facility

Implementation of the Proposed Action in conjunction with other current and proposed regional programs such as Aircrew Training Missions, Ground-Based Midcourse Defense launches, SpaceX Falcon launches, launches as part of the CSM and HTV-2 programs, or Minuteman III launches would not incrementally affect airspace within the region of influence. No new special use airspace proposal, or any modification to the existing Special Use Airspace, is being contemplated. No impacts to the surrounding low-altitude airways and/or high-altitude jet routes have been identified. No impacts to the region of influence airways and jet routes have been identified because of the required coordination with the FAA. Each individual test is coordinated with the FAA prior to altitude reservation request. Consultation with the FAA on all matters affecting airspace would eliminate the possibility of indirect adverse impacts; therefore, no cumulative impacts are expected from the implementation of the Proposed Action.

U.S. Army Kwajalein Atoll

The Proposed Action would not occur at the same time as other regional programs such as Aircrew Training Missions, Ground-Based Midcourse Defense launches, SpaceX Falcon launches, launches as part of the CSM and HTV-2 programs, or Minuteman III. 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 U.S. 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

Pacific Missile Range Facility

Only one AHW/HGB launch is planned. The Proposed Action when combined with current and proposed launch activities would not increase the total number of annual launches currently allowed from PMRF. These combined activities would be performed at varying times and locations on PMRF and should have negligible cumulative impacts on biological resources. Since program activities could adversely affect nocturnal bird species, USASMDC/ARSTRAT has agreed to avoid unnecessary nighttime lighting, try to overlap the full moon period, conduct lethal control of predators on nocturnal seabirds, and conduct monitoring for avian tower strikes at the two Aegis Ashore Test Center boresight towers and three Launch Area lighting and instrumentation towers. In addition, USASMDC/ARSTRAT is in the process of consulting with the USFWS to determine what additional mitigations or permits will be required for AHW activities at PMRF. Additional programs that plan on using the same location as AHW should also agree to these mitigations and the use of green lighting to help reduce the potential for cumulative impacts to nocturnal birds. If turtle nests are discovered, then University of Hawaii personnel would contact PMRF Environmental, which would perform any required consultation with appropriate agencies. No significant cumulative impacts to biological resources have been identified as a result of prior launches from PMRF, including the Strategic Target System and the THAAD test flights.

U.S. Army Kwajalein Atoll

The AHW/HGB launch would be a short-term, discrete event. The Proposed Action would not occur at the same time as other regional programs such as Aircrew Training Missions, Ground-Based Midcourse Defense launches, SpaceX Falcon launches, launches as part of the CSM and HTV-2 programs, or Minuteman III 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.

A biological assessment consisting of the biological resources section of the CSM EA evaluated the consequences of weapon projectiles and RV impacts, plus personnel and motorized vehicles present on Illeginni Islet for several weeks in support of the CSM, AHW/HGB, and Minuteman III Modification flight tests. The assessment concluded the combination of CSM Demonstration, AHW/HGB, and Minuteman III Modification flight tests could 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 eggs prior to each test, minimize the potential for cumulative impacts to occur. (U.S. Department of the Air Force, 2010)

Broad Ocean Area

The combination of CSM Demonstration, AHW/HGB, and Minuteman-III Modification flight tests 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 pre-test 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 a nominal launch. The combination of CSM Demonstration, AHW/HGB, and Minuteman III Modification flight tests is not expected to result in potential cumulative impacts to cultural resources.

Hazardous Materials

Pacific Missile Range Facility

Hazardous materials used and waste generated as a result of the AHW/HGB flight test 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 currently used and generated at PMRF/KTF. 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 PMRF Hazardous Waste Management Plan.

U.S. Army Kwajalein Atoll

Adherence to the hazardous materials and waste management systems of USAKA/RTS would preclude the potential accumulation of hazardous materials or waste. If there were hazardous waste, the AHW program would comply with the emergency response procedures set out in the UES. AHW program actions are not expected to result in cumulative hazardous materials and hazardous waste impacts on USAKA/RTS. No other projects 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.

Broad Ocean Area

There would be no impacts to the Broad Ocean Area as a result of hazardous material or hazardous waste release from the Proposed Action.

Health and Safety

Pacific Missile Range Facility

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, Ship Exclusion Zones for ocean areas, and Restricted Airspace and ALTRVs for airspace. The ground hazard area for the Strategic Target System vehicle 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). 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.

U.S. Army Kwajalein Atoll

USAKA/RTS is a restricted access area dedicated to research, test, and training military activities. Safety standards are high at USAKA/RTS and would serve to keep any cumulative safety impacts attributable to all USAKA/RTS 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 Aircrew Training Missions, Ground-Based Midcourse Defense, SpaceX Falcon launches, launches as part of the CSM and HTV-2 programs, or Minuteman III 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

Pacific Missile Range Facility

The Proposed Action would not occur at the same time as other regional programs such as Aircrew Training Missions, Ground-Based Midcourse Defense launches, SpaceX Falcon launches, launches as part of the CSM and HTV-2 programs, or Minuteman III. No other projects in the region of influence have been identified that would have the potential for cumulative impacts to ambient noise.

Water Resources

Pacific Missile Range Facility

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.

4.4 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 PMRF/KTF and USAKA/RTS. These are summarized below:

1. At Illeginni Islet, should any HGB debris impact in areas of sensitive biological resources (i.e., forested areas, sea turtle nesting habitat, and coral reef), then RMI EPA, 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 U.S. Army in conjunction with USAKA will inspect beach areas for active sea turtle nests at llleginni Islet beginning 30 days prior to the HGB impact. If active nests are

discovered, USAKA will immediately notify the Service and implement Service recommendations to avoid or minimize project-related impacts to sea turtle nests.

3. Prior to the AHW/HGB demonstration test, USAKA and Service 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 HGB impact.
4. To compensate for potential impacts to sea turtle nests at Illeginni, the USAKA/RTS would implement steps to eradicate rodents on Eniwetak Islet (depending on the results of a rodent population assessment) or on Gellinam Islet. Removing rodents from one of the islets, which are located on the eastern side of Kwajalein Atoll, would help protect sea turtle nests from depredation of eggs and hatchlings.
5. USASMDC/ARSTRAT and USAKA/RTS would implement RSA and WROF-C studies.
6. Within 1 day after the test at Illeginni Islet, USAKA/RTS, RMI EPA, USFWS, and/or NMFS biologists would be invited to survey the islet and the near-shore waters for any inadvertent impacts on reef or shallow water. In addition, RMI EPA, USFWS, and NMFS biologists would assist USAKA/RTS in the recovery and rehabilitation of any injured migratory birds or sea turtles found at Illeginni. During inspections of the islet, biologists would assess any sea turtle mortality.
7. During ocean travel to and from impact 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.
8. For the Preferred Alternative at Illeginni Islet, USAKA/RTS personnel would conduct a helicopter or fixed-wing aircraft overflight of the islet vicinity within several hours after the test to survey for any dead or injured marine mammals and sea turtles.
9. 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.
10. Following each flight test, 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 USAKA Environmental Management Office, which would then inform the NMFS in Honolulu. USAKA/RTS aircraft pilots operating in the vicinity of the impact and test support areas near Illeginni Islet would also report any opportunistic sightings of dead or injured mammals. If an accidental take were to occur as a result of the HGB ocean impact, the USAKA/RTS, USASMDC/ARSTRAT, RMI EPA, and the NMFS in Honolulu would formulate a mitigation/action plan to be integrated into future flight test planning to reduce the risk of accidental takes.
11. If any AHW/HGB vehicle debris is found during vessel operations to remove free-floating sensors from the BOA, then the debris would be collected for proper disposal.

4.5 NO-ACTION ALTERNATIVE

Under the No-action Alternative, the AHW flight tests would not be implemented at PMRF, USAKA/RTS, or anywhere else in the Marshall Islands. Thus, there would be no AHW program related environmental impacts from launch activities or terminal flight operations. PMRF and USAKA/RTS would continue ongoing operations and environmental conditions are not expected to change from those described in Chapter 3.0, Affected Environment, of the EA.

4.6 FEDERAL ACTIONS TO ADDRESS ENVIRONMENTAL JUSTICE IN MINORITY POPULATIONS AND LOW-INCOME POPULATIONS (EXECUTIVE ORDER 12898)

Given the launch trajectory of the proposed AHW/HGB flight test, 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 EA and draft Finding of No Significant Impact were made available for public review and comment.

Proposed activities would be conducted in a manner that would not substantially affect human health and the environment. Access to some of the beaches adjacent to PMRF for fishing is allowed and some of these areas would be restricted during hazardous activities. Other areas along the coast currently open to the public would be available for use. Advance notification is provided of closure times (through a 24-hour hotline at PMRF), 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.

4.7 FEDERAL ACTIONS TO ADDRESS PROTECTION OF CHILDREN FROM ENVIRONMENTAL HEALTH RISKS AND SAFETY RISKS (EXECUTIVE ORDER 13045, AS AMENDED BY EXECUTIVE ORDER 13229)

This EA 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

5.0 REFERENCES

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Reagan Test Site
U.S. Army Kwajalein Atoll

U.S. Army Space and Missile Defense Command
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Huntsville, AL

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Appendix A
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Grace Sherwood Library
Kwajalein, Marshall Islands

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Appendix B
Correspondence

APPENDIX B
CORRESPONDENCE

DEPARTMENT OF THE ARMY
U.S. ARMY SPACE AND MISSILE DEFENSE COMMAND/
ARMY FORCES STRATEGIC COMMAND
POST OFFICE BOX 1500
HUNTSVILLE, ALABAMA 35807-3801

REPLY TO
ATTENTION OF:
SMDC / ARSTRAT

Mr. Gerry Davis
Assistant Regional Administrator, Habitat
National Marine Fisheries Service
Pacific Islands Regional Office
1601 Kapiolani Blvd, Suite 1110
Honolulu, HI 96814-4700

Dear Mr. Davis:

Over the past few years, Department of Defense reviews and studies have supported a Conventional Prompt Global Strike capability. This capability would provide the President, Secretary of Defense, and Combatant Commanders with the ability to quickly destroy, delay, or disrupt key enemy targets within a few hours. The Army's version of a Conventional Prompt Global Strike capability (under development), the Advanced Hypersonic Weapon (AHW), would use a Hypersonic Glide Body (HGB) concept, which would demonstrate the ability of the HGB to achieve prompt global reach effects on protected targets with precision.

The U.S. Army Space and Missile Defense Command is preparing an Environmental Assessment (EA) in compliance with the National Environmental Policy Act (NEPA) and the Council on Environmental Quality regulations implementing NEPA. This EA is in support of conducting a single demonstration flight test of the AHW/HGB.

The AHW/HGB flight test vehicle would be launched from the Pacific Missile Range Facility, Kauai using an existing Strategic Target System with three stages. Following booster separation, the AHW/HGB would glide at hypersonic velocities in the upper atmosphere, prior to a land or ocean impact at the U.S. Army Kwajalein Atoll/Reagan Test Site (USAKA/RTS) (on or near Illeginni Islet) in the Republic of the Marshall Islands.

This Coordinating Draft AHW EA provides an evaluation of the No-action Alternative and the Proposed Action. The No-action Alternative is the continuation of training operations; research, development, test, and evaluation activities; and ongoing base operations and maintenance of the technical and logistical facilities that support these operations and activities at PMRF and USAKA/RTS. There would be no Army response to the call for a Conventional Prompt Global Strike capability.

The Proposed Action includes three possible impact zone scenarios. The first impact zone would be in the deep water region southwest of Illeginni Islet. The second possible impact zone would be a land impact on the northwest end of Illeginni. It would be located west of the tree line to avoid affecting the bird habitat. The third impact zone would be northeast of Kwajalein Atoll.

1

SMDC / ARSTRAT

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 scenario. Vehicle impacts from other tests have occurred within the Kwajalein Atoll lagoon, on and in the vicinity of Illeginni Island, and in the broad open ocean near USAKA/RTS. The mission planning process would consider avoiding all potential risks to environmentally significant areas.

The Coordinating Draft EA is being distributed to various agencies, including your office, for review and comment prior to preparing the Final EA and draft Finding of No Significant Impact for public review. We want to ensure that any concerns you might have about our efforts to identify natural resources and assess potential impacts are fully addressed.

Please review the enclosed Coordinating Draft EA and provide comments or concurrence by 9 May 11 to Deputy Commanding General, U.S. Army Space and Missile Defense Command, Attention: SMDC-ENE (Mr. Mark Hubbs), P.O. Box 1500, Huntsville, AL 35807-3801, by email: mark.hubbs@us.army.mil, or by data facsimile (256) 955-5074.

Sincerely,

8 APR 11

Harvey B. Jones III
Colonel, U.S. Army
Deputy Chief of Staff, Engineer

Enclosure

Copy to: Alecia Van Atta, Protected Species
Steve Kolinski, Coral Reef Habitats

2

DEPARTMENT OF THE ARMY
U.S. ARMY SPACE AND MISSILE DEFENSE COMMAND/
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REPLY TO
ATTENTION OF
SMDC / ARSTRAT

Anthony Hoover
U.S. Army Kwajalein Atoll – Reagan Test Site
Environmental Management Office
P.O. Box 26
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Dear Mr. Hoover:

Over the past few years, Department of Defense reviews and studies have supported a Conventional Prompt Global Strike capability. This capability would provide the President, Secretary of Defense, and Combatant Commanders with the ability to quickly destroy, delay, or disrupt key enemy targets within a few hours. The Army's version of a Conventional Prompt Global Strike capability (under development), the Advanced Hypersonic Weapon (AHW), would use a Hypersonic Glide Body (HGB) concept, which would demonstrate the ability of the HGB to achieve prompt global reach effects on protected targets with precision.

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SMDC / ARSTRAT

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Please review the enclosed Coordinating Draft EA and provide comments or concurrence by 9 May 2011 to Deputy Commanding General, U.S. Army Space and Missile Defense Command, Attention: SMDC-ENE (Mr. Mark Hubbs), P.O. Box 1500, Huntsville, AL 35807-3801, by email: mark.hubbs@us.army.mil, or by data facsimile (256) 955-5074.

Sincerely,

8 APR 11

Harvey B. Jones III
Colonel, U.S. Army
Deputy Chief of Staff, Engineer

Enclosure

Copy: Michael Malone, Kwajalein Range Support

2

DEPARTMENT OF THE ARMY
U.S. ARMY SPACE AND MISSILE DEFENSE COMMAND/
ARMY FORCES STRATEGIC COMMAND
POST OFFICE BOX 1500
HUNTSVILLE, ALABAMA 35807-3801

REPLY TO
ATTENTION OF
SMDC / ARSTRAT

Josepha A. Maddison
Secretary of Interior and Outer Island Affairs
Deputy Historic Preservation Officer
P.O. Box #1454
Majuro, MH 96960-1322

Dear Ms. Maddison :

Over the past few years, Department of Defense reviews and studies have supported a Conventional Prompt Global Strike capability. This capability would provide the President, Secretary of Defense, and Combatant Commanders with the ability to quickly destroy, delay, or disrupt key enemy targets within a few hours. The Army's version of a Conventional Prompt Global Strike capability (under development), the Advanced Hypersonic Weapon (AHW), would use a Hypersonic Glide Body (HGB) concept, which would demonstrate the ability of the HGB to achieve prompt global reach effects on protected targets with precision.

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Sincerely,

8 APR 11

Harvey B. Jones III
Colonel, U.S. Army
Deputy Chief of Staff, Engineer

Enclosure

2

DEPARTMENT OF THE ARMY
U.S. ARMY SPACE AND MISSILE DEFENSE COMMAND/
ARMY FORCES STRATEGIC COMMAND
POST OFFICE BOX 1500
HUNTSVILLE, ALABAMA 35807-3801

REPLY TO
ATTENTION OF
SMDC / ARSTRAT

Deborah B. Manase
Republic of the Marshall Islands
Environmental Protection Authority
P.O. Box 1322
Majuro, MH 96960-1322

Dear Ms. Manase:

Over the past few years, Department of Defense reviews and studies have supported a Conventional Prompt Global Strike capability. This capability would provide the President, Secretary of Defense, and Combatant Commanders with the ability to quickly destroy, delay, or disrupt key enemy targets within a few hours. The Army's version of a Conventional Prompt Global Strike capability (under development), the Advanced Hypersonic Weapon (AHW), would use a Hypersonic Glide Body (HGB) concept, which would demonstrate the ability of the HGB to achieve prompt global reach effects on protected targets with precision.

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SMDC / ARSTRAT

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Sincerely,

8 APR 11

Harvey B. Jones III
Colonel, U.S. Army
Deputy Chief of Staff, Engineer

Enclosure

2

DEPARTMENT OF THE ARMY
U.S. ARMY SPACE AND MISSILE DEFENSE COMMAND/
ARMY FORCES STRATEGIC COMMAND
POST OFFICE BOX 1500
HUNTSVILLE, ALABAMA 35807-3801

REPLY TO
ATTENTION OF
SMDC / ARSTRAT

John McCarroll
U.S. Environmental Protection Agency
Region IX Pacific Islands Office
75 Hawthorne Street (CMD-6)
San Francisco, CA 94105

Dear Mr. McCarroll:

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SMDC / ARSTRAT

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8 APR 11

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Colonel, U.S. Army
Deputy Chief of Staff, Engineer

Enclosure

2

DEPARTMENT OF THE ARMY
U.S. ARMY SPACE AND MISSILE DEFENSE COMMAND/
ARMY FORCES STRATEGIC COMMAND
POST OFFICE BOX 1500
HUNTSVILLE, ALABAMA 35807-3801

REPLY TO
ATTENTION OF
SMDC / ARSTRAT

Mr. Loyal Mehrhoff
Field Supervisor
U.S. Fish and Wildlife Service
Pacific Islands Fish and Wildlife Office
300 Ala Moana Blvd., Room 3-122
Honolulu, HI 96850

Dear Mr. Mehrhoff:

Over the past few years, Department of Defense reviews and studies have supported a Conventional Prompt Global Strike capability. This capability would provide the President, Secretary of Defense, and Combatant Commanders with the ability to quickly destroy, delay, or disrupt key enemy targets within a few hours. The Army's version of a Conventional Prompt Global Strike capability (under development), the Advanced Hypersonic Weapon (AHW), would use a Hypersonic Glide Body (HGB) concept, which would demonstrate the ability of the HGB to achieve prompt global reach effects on protected targets with precision.

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Sincerely,

BAR II

Harvey B. Jones III
Colonel, U.S. Army
Deputy Chief of Staff, Engineer

Enclosure

Copy to: Kevin Foster

2

DEPARTMENT OF THE ARMY
U.S. ARMY SPACE AND MISSILE DEFENSE COMMAND/
ARMY FORCES STRATEGIC COMMAND
POST OFFICE BOX 1500
HUNTSVILLE, ALABAMA 35807-3801

REPLY TO
ATTENTION OF
SMDC / ARSTRAT

U.S. Army Engineer District, Honolulu
Attention: CEPOH-PP-E (Helene Takemoto)
Building 230, Room 306
Fort Shafter, Hawaii 96858-5440

Dear Ms. Takemoto:

Over the past few years, Department of Defense reviews and studies have supported a Conventional Prompt Global Strike capability. This capability would provide the President, Secretary of Defense, and Combatant Commanders with the ability to quickly destroy, delay, or disrupt key enemy targets within a few hours. The Army's version of a Conventional Prompt Global Strike capability (under development), the Advanced Hypersonic Weapon (AHW), would use a Hypersonic Glide Body (HGB) concept, which would demonstrate the ability of the HGB to achieve prompt global reach effects on protected targets with precision.

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SMDC / ARSTRAT

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Sincerely,

8 APR 11

Harvey B. Jones III
Colonel, U.S. Army
Deputy Chief of Staff, Engineer

Enclosure

2

FROM :RMIHPO FAX NO. :6254476 May. 06 2011 10:08AM P1

Republic of the Marshall Islands
Ministry of Internal Affairs
Historic Preservation Office
P.O. Box 1454 – Majuro – Marshall Islands – 96960
Phone Number: (692) 625-4476 Fax: (692) 625-4476
rmihpo@ntamar.net

May 6, 2011

Mr. Mark Hubbs
US Army Space and Missile Defense Command
PO Box 1500
Huntsville, AL 35807-3801

Iakwe Mr. Hubbs,

The Republic of the Marshall Islands Historic Preservation Office has received the Environmental Assessment for the Advanced Hydrosonic Weapon Program which includes testing on Illeginni Islet, on Kwajalein Atoll. We concur with the assessment which determines that cultural resources will not be affected by the testing.

Please notify our office of any changes to the weapons testing plans, should cultural resources be affected. We appreciate the opportunity to work with you to protect our valuable national cultural heritage.

Best regards,

Wilbur Heine
Secretary of Internal Affairs
Ministry of Internal Affairs.

REPUBLIC OF THE MARSHALL ISLANDS
ENVIRONMENTAL PROTECTION AUTHORITY
P.O. BOX 1322 Majuro, Marshall Islands 96960
Phone: (692) 625-3035/5203 Fax: (692) 625-5202 email: epamri@ntamar.net

RMIEPA Comments
Advanced Hypersonic Weapon Program
Environmental Assessment, Coordinating Draft, April 2011

The Republic of the Marshall Islands National Environmental Protection Authority (RMIEPA) has reviewed the Coordinating Draft Environmental Assessment (CDEA) for the Advanced Hypersonic Weapon Program, dated April 2011. RMIEPA offers the following comments:

- At Section 2.1.8 and elsewhere, the CDEA states that any crater caused by a land impact will be filled. Where and how will fill be obtained?

- At Sections 2.1.9, 4.2.23, and elsewhere, we ask that an RMIEPA representative, along with representatives from NMFS and USFWS, be invited to inspect sites of inadvertent reef, reef flat, or shallow water impacts and be involved in all post-test recovery planning and oversight.

- Which potential target area, land or BOA, is more likely to be the impact location? What are the probabilities?

- We note that the physical and biological resources sections referring to areas within RMI are quite brief and not adequately detailed.

- We ask that the primary impacts to Illeginni Islet be stated more fully and explicitly.

- We note the assertions regarding concentrations of Beryllium (Be) and Depleted Uranium (DU) in the soil at Illeginni Islet at CDEA p. 3-38, but also note previous discussions with RMIEPA and Ministers of Cabinet (16-17 Sept 2010) indicating that the Republic's concerns about cumulative impacts at Illeginni have led USAKA to plan to perform soil field screening activities to characterize the redistribution of existing Be/DU following AHW and CSM impacts. Please address RMI concerns regarding buildup of contaminants by offering specific sampling, monitoring and mitigation actions. We refer you to wording under Item #1 of "*Action Items/ Data Requirements Identified During Conventional Strike Missile Program and Advanced Hypersonic Weapon Program Meetings with GRMI Officials and Kwajalein Traditional Landowners (16 Sep 2010) and with RMI EPA and RMI HPO (17 Sep 2010)*" (*CSM/AHW Action Items*): "Given RMIEPA concerns regarding redistribution and accumulation of contaminants...USAKA proposes to undertake field sampling for both DU and Be immediately after each CSM and AHW test event. This sampling effort will glean results sufficiently quantitative to assess whether or not UES contamination levels have been exceeded."

- Please add the mitigations discussed at Item 10 of *CSM/AHW Action Items*, including Rodent Sperm Analysis (RSA), and the Wild Rodent Ovarian Follicle Counting (WROF-C). RMI Ministers

and RMIEPA wish both studies to begin as soon as possible, but in any event before any testing occurs. Please add coral core sampling, as a parallel combination of above-water (rat) and below-water (coral) testing would be an excellent indice of the environmental health of the islet and its inhabitants.

- At Section 4.5, please set forth a specific list of predicted environmental issues/impacts and proposed mitigation/enhancement measures and responsibilities.

Thank you for the opportunity to comment. When the Draft EA is released, please send an electronic and a hard copy to our office. If you have any questions, please feel free to contact me at eparmi@ntamar.net or deb.manase@gmail.com.

5/26/11

Deborah Barker-Manase
General Manager, RMIEPA
P.O. Box 1322
Majuro, Marshall Islands 96960

Date

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