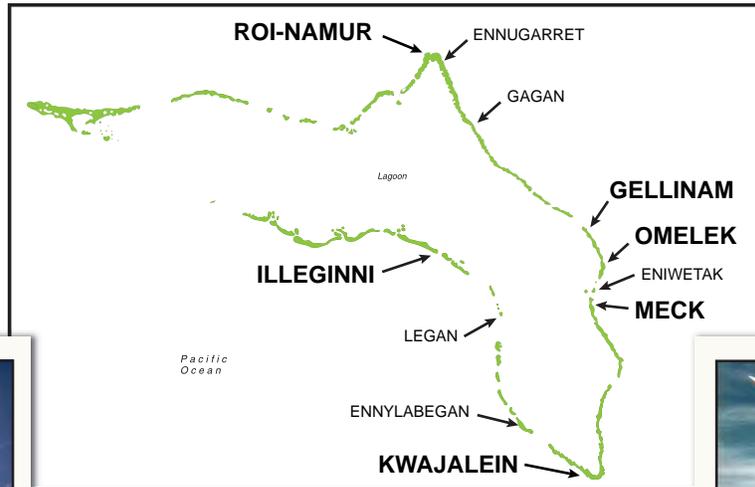


Integrated Flight Tests at U.S. Army Kwajalein Atoll/ Ronald Reagan Ballistic Missile Defense Test Site (USAKA/RTS)



THAAD



Patriot



AN-TPY-2 Radar



C2BMC



Aegis BMD

USAKA/RTS

Environmental Assessment

July 2012

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14. ABSTRACT
This Environmental Assessment (EA) has been prepared to analyze the impacts of performing Integrated Flights (IFTs) at the U.S. Army Kwajalein Atoll/Ronald Reagan Ballistic Missile Defense Test Site, Wake Island, and in the broad ocean area (BOA). It evaluates the potential environmental effects of the proposed demonstrations of the integrated Ballistic Missile Defense System operational effectiveness against short range ballistic missiles, medium range ballistic missiles, and anti-warfare targets in an operationally realistic flight test. The EA identifies and addresses potential environmental impacts from site preparation, flight test, post flight test, and cumulative impacts. It also addresses the No-action Alternative.

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Executive Summary

EXECUTIVE SUMMARY

Introduction

Pursuant to the National Environmental Policy Act (NEPA) of 1969 as amended (42 United States Code 4321, et seq.); the Council on Environmental Quality Regulations for Implementing the Procedural Provisions of NEPA (40 Code of Federal Regulations 1500-1508); 32 CFR Part 989, U.S. Army Kwajalein Atoll Environmental Standards (UES), 12th Edition; Executive Order 12114, Environmental Effects Abroad of Major Federal Actions; and CFR Part 187, Environmental Effects of Major Department of Defense Actions, Department of Defense (DoD) officials should consider environmental consequences when authorizing and approving Federal actions.

Within the DoD, the Missile Defense Agency (MDA) is responsible for developing, testing, and deploying the Ballistic Missile Defense System (BMDS). The BMDS is designed to intercept target missiles during all phases of their flight: ascent, boost, midcourse, and terminal. The mission of the Integrated Flight Tests (IFT) is to demonstrate the integrated BMDS operational effectiveness against short range ballistic missiles (SRBM), medium range ballistic missiles (MRBM), and air-breathing targets in an operationally realistic flight test.

Background

The U.S. Army Kwajalein Atoll/Ronald Reagan Ballistic Missile Defense Test Site (USAKA/RTS), located in the Kwajalein Atoll in the Republic of the Marshall Islands (RMI), is the site of major test facilities for the DoD such as the U.S. Army Space and Missile Defense Command/Army Forces Strategic Command (USASMDC/ARSTRAT).

Kwajalein Island is the largest of the 11 islands that make up USAKA/RTS. The U.S. Government has the right to use USAKA/RTS under the terms and conditions set out in the Military Use and Operating Rights Agreement, an agreement between the U.S. Government and the Government of the RMI. The proposed USAKA/RTS sites for the IFT activities include Meck, Roi-Namur, Omelek, Kwajalein, Gellinam, and Illeginni. Wake Island is a U.S. Territory under the operational control of the US Air Force and is a part of the Wake Atoll. The Atoll consists of three islands: Wake, Wilkes, and Peale. The broad ocean area (BOA) is the part of the high seas outside 12 nautical miles (nm) offshore of any island or atoll in the RMI.

Purpose and Need

In order to demonstrate the integrated performance of the regional/theater BMDS, MDA is planning to conduct a series of flight tests at and around USAKA/RTS. The first two missions are called Flight Test Integrated-01 (FTI-01), planned for the fourth quarter of fiscal year (FY) 2012, and Flight Test Operational-01 (FTO-01) in the third quarter of FY 2013. These tests will demonstrate the BMDS's ability to defeat a raid of up to five targets.

Each of the BMDS systems has proven its individual effectiveness in flight and ground tests. FTI-01 and FTO-01 provide a unique opportunity to demonstrate critical interoperability capabilities of these systems. All three weapon systems (Aegis, Terminal High Altitude Area Defense [THAAD], and Patriot) would be tested in a live-fire integrated test at USAKA/RTS.

Proposed Action

MDA proposes to conduct system-level flight tests that integrate multiple BMDS components. Integrated flight tests would include up to five targets (ballistic missile targets and air-breathing remotely-piloted targets) in flight simultaneously. Aegis Standard Missiles (SMs) could engage SRBM targets, MRBM targets, and/or air-breathing targets. Patriot could engage SRBM targets and/or air-breathing targets. THAAD could engage SRBM and/or MRBM targets. THAAD and Patriot interceptors (Patriot Advanced Capability-2 [PAC-2] and PAC-3) would be launched from USAKA/RTS. Standard Missile-2 and -3 (SM-2 and SM-3) interceptor missiles would be launched by the Aegis BMD ship located in the BOA north of USAKA/RTS.

SRBM targets would be launched from a launch rail on Wake and from the Mobile Launch Platform (MLP) located in the BOA northeast of USAKA/RTS. MRBM targets would be dropped from a C-17 aircraft over the BOA northeast of Wake. Remotely-piloted aircraft would be launched from land locations at USAKA/RTS or from an airborne platform flying above the BOA. MDA proposes to conduct integrated flight tests starting during the fourth quarter of FY 2012.

Alternative 1

Under Alternative 1, up to two THAAD launchers, the THAAD Army-Navy Ground Transportable Radar Surveillance and Control-Series 2 (AN/TPY-2 [TM]) radar, and the Patriot Army Navy/Mobile Combination Radar-65 (AN/MPQ-65) radar would be located on Meck, and up to two PAC-3 launchers on Omelek.

Alternative 2

Under Alternative 2, up to two THAAD launchers, the AN/TPY-2 (TM) radar, and the AN/MPQ-65 radar would be located on Meck with up to two PAC-3 launchers on Gellinam.

Alternative 3

Under Alternative 3, up to two THAAD launchers and the AN/TPY-2 (TM) radar would be located on Meck and the AN/MPQ-65 radar and up to two PAC-3 launchers would be located on Gellinam.

In all three alternative interceptor test configurations, MDA proposes to operate the Aegis BMD ship in the BOA north of USAKA/RTS, an Army-Navy Transportable Radar Surveillance-2 (Forward Based Mode) (AN/TPY-2 [FBM]) radar at Roi-Namur or Wake and a High Frequency (HF) Radar at Roi-Namur, Kwajalein, or Illeginni. Targets to be used would include a combination of up to five of the following targets: air-launched MRBM target(s) launched from a C-17 aircraft staged at Joint Base Pearl Harbor Hickam in Hawaii, or from Wake, or from Guam; ground-launched SRBM target launched from a launch rail on Wake Island; sea-launched SRBM target(s) launched from the Mobile Launch Platform in the BOA; air-breathing target(s) ground-launched from a trailer at either Roi-Namur, or Kwajalein, or Illeginni; and air-launched target(s) from a G1 aircraft that would stage out of Wake or Kwajalein.

No-Action Alternative

The No-action Alternative would be not to conduct IFTs at the action alternative sites. MDA would not be able to demonstrate integrated BMDS effectiveness against SRBM, MRBM, and other threats in an operationally realistic flight test. Previously planned and on-going activities at the alternative sites would continue.

Impact Assessment Methodology

Thirteen broad resources 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, visual aesthetics, and water resources. These areas were analyzed as applicable for the proposed locations or activity.

Results

This section summarizes the conclusions of the analyses made for each of the areas of environmental consideration.

Air Quality

USAKA/RTS: For Alternatives 1, 2, and 3, no substantial cumulative impacts to air quality are expected from the use of USAKA/RTS for missile launch programs. Most of the emission sources on USAKA/RTS are not continuous in nature. The strong tradewinds prevent any localized emissions, including those from missile launches from accumulating. No significant cumulative impacts to air quality have been identified as a result of prior launch-related activities from USAKA/RTS. The activities of the Proposed Action would be performed at varying times and should have negligible cumulative impacts on the air quality of USAKA/RTS.

WAKE: For Alternatives 1, 2, and 3, the Proposed Action would allow various pollutants to be released into the atmosphere; the levels are not expected to violate any federal ambient air quality standards that may apply to Wake. It is believed that there are no air pollution problems at Wake due to the strong trade winds quickly dispersing any local emissions. Additionally, there are no other islands within several hundred miles of Wake Atoll that could be affected by pollutants generated on Wake. Based on this information, air quality on Wake would not be affected.

BOA: For Alternatives 1, 2, and 3, flights (interceptors or targets) occur within a large open area of the ocean. Missile intercepts in this area would result in only temporary, minor, and localized emissions. There is no indication of emissions from the Proposed Action affecting the air quality in the BOA area. No cumulative impacts are anticipated that could significantly affect air quality in the global upper atmosphere of the BOA.

Airspace

USAKA/RTS: For Alternatives 1, 2, and 3, missile launches are short-term, discrete events that are actively managed by USAKA/RTS range safety in coordination with the Federal Aviation Administration. The Proposed Action is not scheduled to occur at the same time as other regional programs. 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 Notices to Airman (NOTAMs) and selection of missile firing areas and trajectories, lessen the potential for significant incremental, additive, cumulative impacts.

WAKE: Since the number of aircraft (one jet route) flying over or near to the island is small and only a small number of IFTs are anticipated for Alternatives 1, 2, and 3, no major impacts are

expected to airspace use. The Proposed Action would not impact airspace management or air traffic control. No cumulative impacts are expected.

BOA: For Alternatives 1, 2, and 3, all missile launches, missile intercepts, and debris impacts would take place in international airspace. There is no airspace segregation method such as a warning or restricted area to ensure that the area would be cleared of nonparticipating aircraft. However, missile launches are short-term, discrete events. The use of the required scheduling and coordination process for international airspace, and adherence to applicable DoD directives and Army regulations concerning issuance of NOTAMs and selection of missile firing areas and trajectories, obviates the potential for significant incremental, additive, cumulative impacts.

Biological Resources

USAKA/RTS: USAKA/RTS has been extensively altered by human activity, and little native vegetation remains to serve as wildlife habitat. No threatened or endangered vegetation has been identified in the project areas. No long-term impacts to vegetation would occur as a result of launch activities on USAKA/RTS. Disturbance to wildlife from the launches would be brief and is not expected to have a lasting impact nor a measurable negative effect on migratory bird populations. For Alternatives 1, 2, and 3, potential impacts of construction, building modification, and missile launches on terrestrial and marine biological resources within the USAKA/RTS have been addressed in detail in the USAKA Environmental Impact Statement (EIS), USAKA Supplemental EIS, Theater Missile Defense Extended Test Range EIS, and the USAKA Temporary Extended Test Range EA.

Also, based on the prior analyses done and the effects of past target and interceptor launch activities, the potential impacts of activities related to IFT activities on biological resources are expected to be minimal. The likelihood that debris from a spent booster or terminated launch would strike a sea turtle or marine mammal is remote since the potential for a launch mishap is small and the marine species tend to be widely scattered. No significant cumulative impacts to biological resources have been identified as a result of prior launch-related activities from USAKA/RTS. These combined activities would be performed at varying times and locations on USAKA/RTS and should have negligible cumulative impacts on biological resources.

WAKE: The site(s) for the launch activities are previously cleared, improved locations. No substantial impacts to vegetation are anticipated from nominal launch activities. Disturbance to wildlife, including migratory birds, from construction noise and increased personnel would be short-term and is not expected to have a lasting impact nor a measurable negative effect.

For Alternatives 1, 2, and 3, adherence to the standard procedures in place to minimize the introduction of invasive species would reduce the potential for cumulative impacts of these species to existing vegetation and wildlife on Wake. No substantial cumulative impacts have been identified as a result of previous launches from Wake Island Launch Center. The Alternative Action in combination with other regional activities should also result in negligible cumulative impacts to biological resources.

BOA: For Alternatives 1, 2, and 3, no substantial impacts to the BOA and its wildlife have been identified from current and past missile test activities. Prior analysis has not identified a significant potential for cumulative impacts. Although IFT activities would take place in the BOA, these would be discrete, short-term events, and no adverse cumulative impacts are anticipated.

Cultural Resources

USAKA/RTS, WAKE, AND BOA: Activities associated with this EA are not expected to adversely affect cultural resources on Meck, Omelek, Gellinam, Illeginni, Wake, or within the BOA. Although there are no known recorded sites within the project footprints at these locations, the potential for subsurface materials to be unexpectedly encountered exists across USAKA and Wake. As a result, project personnel will be briefed during the routine construction briefings and before activities commence at each location regarding the significance of cultural resources and the penalties associated with their disturbance or collection. If, during the course of program activities, prehistoric, historic, or traditional cultural materials, particularly human remains, are discovered, activities in the immediate vicinity of the find would be halted and the USASKA/RTS or Wake environmental office notified. Coordination/consultation required by the UES would be conducted by the USAKA/RTS environmental office as appropriate to the find.

Project activities on Roi-Namur and Kwajalein Islands will take place within areas that are high and high to moderate sensitivity for archaeological resources. The types of cultural remains that could be encountered include human burials, World War II impact craters, lens wells, and subterranean or semi-subterranean facilities and structures. Unless they take place within existing utility lines, all ground disturbing activities within USAKA's high and moderate to high sensitivity areas require archaeological monitoring. Emplacement of the lightning rods (telephone poles with lightning arrestors) associated with the various radars and communications equipment and staking required for the MQM 107-E launch trailer may extend to depths below the ground surface that are sufficient to unexpectedly encounter and adversely affect archaeological remains if they are present. In accordance with the current UES, Document of Environmental Protection (DEP)—Protection of Cultural Resources (04-001), and USAKA Historic Preservation Plan, and depending on the various alternative locations ultimately selected for program activities, archaeological monitoring may be required. Once the locations are finalized, coordination with the USAKA Environmental Coordinator would be conducted.

The Proposed Action and all alternatives meet the definition of actions covered under the DEP—Protection of Cultural Resources (04-001) for both on-going operations and mission activities; therefore, a new or separate DEP for this project is not required.

Geology and Soils

USAKA/RTS

Meck: For Alternatives 1, 2, and 3, launch activities on the Meck are not expected to result in any adverse geological or soil impacts. No adverse changes to soil chemistry are predicted to occur as a result of hydrogen chloride, aluminum oxide, or other solid rocket motor emission products deposited on the soil. Deposition of these materials is expected to be minimal because they disperse in the air.

Roi-Namur, Kwajalein, and Illeginni: Impacts to area soils could occur as a result of augering four holes about 4 feet deep and about 6-8 inches in diameter to stake down the launch trailer. However, this would occur in a previously disturbed area and result in minimal soil damage. Any spills would be remediated in accordance with the UES and Kwajalein Environmental Emergency Plan (KEEP). Adverse impacts to soils, other than slight compaction, are unlikely to occur. For Alternatives 1, 2, and 3, no cumulative adverse effects to soils are anticipated from program activities on Roi-Namur, Kwajalein, and Illeginni. Emission products from nominal launches would be rapidly buffered by the soil. Hazardous byproducts from any spill would be

removed, and any residual accumulation of nitrogen compounds would be ultimately washed out to sea or taken up by plants.

Omelek and Gellinam: The movement of the Patriot Fire Unit and the placement of portable sensors on the proposed USAKA islands are not expected to result in any increase in soil erosion. Adverse impacts to soils, other than slight compaction, are unlikely to occur. For Alternatives 1, 2, and 3, no cumulative adverse effects to soils are anticipated from program activities on Omelek and Gellinam.

WAKE: For Alternatives 1, 2, and 3, the movement and the placement of portable sensors on pre-existing launch sites on Wake are not expected to result in any increase in soil erosion. No cumulative adverse effects to soils are anticipated from program activities. Emission products from nominal launches would be rapidly buffered by the soil. Hazardous byproducts from any spill would be removed and any residual accumulation of nitrogen compounds would be ultimately washed out to sea or taken up by plants.

BOA: Proposed IFT activities would not impact the ocean floor.

Hazardous Materials and Waste

USAKA/RTS: For Alternatives 1, 2, and 3, activities would require use of diesel fuel, solid propellant, and lubricants for the operation of the Proposed Action. Adherence to the standard procedures in place to minimize impacts would preclude the potential accumulation of hazardous materials or waste. As required by the UES, the Army has prepared the KEEP, which addresses the procedure for responding to release of hazardous materials and the management of hazardous material (e.g., import, use, and inventory).

WAKE: For Alternatives 1, 2, and 3, minimal quantities of hazardous waste would be produced by operating on Wake. These materials are similar to waste already generated and handled at Wake. Management of this hazardous waste is the responsibility of the program and would be accomplished in accordance with applicable regulatory requirements.

BOA: For Alternatives 1, 2, and 3, the Proposed Action is not anticipated to produce an accumulation of hazardous material or waste in the BOA; therefore, no impacts are anticipated to the BOA.

Health and Safety

USAKA/RTS: At radar unit operational locations at USAKA, hazards associated with the Proposed Action would be limited to worker exposure to radio frequency radiation, but also, the potential exists for disturbance of unexploded ordnance, if trenching is necessary. However, USAKA has procedures for explosive safety in place and has explosive ordnance disposal personnel onsite. Missile launch operations associated with the Proposed Action have been conducted for many years at USAKA/RTS. While risks associated with these operations will always be present, the use of standard safety procedures minimizes the risks. Best management practices such as establishing launch hazard areas, evacuating personnel from Omelek and Gellinam during actual firing and visually surveying the area prior to operating on site radars all function to minimize the risk to both workers and the public. No cumulative impacts to health and safety are anticipated from the proposed IFT activities.

WAKE: For Alternatives 1, 2, and 3, the increased use of fuels, explosives, and the performance of other launch and radar-related activities would only represent a small increase in the potential safety risk at Wake. No cumulative impacts to health and safety are predicted as a result of MDA IFT activities.

BOA: For Alternatives 1, 2, and 3, each launch would result in the impact of boosters and the payload into the open ocean. The Proposed Action would result in a temporary increase in missile activities in the BOA. The Proposed Action requires the administration of NOTAMs and Notice to Mariners (NOTMARs) to warn aircraft and surface vessels of the potentially hazardous areas and allow them ample time to avoid the hazards. As such, any cumulative health and safety impact in the BOA due to the Proposed Action would be minimal.

Infrastructure

USAKA/RTS: For Alternatives 1, 2, and 3, no adverse impacts to waterway transport are expected from the transport of test components. No impacts are anticipated from the use of generators that would supply power to the radars and launch stations. Sufficient infrastructure would be available and capable of supporting launch activities and the approximately 120 soldiers and other test-related personnel would be deployed in support of the Proposed Action. No cumulative impacts are predicted from the proposed IFT activities.

WAKE: The use of infrastructure facilities at Wake for launch activities has been analyzed in previous documents (e.g., Wake Island Launch Center Supplemental EA, 1999; MDA Wake Island Supplemental EA, 2007) and both concluded no cumulative impacts to infrastructure and transportation would be expected from the Proposed Action; therefore, this resource was not analyzed for Wake Island.

BOA: Infrastructure is not applicable to the BOA; therefore, this resource was not analyzed for this location.

Land Use

USAKA/RTS: There would be no changes in the current land use patterns for USAKA/RTS. The use of the facilities (i.e., placement of radar, launch activities for interceptors or targets) is a normal operation. No impacts are anticipated from the Proposed Action.

WAKE: The Proposed Action would not alter the current land use pattern for Wake. The use of the facilities for the placement of radar, target, and missile launchers is a normal operation. No impacts are anticipated from the Proposed Action.

Noise

USAKA/RTS: For Alternatives 1, 2, and 3, potential noise impacts from the launches of strategic launch vehicles and the operation of their support equipment on USAKA/RTS were addressed in the USAKA Final Supplemental EIS. The EIS concluded that the resulting sound pressure levels would cause neither workplace standards to be violated nor noise sensitive receptors to experience maximum short-term noise levels greater than 92 decibels. Due to the temporary nature of these launch events on USAKA/RTS, the proposed test flights and the use of the radars would not result in short-term or cumulative noise impacts.

WAKE: For Alternatives 1, 2, and 3, the operation of the radar system on and launches from Wake Island are normal activities. Due to the high ambient noise levels from wind and surf, additional noise generated would be negligible. Therefore, no cumulative impacts from the Proposed Action would be expected.

BOA: No substantial impacts to the BOA and its wildlife from program noise have been identified from current and past missile test activities. Prior analysis has not identified a significant potential for cumulative noise impacts. For Alternatives 1, 2, and 3, test flight activities that would take place in the BOA would be discrete, short-term events, and no adverse cumulative impacts are anticipated.

Socioeconomics

USAKA/RTS: Meck, Omelek, Gellinam, and Illeginni are unpopulated and do not have any socioeconomic attributes (population size, employment, income generated, and type and cost of housing). The Proposed Action would have a slight beneficial effect on the potential for new jobs supporting actions on Roi-Namur and Kwajalein. Based on the use of the unpopulated islands and the insignificant effect on Roi-Namur and Kwajalein, this resource was not analyzed further for USAKA/RTS.

WAKE: Only military or contractor personnel live on Wake Island, and the island is an isolated military installation. Because of Wake's location, socioeconomic issues are of no factor; therefore, this resource was not analyzed further for Wake.

BOA: There are no known commercial fishing and commercial shipping routes in the vicinity of the Proposed Action; therefore, this resource was not analyzed further for this location.

Visual Aesthetics

USAKA/RTS: The Proposed Action is not anticipated to alter the current scenic quality of USAKA/RTS.

WAKE: The island is an isolated military installation where actions taken have little effect to the views of government and contracted employees. For Alternatives 1, 2, and 3, the Proposed Action is not anticipated to alter the current scenic quality.

BOA: For Alternatives 1, 2, and 3, the Proposed Action is not anticipated to alter the current scenic quality of the BOA.

Water Resources

USAKA/RTS:

Meck, Omelek, Gellinam, and Illeginni: There are no known surface water, groundwater, and flood zones on Meck, Omelek, Gellinam, and Illeginni. In the unlikely event of an accidental release of hazardous material at the storage area, emergency response personnel would comply with the KEEP.

Roi-Namur and Kwajalein: This resource was not analyzed further for Roi-Namur and Kwajalein.

WAKE: No impacts are anticipated from the Proposed Action; therefore, this resource was not analyzed for Wake.

BOA: For Alternatives 1, 2, and 3, no cumulative effects to water resources are anticipated as a result of the Proposed Action. The effect of any electric generator or rocket motor emission products deposited in the BOA would be very transient due to the buffering capacity of sea water and dilution by current mixing and would not be expected to result in any cumulative effects with ongoing USAKA/RTS activities.

Cumulative Impacts

Most of the emissions sources on USAKA/RTS are not continuous in nature. The strong tradewinds prevent any localized emissions, including those from missile launches from accumulating. Air pollutants do not accumulate at any locations under consideration because winds effectively disperse them between launches. No significant cumulative impacts to air quality have been identified as a result of prior launch-related activities from USAKA/RTS. The activities of the Proposed Action would be performed at varying times and should have negligible cumulative impacts on the air quality of USAKA/RTS. MDA will operate within the parameters of the current Air DEP, which outlines requirements and limitation for air emission sources.

It is believed that there are no air pollution problems at Wake due to the strong trade winds quickly dispersing any local emissions. There are no other islands within several hundred miles of Wake Atoll that could be affected by pollutants generated on Wake. Based on this information, air quality on Wake would not be affected and no cumulative impacts are anticipated. No cumulative impacts are anticipated that could significantly affect air quality in the global upper atmosphere of the BOA.

Missile launches are short-term, discrete events and are actively managed by USAKA/RTS range safety. The Proposed Action is not scheduled to occur at the same time as other regional programs. 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, lessen the potential for significant incremental, additive, cumulative impacts.

The THAAD Pacific Flight Tests EA analyzed up to 50 THAAD missile launches over a period of 4 years, typically ranging from 1 to 14 per year from Meck. The USAKA Supplemental Environmental Impact Statement evaluated the impacts from multiple launches of missiles per year for several years, a maximum of 28 strategic missiles launched in a single year from Meck. These documents concluded that no substantial cumulative impacts to biological resources were expected from the continued use of USAKA/RTS for missile launch programs. Flight tests as part of the MDA IFTs would not exceed these numbers. No significant cumulative impacts to biological resources have been identified as a result of prior launch-related activities from RTS. These combined activities would be performed at varying times and locations on RTS and should have negligible cumulative impacts on biological resources.

Adherence to the standard procedures in place to minimize the introduction of invasive species would reduce the potential for cumulative impacts of these species to existing vegetation and wildlife on Wake. No substantial cumulative impacts have been identified as a result of previous

launches from Wake Island Launch Center. The Alternative Action in combination with other regional activities should also result in negligible cumulative impacts to biological resources.

No substantial impacts to the BOA and its wildlife have been identified from current and past missile test activities. Prior analysis has not identified a significant potential for cumulative impacts. Although MDA IFT activities would take place in the BOA, these would be discrete, short-term events, and no adverse cumulative impacts are anticipated.

There is always potential for unexpected subsurface cultural remains to be encountered. Project personnel would be briefed during the routine construction briefing regarding the significance of these types of resources and the penalties associated with their disturbance or collection. If, during the course of program activities, cultural materials, particularly human remains, are unexpectedly discovered (e.g., during vegetation removal, leveling for the radar, emplacement of lightning protection poles or grounding rods), activities in the immediate vicinity of the find would be halted, and the environmental coordinator would be notified. These actions would minimize the potential for cumulative impacts to cultural resources.

The launcher would be located on the asphalt road and a steel blast plate will be used to reduce damage to the asphalt. This will minimize the potential for impacts to soil. Emission products from nominal launches would be rapidly buffered by the soil. Hazardous byproducts from any spill would be removed, and any residual accumulation of nitrogen compounds would be ultimately washed out to sea or taken up by plants. No cumulative adverse effects to soils are anticipated from IFT activities.

Adherence to the standard procedures in place would preclude the potential accumulation of hazardous materials or waste. As required by the UES, the Army has prepared the KEEP, which addresses the procedure for responding to release of hazardous materials and the management of hazardous material (e.g., import, use, and inventory).

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 the cumulative safety impacts attributable to all USAKA/RTS operations within acceptable standards to both workers and the public. MDA flight tests when combined with other regional activities are not expected to exceed these numbers and would not be performed at the same time as other missile testing that periodically occurs in the region. The increased use of ordnance, explosives, and other hazardous materials and the performance of launch and radar-related activities would represent a small increase in the potential safety risk at USAKA/RTS, and no cumulative impacts are anticipated.

The increased use of ordnance, explosives, and other hazardous materials and the performance of launch and radar-related activities would represent a small increase in the potential safety risk at USAKA/RTS and no cumulative impacts are anticipated. The Proposed Action requires the administration of NOTAMs and NOTMARs to warn aircraft and surface vessels of the potentially hazardous areas and allows them ample time to avoid the hazards. As such, any cumulative health and safety impact in the BOA due to the Proposed Action would be minimal.

Sufficient infrastructure would be available and capable of supporting the personnel associated with the launch activities. The demand on electrical, wastewater, solid waste, water, and marine transport needed to support the personnel is expected to be within the current capacity of the utility systems on Meck. No cumulative impacts are predicted. There would be no changes in the current land use patterns at USAKA, Wake, or the BOA.

Given the temporary nature of the planned launch events, the proposed test flights and the use of the radar systems would not result in cumulative noise impacts. No noise sensitive noise receptors are in the vicinity of planned activities (soldiers would be evacuated from the island during rehearsal and on firing day). No substantial impacts to the BOA and its wildlife from program noise have been identified from current and past missile test activities. Prior analysis has not identified a significant potential for cumulative noise impacts.

The Proposed Action would have a slight beneficial effect on the on the potential for new jobs supporting actions on Roi-Namur and Kwajalein. The Proposed Action is not anticipated to alter current scenic views since all program elements would be located on existing military facilities.

There are no known surface water, groundwater and flood zones on the islands. In the unlikely event of an accidental release of hazardous material at the storage area, emergency response personnel would comply with the KEEP. No cumulative impacts are expected from the Proposed Action.

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Acronyms and Abbreviations

ACRONYMS AND ABBREVIATIONS

AAF	Army Airfield
AD	Anno Domini
AEU	Antenna Equipment Unit
AN/MPQ-65	Army Navy/Mobile Combination Radar-65
AN/SPY-1	Army-Navy Surface Water Craft Surveillance and Control Radar-1
AN/TPY-2 (FBM)	Army-Navy Ground Transportable Radar Surveillance and Control-Series 2 Forward Based Mode
AN/TPY-2 (TM)	Army-Navy Ground Transportable Radar Surveillance and Control-Series 2 Terminal Mode
APE	Area of Potential Effects
ARAV-B	Aegis Readiness Assessment Vehicle-B
ARTCC	Air Route Traffic Control Center
AWS	Aegis Weapon System
BMD	Ballistic Missile Defense
BMDS	Ballistic Missile Defense System
BOA	Broad Ocean Area
BOS	Base Operations Support
C2BMC	Command, Control, Battle Management, and Communications
C3	Command Control and Communication
CEQ	Council on Environmental Quality
CES	Carriage Extraction System
CEU	Cooling Equipment Unit
CFC	Chlorofluorocarbons
CFR	Code of Federal Regulations
CH ₄	Methane
CO ₂	Carbon dioxide
CONEX	Container Express (Military Shipping Container)
CRG	Communications Relay Group
DACS	Divert and Attitude Control System
DEP	Document of Environmental Protection
DoD	Department of Defense
DOT	Department of Transportation
EA	Environmental Assessment
ECS	Engagement Control Station
EEU	Electronic Equipment Unit

EIS	Environmental Impact Statement
EO	Executive Order
EPP	Electric Power Plant
E-LRALT	Extended Long Range Air Launched Target
eMRBM	Extended Medium Range Ballistic Missile
ESQD	Explosive Safety-Quantity Distance
°F	Degree(s) Fahrenheit
FAA	Federal Aviation Administration
FBM	Forward-Based Mode
FMA	Foreign Military Asset
FMTV	Family of Medium Tactical Vehicles
FONSI	Finding of No Significant Impact
FTI-01	Flight Test Integrated-01
FTO-01	Flight Test Operational-01
FTS	Flight Termination System
FY	Fiscal Year
GHG	Greenhouse Gases
HEMTT	Heavy Expanded Mobility Tactical Truck
HF	High Frequency
HPP	Historic Preservation Plan
ICAO	International Civil Aviation Organization
ICC	Information Coordination Center
IFT	Integrated Flight Test
IRFNA	Inhibited Red Fuming Nitric Acid
KEEP	Kwajalein Environmental Emergency Plan
kHz	Kilohertz
kVA	Kilovolt Ampere
kW	Kilowatt
LCS	Launch Control Station
LHA	Launch Hazard Area
LMTV	Light Medium Tactical Vehicle
LS	Launching Station
MAB	Missile Assembly Building
MDA	Missile Defense Agency
MEP	Mobile Electric Power
MHz	Megahertz
MLP	Mobile Launch Platform

MRBM	Medium Range Ballistic Missile
MSS	Mission Support Shelter
MW	Megawatt(s)
N ₂ O	Nitrous oxide
NEPA	National Environmental Policy Act
nm	Nautical Miles
NOAA	National Oceanic and Atmospheric Administration
NOTAM	Notice to Airmen
NOTMAR	Notice to Mariners
OSHA	Occupational Safety and Health Administration
PAC-2	Patriot Advanced Capability 2
PAC-3	Patriot Advanced Capability 3
PMRF	Pacific Missile Range Facility
PPU	Prime Power Unit
RCC	Range Commanders Council
REC	Record of Environmental Consideration
RMI	Republic of the Marshall Islands
RO	Reverse Osmosis
RS	Radar Station
SATCOM	Satellite Communications
SM	Standard Missile
SM-2 Blk IIA	Standard Missile 2 Block IIA
SM-3 Blk IA	Standard Missile 3 Block IA
SRBM	Short Range Ballistic Missile
TADIL	Tactical Data Information Link
TFCC	THAAD Fire Control and Communications
THAAD	Terminal High Altitude Area Defense
TOC	Tactical Operations Center
TOS	Tactical Operation Station
TPW	Tactical Planner Workstation
TTS	Transportable Telemetry System
UES	U.S. Army Kwajalein Atoll Environmental Standards
USAKA	U.S. Army Kwajalein Atoll
USAKA/RTS	U.S. Army Kwajalein Atoll/Ronald Reagan Ballistic Missile Defense Test Site
USASMDC/ARSTRAT	U.S. Army Space and Missile Defense Command/Army Forces Strategic Command

USASSDC
USEPA
VLS

U.S. Army Space and Strategic Defense Command
United States Environmental Protection Agency
Vertical Launcher System

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1.0 Purpose and Need

1.0 PURPOSE AND NEED

This Environmental Assessment (EA) has been prepared by the Missile Defense Agency (MDA) to analyze the impacts of performing Integrated Flight Tests (IFT) at the U.S. Army Kwajalein Atoll/Ronald Reagan Ballistic Missile Defense Test Site (USAKA/RTS), Wake Island, and in the broad ocean area (BOA). Figure 1-1 provides a regional map of the area. Figures 1-2 and 1-3 show USAKA/RTS and Wake Island.

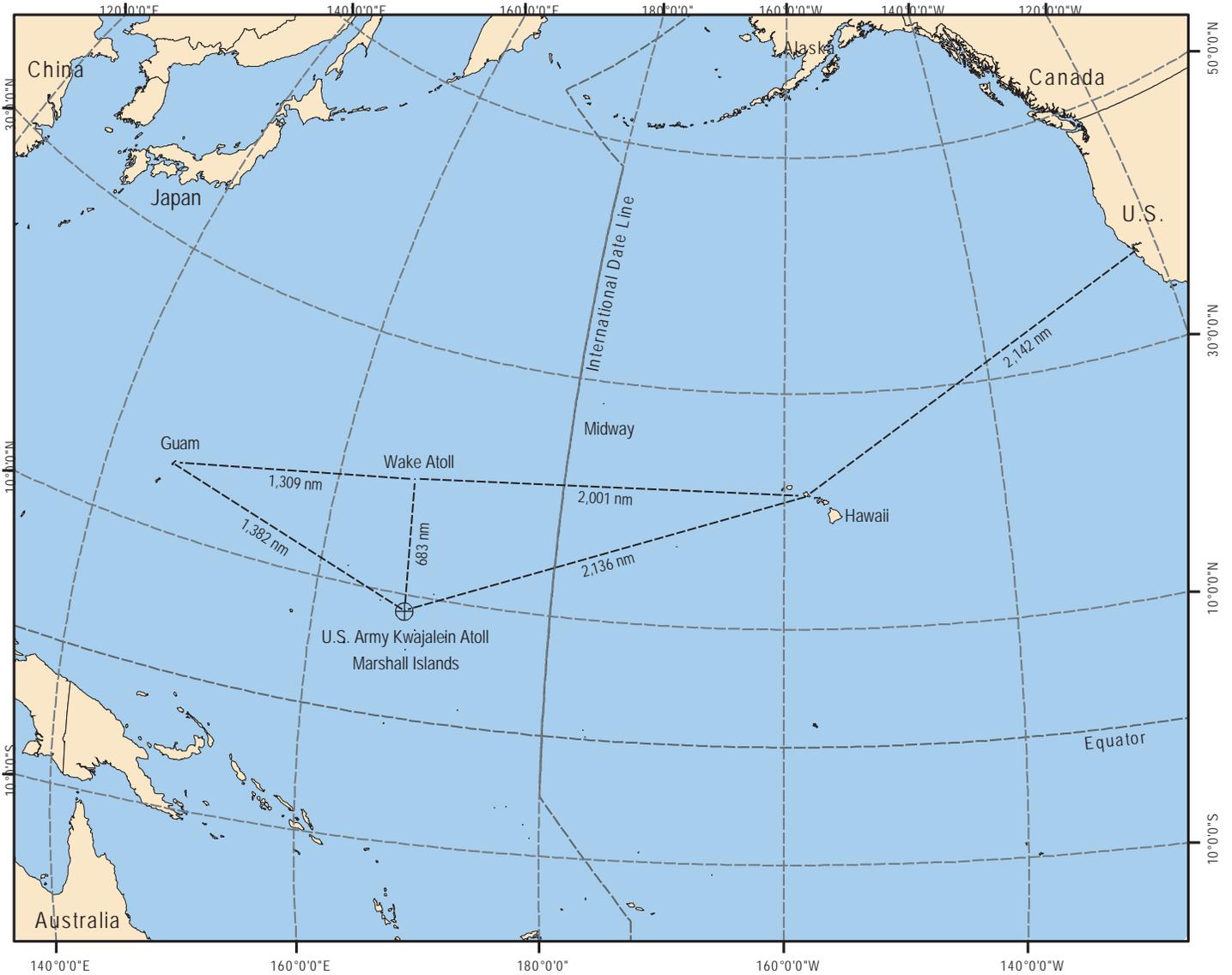
This EA is in compliance with the National Environmental Policy Act (NEPA) of 1969, as amended (42 United States Code § 4321 et seq.); the Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (Title 40 Code of Federal Regulations [CFR] §§ 1500-1508 (2005)); 32 CFR Part 989, U.S. Army Kwajalein Atoll Environmental Standards (UES), 12th Edition; Executive Order (EO) 12114, *Environmental Effects Abroad of Major Federal Actions*; and CFR Part 187, *Environmental Effects of Major Department of Defense Actions*.

1.1 BACKGROUND

USAKA/RTS, located in the Kwajalein Atoll in the Republic of the Marshall Islands (RMI), is the site of major test facilities for the Department of Defense (DoD) such as the U.S. Army Space and Missile Defense Command/Army Forces Strategic Command (USASMDC/ARSTRAT). The programs that USAKA/RTS supports include Army missile defense, MDA demonstration and validation, Air Force Intercontinental Ballistic Missile development and operational testing, U.S. Space Surveillance Network, and National Aeronautics and Space Administration Space Transportation orbital debris experiments.

Kwajalein is the largest of the 11 islands in the RMI used under the terms of the Military Use and Operating Rights Agreement by USAKA/RTS: Kwajalein, Ennylabegan (Carlos), Legan, Illeginni, Roi-Namur, Ennugarret, Gagan, Gellinam, Omelek, Eniwetak, and Meck. The proposed USAKA/RTS locations for the integrated flight tests include Meck, Roi-Namur, Omelek, Kwajalein, Gellinam, and Illeginni. Kwajalein is approximately 748 acres in size, and remains one of the most important and busiest of the islands. It is bounded on the north and west by Kwajalein Lagoon and on the east and south by the Pacific Ocean. It is the headquarters and main logistical base for USAKA/RTS, and has a population of about 1,400 (April 2012).

Wake Island is a part of the Wake Atoll. The Atoll consists of three islands: Wake, Wilkes, and Peale. Wake is less than 3 square miles in area and lies in the middle of the Pacific Ocean, roughly halfway between Hawaii and Japan. The United States annexed Wake in 1899 for a cable station. In subsequent years, Wake was developed as a stopover and refueling site for military and commercial aircraft transiting the Pacific. The island's airstrip has been used by the U.S. military and some commercial cargo planes, as well as for emergency landings. Wake has the capability to support missile launches. It is primarily an emergency divert airfield or planned stopover location on cross-Pacific military flights. About 140 contract employees and 4 active-duty military members reside on Wake.



EXPLANATION

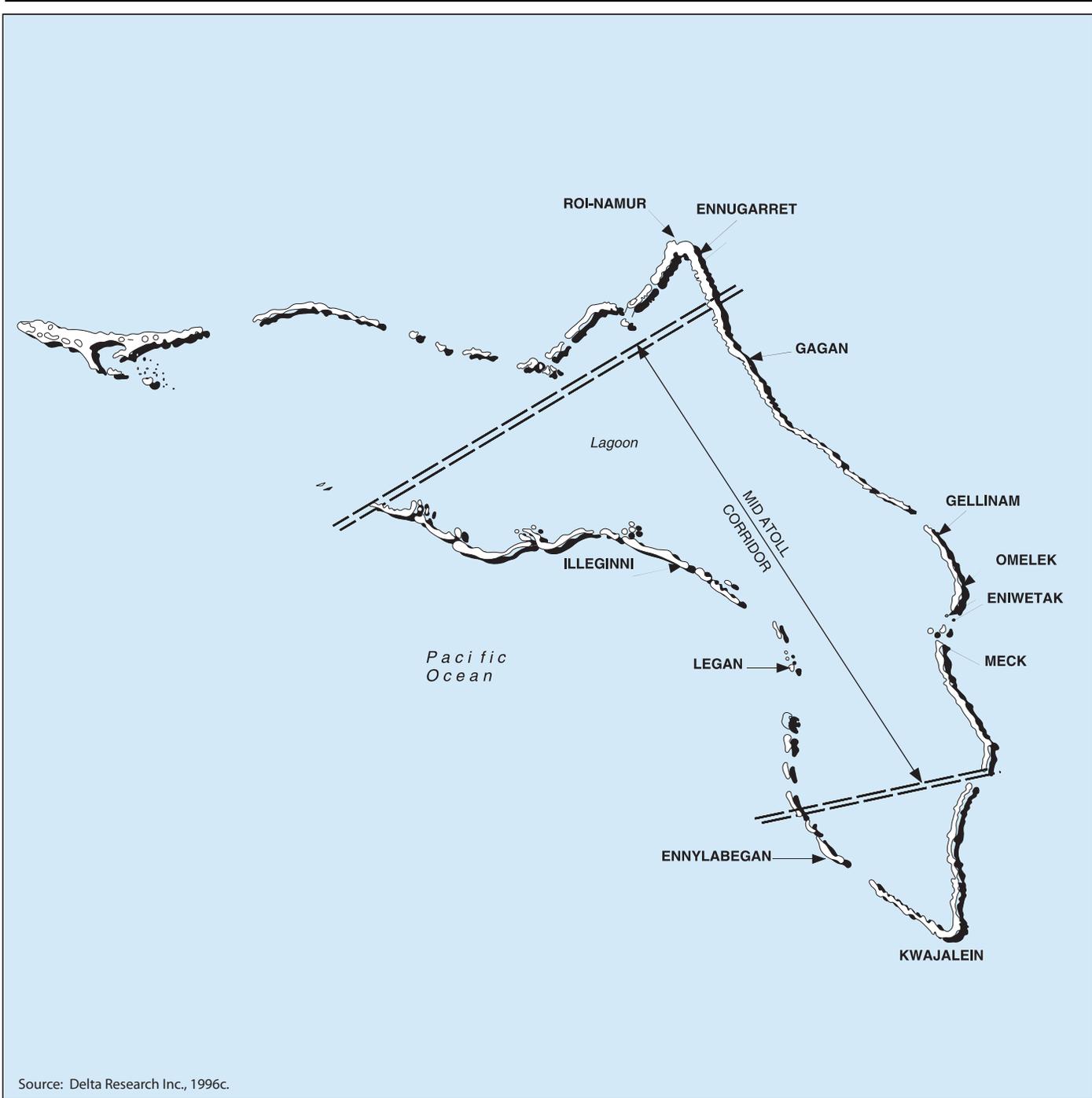
nm - Nautical Mile



Regional Location of Kwajalein Atoll and Wake Atoll

Pacific Ocean

Figure 1-1



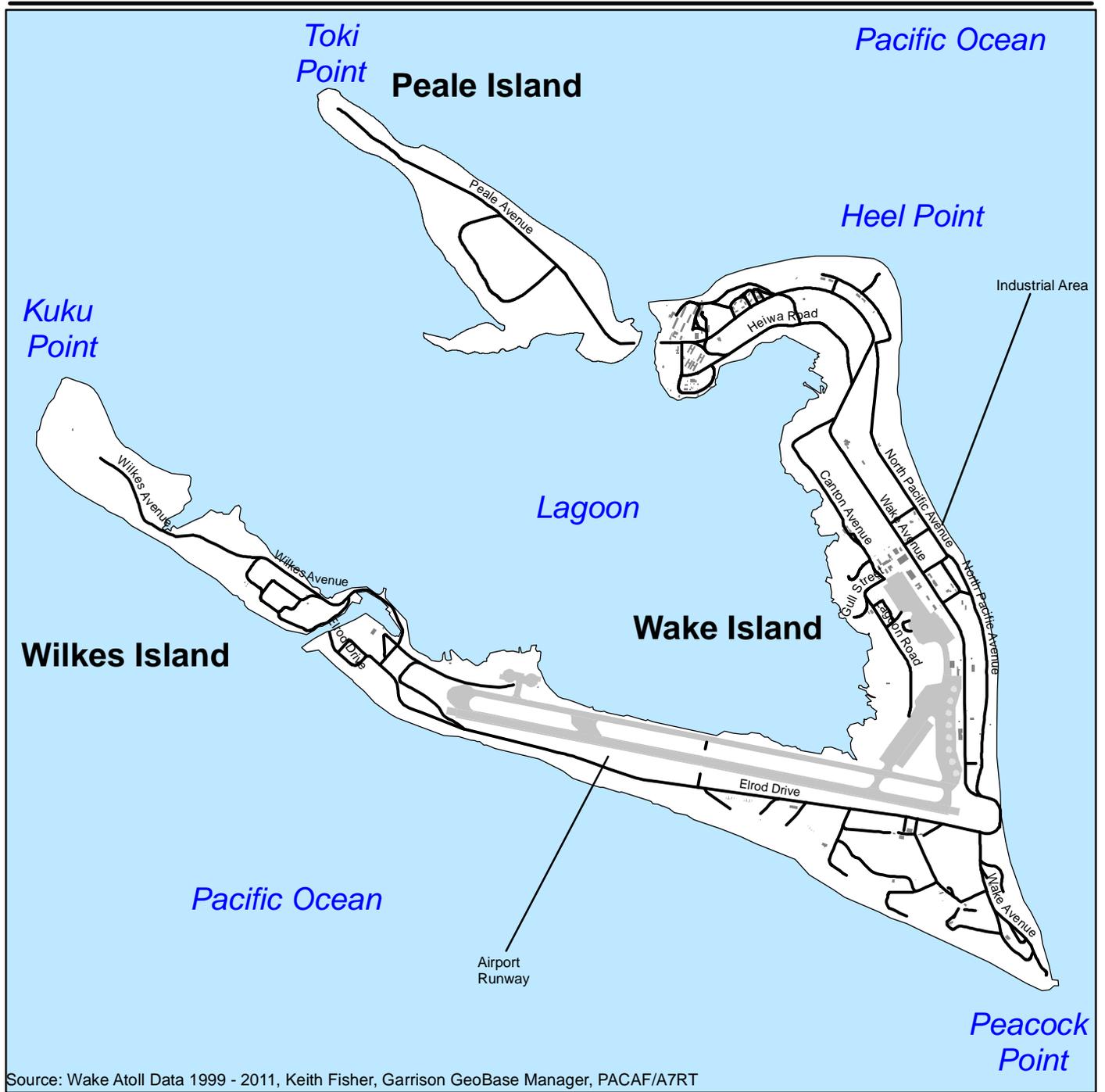
EXPLANATION

U.S. Army Kwajalein Atoll/ Ronald Reagan Ballistic Missile Defense Test Site (USAKA/RTS)

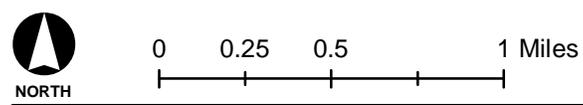
Kwajalein Atoll

Figure 1-2

Not to scale



- EXPLANATION**
-  Roads
 -  Buildings



Wake Island

Wake Atoll

Figure 1-3

The BOA is the part of the high seas outside 12 nautical miles (nm) offshore of any islet or atoll in the RMI. Any U.S. Government activity performed in the BOA is subject to EO 12114.

1.2 SCOPE OF ENVIRONMENTAL ASSESSMENT

This EA is prepared in compliance with the following statutes and regulations that direct DoD lead-agency officials to consider potential environmental consequences when authorizing or approving federal actions:

- The NEPA of 1969, as amended
- The CEQ regulations that implement NEPA (Code of Federal Regulations, Title 40, Parts 1500-1508)
- DoD Instruction 4715.9, *Environmental Planning and Analysis*
- 32 CFR Part 651, *Environmental Analysis of Army Actions* (Army Regulation 200-2)
- Compact of Free Association between the Governments of the United States and Republic of the Marshall Islands, 2003
- *Environmental Standards and Procedures for United States Army Kwajalein Atoll (USAKA) Activities in the Republic of the Marshall Islands, Twelfth Edition, August 2011*

This EA evaluates the potential environmental effects of the proposed demonstrations of the integrated Ballistic Missile Defense System (BMDS) operational effectiveness against short range ballistic missile (SRBM), medium range ballistic missile (MRBM), and air-breathing targets in an operationally realistic flight test. The EA identifies and addresses potential environmental impacts at USAKA/RTS locations in the RMI, Wake Atoll, and the BOA. Impacts could result from site preparation and pre-flight activities at launch and other support locations, missile flight tests, successful intercept events, and post-flight activities. Analysis of alternative locations for proposed activities is included. The EA also considers the No-action Alternative. If this alternative were chosen, the IFT activities described in the EA would not take place. Ongoing and future activities for which potential environmental effects have been analyzed and documented would continue.

The EA addresses all of the reasonably foreseeable activities in the particular geographical areas affected by the Proposed Action and the No-action Alternative and focuses on the activities ready for the DoD and other related federal and resource agency decisions. The majority of activities would use existing facilities and/or be on previously disturbed land.

Consistent with the President's CEQ regulations, the scope of the analysis presented in this EA was defined by the range of potential environmental impacts that would result from implementation of the Proposed Action or the No-action Alternative. Resources that have a potential for impacts were considered in the EA analysis to provide the decision makers with sufficient evidence and analysis for evaluation of the potential effects of the action. For this EA, the environment is discussed in terms of 13 resource areas. Each resource area is discussed at each location addressed in this EA proportionate to the potential for environmental impacts.

1.3 PURPOSE AND NEED

1.3.1 PURPOSE OF AND NEED FOR THE PROPOSED ACTION

In order to demonstrate the integrated performance of the regional/theater BMDS, MDA is planning to conduct a series of flight tests at and around USAKA/RTS. The first two missions are called Flight Test Integrated-01 (FTI-01) in the fourth quarter of fiscal year (FY) 2012 and Flight Test Operational-01 (FTO-01) in the third quarter of FY 2013. These tests will demonstrate the BMDS's ability to defeat a raid of up to five targets.

Each of the BMDS systems has proven its individual effectiveness in flight and ground tests. FTI-01 and FTO-01 provide a unique opportunity to demonstrate critical interoperability capabilities of these systems. All three weapon systems (Aegis, Terminal High Altitude Area Defense [THAAD], and Patriot) would be tested in a live-fire integrated test at USAKA/RTS.

1.4 DECISION(S) TO BE MADE

The decision to be made, based in part on the analysis presented in the EA, is where to locate the interceptor system test components, which include an Aegis Ballistic Missile Defense (Aegis BMD) ship, a THAAD unit, and a Patriot Advanced Capability 3 (PAC-3) unit to conduct IFT. MDA can accomplish the Proposed Action by selection of one of three alternatives:

- Alternative 1—To locate up to two THAAD launchers, the THAAD Army-Navy Ground Transportable Radar Surveillance and Control-Series 2 (AN/TPY-2 [TM]) radar, and the Patriot Army Navy/Mobile Combination Radar-65 (AN/MPQ-65) radar on Meck, and up to two PAC-3 launchers on Omelek.
- Alternative 2—To locate up to two THAAD launchers, the AN/TPY-2 (TM) radar, and the AN/MPQ-65 radar on Meck with up to two PAC-3 launchers on Gellinam.
- Alternative 3—To locate up to two THAAD launchers and the AN/TPY-2 (TM) radar on Meck and to locate the AN/MPQ-65 radar and up to two PAC-3 launchers on Gellinam.

In all three alternative interceptor test configurations, MDA proposes to operate the Aegis BMD ship in the BOA north of USAKA/RTS, an Army-Navy Transportable Radar Surveillance-2 (Forward Based Mode) (AN/TPY-2 [FBM]) radar at Roi-Namur or Wake and a High Frequency (HF) Radar at Roi-Namur, Kwajalein, or Illeginni. Targets to be used would include a combination of up to five of the following targets: air-launched MRBM target(s) launched from a C-17 aircraft staged at Joint Base Pearl Harbor Hickam in Hawaii, or from Wake, or from Guam; ground-launched SRBM target launched from a launch rail on Wake Island; sea-launched SRBM target(s) launched from the Mobile Launch Platform in the BOA; air-breathing target(s) ground-launched from a trailer at either Roi-Namur, or Kwajalein, or Illeginni; and air-launched target(s) from a G1 aircraft that would stage out of Wake or Kwajalein. Table 1-1 illustrates the alternative sites considered for the location of IFT interceptor components, and Table 1-2 illustrates the location alternatives for the IFT target components.

The decision-maker(s) could also select the No-action Alternative, which would be to not conduct IFT at the proposed alternative locations.

Table 1-1. Location Alternatives for Integrated Flight Test Interceptor Components

	AN/TPY-2 (TM)	THAAD Launcher	AN/MPQ-65	PAC-3 Launch Stations	AN/TPY-2 (FBM)	HF Radar	Aegis
Alternative 1	Meck	Meck	Meck	Omelek	Roi-Namur (or Wake)	Roi-Namur or Kwajalein (or Illeginni)	BOA
Alternative 2	Meck	Meck	Meck	Gellinam	Roi-Namur (or Wake)	Roi-Namur or Kwajalein (or Illeginni)	BOA
Alternative 3	Meck	Meck	Gellinam	Gellinam	Roi-Namur (or Wake)	Roi-Namur or Kwajalein (or Illeginni)	BOA

Table 1-2. Location Alternatives for Integrated Flight Test Target Components

	Land Launched Target – Rail/Missile	Air Launched Target – C-17/Missile	Sea Launched Target – MLP/Missile	Air Launched Target – Gulfstream/Target	Land Launched Target – Trailer/Target
Alternative 1	Wake	Wake*, JBPHH, or Guam Staging/BOA	BOA	Wake or Kwajalein Staging and Ground Control/BOA	Roi-Namur (Kwajalein or Illeginni)
Alternative 2	Wake	Wake*, JBPHH, or Guam Staging/BOA	BOA	Wake or Kwajalein Staging and Ground Control/BOA	Roi-Namur (Kwajalein or Illeginni)
Alternative 3	Wake	Wake*, JBPHH, or Guam Staging/BOA	BOA	Wake or Kwajalein Staging and Ground Control/BOA	Roi-Namur (Kwajalein or Illeginni)

Note: All air and sea launched targets and intercepts are in the BOA

BOA = Broad Ocean Area

JBPHH = Joint Base Pearl Harbor Hickam

* = Staging locations for target delivery systems

1.5 PUBLIC NOTIFICATION AND REVIEW

In accordance with the CEQ 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 will be published in the newspapers identified in Table 1-3.

Table 1-3. Local Newspapers

Country or State	City/Town	Newspaper
Republic of the Marshall Islands	Majuro	<i>Marshall Islands Journal</i>
	USAKA/RTS	<i>Kwajalein Hourglass</i>

Copies of the EA and Draft FONSI have been placed in local libraries and are available on the Internet at http://www.mda.mil/news/environmental_reports.html.

1.6 RELATED ENVIRONMENTAL DOCUMENTATION

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

- *USAKA/RTS Facility Closure and Demolitions Final Supplemental Environmental Assessment*, August 2011
- *USAKA/RTS Facility Closures and Demolitions Environmental Assessment*, June 2009
- *Flexible Target Family Environmental Assessment*, October 2007
- *SpaceX Falcon Program Environmental Assessment*, September 2007
- *Missile Defense Agency Wake Island Supplemental Environmental Assessment*, February 2007
- *Micronesia Cable System Environmental Assessment*, USAKA, May 2006
- *Roi Fuel/Supply Pier Replacement Environmental Assessment*, November 2005
- *Missile Defense Agency Mobile Sensors Environmental Assessment*, September 2005
- *Proof of Principle Space Launches from Omelek Island Environmental Assessment*, December 2004
- *Minuteman III Modification Environmental Assessment*, December 2004
- *Missile Defense Agency Mobile Launch Platform (MLP) Environmental Assessment*, June 2004
- *Programmatic Environmental Assessment United States Army Kwajalein Atoll Real Property Master Plan Implementation*, May 2004
- *Ground-Based Midcourse Defense (GMD) Extended Test Range (ETR) Final Environmental Impact Statement*, July 2003
- *Theater High Altitude Area Defense (THAAD) Pacific Test Flights Environmental Assessment*, December 2002
- *Development and Demonstration of the Long Range Air Launch Target System Environmental Assessment*, October 2002

- *Ballistic Missile Defense Organization Cooperative-Engagement-Capability/Patriot (CEC/Patriot) Interoperability Test*, July 2000
- *Wake Island Launch Center Supplemental Environmental Assessment*, October 1999
- *Patriot Advanced Capability-3 (PAC-3) Life-cycle Environmental Assessment*, May 1997
- *USAKA Temporary Extended Test Range Environmental Assessment*, October 1995
- *Wake Island Environmental Assessment*, January 1994
- *Final Supplemental Environmental Impact Statement Proposed Actions at U.S. Army Kwajalein Atoll*, December 1993
- *Extended Range Intercept Technology Environmental Assessment*, Huntsville, AL, September, 1991
- *Final Environmental Impact Statement Proposed Actions at U.S. Army Kwajalein Atoll*, October 1989

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2.0 Description of Proposed Action and Alternatives

2.0 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

This chapter describes the Proposed Action, the Action Alternatives, the No-action Alternative, and alternatives considered but eliminated from further study.

2.1 OVERVIEW

MDA was established to manage and integrate all missile defense programs and technologies into one BMD system. MDA is responsible for developing and testing conceptual BMD systems. Two of the priorities of missile defense are: (1) to defend the United States and its deployed forces, allies, and friends; and (2) to employ a BMD system that consists of layers of defenses to intercept ballistic missiles in all phases of their flight (ascent, boost, midcourse, and terminal) against all ranges of threats (short, medium, intermediate, and long). MDA proposes to conduct system-level flight tests that integrate multiple BMDS components.

Integrated flight tests would include up to five targets (ballistic missile targets and air-breathing remotely-piloted targets) in flight simultaneously. Aegis Standard Missiles (SMs) could engage SRBM targets, MRBM targets, and/or air-breathing targets. Patriot could engage SRBM targets and/or air-breathing targets. THAAD could engage SRBM and/or MRBM targets. THAAD and Patriot interceptors (Patriot Advanced Capability-2 [PAC-2] and PAC-3) would be launched from USAKA/RTS. Standard Missile-2 and -3 (SM-2 and SM-3) interceptor missiles would be launched by the Aegis BMD ship located in the BOA north of USAKA/RTS.

SRBM targets would be launched from a launch rail on Wake and from the Mobile Launch Platform (MLP) located in the BOA northeast of USAKA/RTS. MRBM targets would be dropped from a C-17 aircraft over the BOA northeast of Wake. Remotely-piloted air-breathing target would be launched from land locations at USAKA/RTS or from an airborne platform flying above the BOA. MDA proposes to conduct integrated flight tests starting during the fourth quarter of FY 2012. Tables 1-1 and 1-2 provide the alternative locations for IFT radars, interceptors, and targets.

2.2 DESCRIPTION OF THE PROPOSED ACTION

2.2.1 PROPOSED INTEGRATED FLIGHT TESTS

While the targets involved in integrated flight tests would be in flight near simultaneously, a representative test scenario is easier to understand by considering each target engagement separately.

2.2.1.1 Test Scenarios

One target missile, a ground-launched SRBM target, would be launched from a fixed pad or rail launcher located on Wake. A U.S. Navy ship equipped with the Aegis combat system cruising

between Wake and Kwajalein Atoll would use its Army-Navy Surface Water Craft Surveillance and Control Radar (AN/SPY-1) to detect and track the ground-launched SRBM target. Aegis personnel would attempt to intercept it by launching an SM-3 Block IA (SM-3 Blk IA) interceptor missile. The SM-3 would collide with the ground-launched SRBM target outside the Earth's atmosphere (termed an exoatmospheric intercept) and destroy it by force of impact. The resulting debris is planned to fall into the BOA north of Kwajalein Atoll.

A second target missile, an air launched MRBM target, would be carried from a forward staging area (FSA) to the launch area inside a government C-17 aircraft. At a predetermined location above the BOA northeast of Wake, the air-launched MRBM target missile and carriage extraction system would exit the aircraft as a single unit and descend toward the ocean surface suspended by parachutes. At a specific altitude above the ocean surface, the carriage extraction system would release the target missile, allowing it to fall freely; the missile's solid rocket motor (SRM) would ignite, placing it on a southerly ballistic trajectory toward the BOA north of Kwajalein Atoll. The AN/TPY-2 (TM) on Meck would detect and track the air-launched MRBM target. MDA would attempt to intercept the air-launched MRBM target by launching up to two THAAD interceptor missiles almost simultaneously from the THAAD launchers on USAKA/RTS to collide with the target high in the Earth's atmosphere (termed a high endoatmospheric intercept) or in an exoatmospheric intercept and destroy it by force of impact. Debris from this engagement is planned to fall into the BOA north of Kwajalein Atoll. The second THAAD missile would run out of fuel and fall (whole body) into the BOA.

The third target missile, a Foreign Military Asset (FMA) is an SRBM that would be launched from the MLP at sea to the northeast of Kwajalein Atoll. This target would lift off from the MLP's deck and fly in a southwesterly direction toward the ocean east of Kwajalein Atoll. The Patriot unit's AN/MPQ-65 on USAKA/RTS would detect and track the target missile's flight. Up to two Patriot interceptor missiles would be launched almost simultaneously to collide with the SRBM target in the Earth's atmosphere and destroy it by force of impact. A THAAD missile could also engage the SRBM if a re-plan of test activities occurs. The resulting debris is planned to fall into the BOA north and east of Kwajalein Atoll.

An air-breathing target, the BQM-74E, would be launched from a Gulfstream aircraft above the BOA. The Gulfstream aircraft would be staged from Wake or Kwajalein as an alternative. Once free of the aircraft, the target would fly under its own power toward the Aegis ship on a path emulating a threat. The target's flight would be controlled by personnel at a control station on Wake or Kwajalein. Using its AN/SPY-1 radar, the Aegis ship would detect the air-breathing target and attempt to intercept it by launching a SM-2 Blk II interceptor missile. The SM-2 would fly close to the BQM-74E target, but no collision between the SM-2 and BQM-74E is planned. Once it has passed the BQM-74E target, the SM-2 would be detonated by command and the resulting debris would fall into the BOA. The BQM-74E target would fly into a stall attitude, deploy a parachute, and descend to the ocean surface where it would be recovered. In the unlikely event the SM-2 did contact the BQM-74E target, the resulting debris would fall into the BOA.

A second air-breathing target, the MQM-107E, would be launched from a trailer staked to a land location on Roi-Namur. Kwajalein and Illeginni are alternate sites. Controlled by personnel located near the launch site, the target would quickly gain altitude and fly to a designated area where it would begin flying in a pattern that emulates a threat in flight. The Patriot unit's AN/MPQ-65 on USAKA/RTS would detect and track the target's flight. Up to two PAC-3 or

PAC-2 missiles would be launched to collide with the air-breathing target in the Earth's atmosphere and destroy it by force of impact. The resulting debris is planned to fall into the BOA north of Kwajalein Atoll. Alternately, testing activities may require the Patriot system to engage two MQM targets if a replan of test activities occurs.

A HF radar located on Roi-Namur or Kwajalein would also support the test scenarios discussed above. This radar would be used to monitor and gather target and intercept data. This radar is discussed in detail in section 2.2.4.2.

All engagements would occur over the BOA north of Kwajalein Atoll. Debris resulting from successful missile intercepts is planned to fall into the BOA. NEPA documents that analyzed various flight tests that result in intercept debris and target and interceptor boosters falling in the BOA include the *Development and Demonstration of the Long Range Air Launch Target System Environmental Assessment* (U.S. Department of the Air Force, October 2002); the *Theater High Altitude Area Defense (THAAD) Pacific Test Flights EA*, U.S. Army Space and Missile Defense Command, December 2002); and the *Advanced Hypersonic Weapon Program Final EA* (U.S. Army Space and Missile Defense Command/Army Forces Strategic Command, June 2011). If an intercept was not successful, target and interceptor missiles would continue flying on a ballistic path until they were destroyed by flight termination systems (FTSs) or by impact with the ocean surface in the BOA. No debris hazardous to human health would fall on inhabited land. All debris resulting from integrated flight tests, to include booster drops and intercept debris, would conform to Range Commanders Council (RCC) Standard 321-10, *Common Risk Criteria Standards For National Test Ranges*, December 2010.

Proposed land-based activities associated with integrated flight tests are similar to activities described in the Final Supplemental Environmental Impact Statement, *Proposed Actions at U.S. Army Kwajalein Atoll*, U.S. Army Space and Strategic Defense Command, December 1993. That document described "...tests [that] could involve all-range operational tests with up to six SLVs [space launch vehicles] launched from USAKA/RTS and two targets... all launched within a period of a few minutes... Some of the launches for TMD [Theater Missile Defense] testing could involve the launch of interceptors from Illeginni, Omelek, or Meck to intercept targets launched from aircraft and ocean platforms (such as ships, MLP or barges)...."

The types of target missiles and launching methods proposed for integrated flight tests were discussed in the *Theater High Altitude Area Defense Pacific Test Flights Environmental Assessment* (U.S. Army Space and Missile Defense Command, 2002). The FONSI for that document concluded that no significant impacts would occur as a result of the construction and operation of any of the analyzed THAAD test sites and related support facilities.

2.2.1.2 Safety and Range Control

Range Safety

Range Safety at RTS includes missile flight control, laser safety, ionizing radiation safety, toxic and thermal hazards safety, directed energy safety, and explosive and ordnance safety. U.S. Air Force 3rd SW, Elmendorf AFB, AK is the Wake Island range safety authority. However, Wake, located 683 miles north of the Kwajalein Atoll, is a functional adjunct to RTS, providing a launch site for intermediate range target missiles. Program requirements, mission planning and implementation, and logistics support are coordinated through RTS. Range users are required

to provide specific information about their programs so that a safety analysis of all types of hazards can be completed and appropriate remedial procedures taken before initiation of hazardous activities. RTS establishes and maintains appropriate Explosive Safety Quantity Distances (ESQDs) around facilities where ordnance is stored and handled.

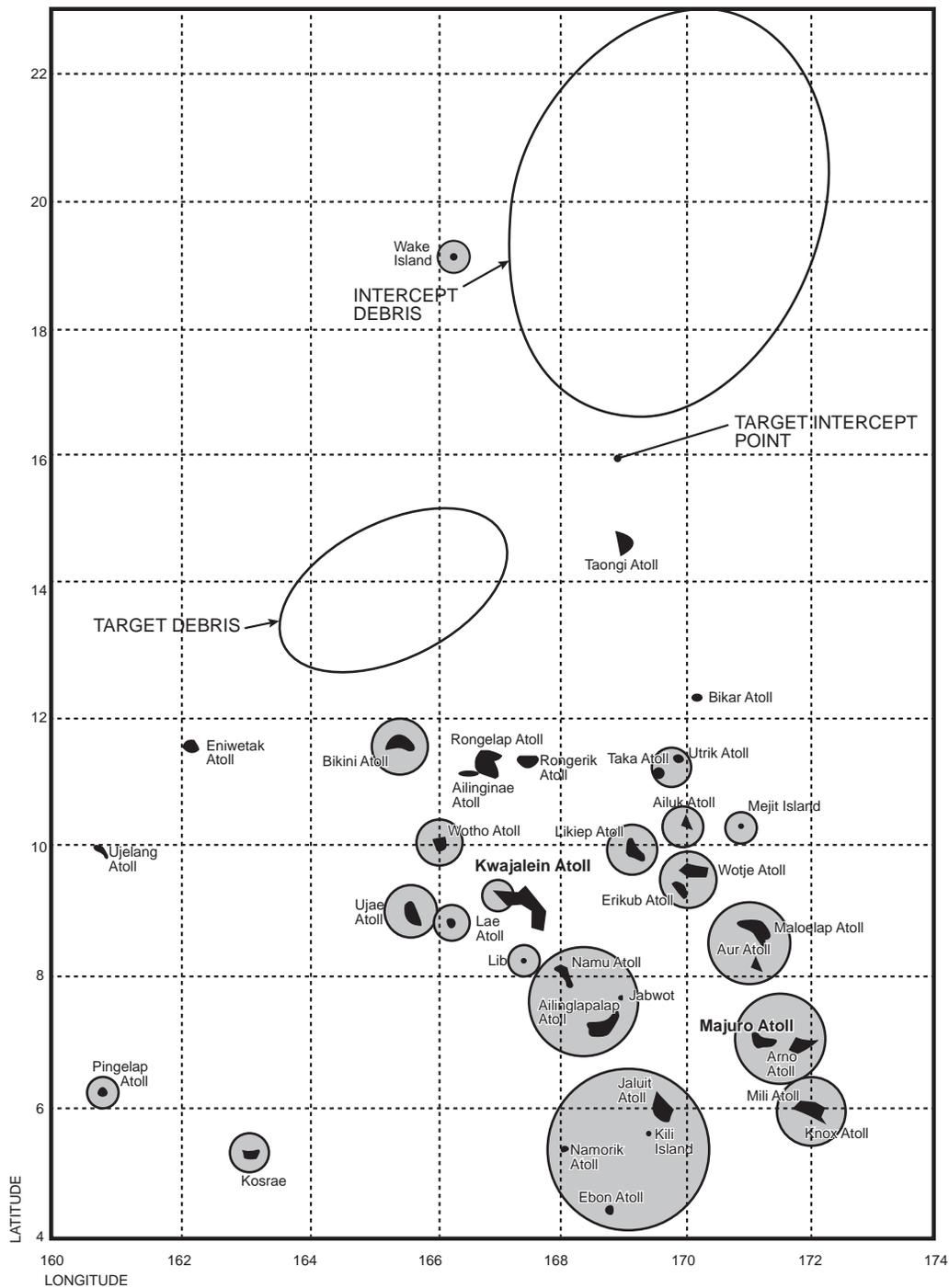
For missile and weapons system tests, USAKA/RTS Range Safety establishes criteria for the safe execution of the test operation in the form of Range Safety Approval and Range Safety Operation Directive documents, which are required for all weapon and target systems using USAKA/RTS. Missile hazards are identified and minimized prior to flight testing as required by applicable military standards. USAKA/RTS Range Safety currently uses the RCC risk management criteria as described below in Range Safety—RCC Standards.

Target missiles are launched from fixed or mobile land-based launchers, sea-based platforms, and air-based platforms, and flown on trajectories that emulate threat missile flight paths. Trajectories and range vary depending on the test or training exercise scenario, including BMD system testing.

Protection of the public on the ground, in aircraft, or on boats and ships is accomplished by adhering to the RCC risk management criteria. These criteria require that USAKA/RTS operations maintain a very low probability for any harmful or lethal intercept debris, or spent stages, targets, or defensive missiles, to impact outside of pre-established impact zones over the open ocean.

When a missile flight test is planned there are certain prescribed debris impact areas such as the notional ones shown in Figure 2-1. Additional areas (i.e., booster drop zones) will be determined prior to program launches. There are other areas where debris may impact if the test does not proceed as planned. In the case of a missed intercept, the missiles would continue on a ballistic path and a whole body impact would occur in controlled areas. These established areas of the test event may be subject to the risk of mishap, such as an explosion or flight termination. An example of this type of area is the launch hazard area (LHA). Clearance areas are defined by the USAKA/RTS Safety Office to encompass the areas where people, ships or aircraft would be at unacceptable levels of risk should a launch or a pre-launch anomaly occur.

Each missile flight test event is modeled using computer predictions of the behavior of the missiles. This modeling predicts what the missile may do in a number of situations where the missile, or parts of the missile, may fall to earth. The models incorporate a number of variables such as the missile mass, velocity, trajectory, and altitude that may affect the missile in flight. The more specific, or accurate, the variables are, the more accurate the prediction of the missile's behavior can be. Modeling that is done during early mission planning takes into account anticipated seasonal weather conditions, including average winds. Modeling done on the day of test is based on weather measurements made that day. Winds measured on the actual day of the launch/test are used to refine launch predictions/criteria.



EXPLANATION

○ Protection Circles for Inhabited Islands

**Notional Intercept/
Target Debris Impact
Areas**

Broad Ocean Area

Figure 2-1

Ground hazard areas and LHAs (over water) are established to limit the region that may be impacted by hazardous debris from an early flight termination. The hazard area is determined by size and flight characteristics of the missile, individual flight profile of each exercise or flight test, and reaction time between recognition of a flight malfunction and decision to terminate flight.

Prior to conducting each missile operation, Range Safety officials request the issuing of Notices to Airmen (NOTAMs) from the Federal Aviation Administration (FAA) and Notices to Mariners (NOTMARs) from the U.S. Coast Guard. These notices identify all hazards areas to avoid. Prior to the test event, the impact areas and closure of the mid-atoll corridor is printed in the weekly *Hourglass*, a USAKA newspaper, and sometimes in the *Marshall Islands Journal*, published in Majuro.

Each flight test requires collection and analysis of data on the target, the interceptor, and the intercept event. Tracking data is required for post-exercise or test reconstruction and analysis. Telemetry receivers, optical sensors, and radar support both collection and analysis. Data are transmitted from the target and interceptor to ground stations during flight for recording and analysis. Ground-based optical sensors, radar, and telemetry are supplemented by ship-based and/or airborne sensors.

The USAKA/RTS Range Safety Office is responsible for establishing ground hazard areas, LHAs, and over water range areas that exclude the public when risks would exceed acceptable levels defined in the safety standard RCC 321, *Common Risk Criteria Standards for National Test Ranges, Subtitle: Inert Debris* and as adopted in USAKA/KMR Range Safety Manual (1996). The ground and LHAs for missile launches are determined by size and flight characteristics of the missile, as well as individual flight profiles of each flight test. If unauthorized personnel or craft are found within a hazard area, an evaluation is made on whether the encroaching parties are exposed to risks beyond what is acceptable according to existing standards, such as RCC 321. If not, the test may still proceed.

Range Safety—RCC Standards

While range safety is location, facility, and mission-dependent, the DoD has established advisory standards and protocols to eliminate or acceptably minimize potential health and safety risks/hazards. The RCC Standards are guidelines that provide definitive and quantifiable measures to protect mission-essential personnel and the general public. These guidelines address flight safety hazards (including inert debris) and consequences potentially generated by range operations. All risks to aircraft generated by testing activities at USAKA/RTS are within RCC standards and in coordination with the FAA. USAKA/RTS requests the use of airspace during missile defense testing from the FAA. The four key RCC standards applied for missile launches are as follows:

- RCC Standard 319, *Flight Termination Systems Commonality Standard*
- RCC Standard 321, *Common Risk Criteria Standards for National Test Ranges, Subtitle: Inert Debris*
- RCC Document 323, *Range Safety Criteria for Unmanned Air Vehicles*
- RCC Standard 324, *Global Positioning and Inertial Measurements Range Safety Tracking Systems Commonality Standard*

These documents are regularly updated to reflect advances in research that improve the fidelity of risk assessment and developments to new test situations.

The USAKA/RTS Range Safety Office is an active participant in the RCC Range Safety Group, and the Range mandates specific policies that follow these guidance documents, as specified in USAKA/KMR Range Safety Manual (1996) and the applicable Range Safety Operations Directive for each test.

Safety regulations are directed at preventing the occurrence of potentially hazardous accidents and minimizing or mitigating the consequences of hazardous events. This is accomplished by employing system safety concepts and risk assessment methodology to identify and resolve potential safety hazards.

The range safety process is predicated on risk management, minimization of accident impacts, and protection of population centers. Risk values related to missile launch activities are categorized in two ways: (1) probability of vehicle failure, including all credible failure modes that could lead to debris impact events; and (2) the expected adverse consequences that could result from impact events. The consequence estimation is quantified by two key measures: (1) the probability of individual injury, defined as the probability of a person at a given location being injured; or (2) the expected number of injuries (collective risk), defined as the average number of persons that may be injured in a launch (typically a very small number, such as a few injuries per million operations).

Range safety is accomplished by establishing:

- Requirements and procedures for storage and handling of propellants, explosives, and hazardous materials
- Evaluation of mission plans to assess risks and methods to reduce risk
- Performance and reliability requirements for the Flight Termination System (FTS) on the missile which is employed, as required, for safety assurance
- A real-time tracking and control system at the range
- Mission rules that are sufficient to provide the necessary protection to people both in and outside the boundaries of the launch facility

Procedures and analyses to protect the public can be generally divided into five aspects:

- Ground safety procedures—handling of propellants, ordnance, noise, hazardous operations, toxics, etc.
- Pre-flight mission analysis—vehicle, trajectory, etc.
- FTS verification
- In-flight safety actions
- Emergency response

USAKA/RTS uses probabilistic risk assessment criteria from RCC standards, including RCC 321, to evaluate the acceptability of each mission.

Range Control

Range Control is responsible for hazard area surveillance and clearance, and the control of all Range operational areas. The USAKA/RTS Range Control Officer is solely responsible for determining range status and setting RED (no firing) and GREEN (range is clear and support units are ready to begin the event) range firing conditions. The Range Control Officer coordinates the control of USAKA/RTS airspace with the FAA and other military users, and communicates with the test directors and all participants entering and leaving the range areas. The Range Control Officer also communicates with other agencies, as required.

Ground Safety Area

Missile and flight safety procedures require that the public and nonessential mission personnel be excluded from hazardous areas to protect them in the unlikely event of an early flight termination. Range officials are required by DoD policy to be able to exclude nonparticipants from hazardous areas. Ground hazard areas are established around each launch site to ensure public safety in the event of an unplanned impact of debris on land as a result of missile launch activities.

2.2.1.3 Range Training and Operation—Proposed Action

Range Safety and Range Control

For missile and weapons system tests, USAKA/RTS Safety would continue to establish criteria for the safe execution of test operations.

Under the Proposed Action, missiles (target or intercept) used in more complex test scenarios would be launched from fixed or mobile launchers. Trajectories and distance would vary depending on the test scenario. USAKA/RTS would continue to ensure the protection of the public from any intercept or other missile debris through the application of standard range safety procedures and risk standards, including RCC Standard 321, Common Risk Criteria Standards for National Test Ranges, Subtitle: Inert Debris.

USAKA/RTS would notify the FAA that a test is planned that could temporarily affect airspace. The FAA would review the request and advise regarding windows of opportunity for the testing in order to minimize or avoid effects. These windows would determine whether the test could be performed. The FAA would issue NOTAMs covering the airspace that could potentially be affected if approved. Intercept tests would be scheduled at times that would avoid periods of high air traffic based on FAA approval. Intercept tests could be performed at night as long as mission requirements can be met. Because of the coordination with the FAA, no impacts are anticipated to Bucholz or Majuro airports.

USAKA/RTS Flight Safety would conduct an analysis of the risk associated with each proposed intercept test activity prior to conducting tests and would constrain test activities to ensure risk and debris dispersion criteria are met. If Medevac or other emergency flights are requested prior to target or interceptor launch, the mission would hold until the medical emergency requiring the flight is over. Range Control would communicate with the operations officers/managers and all participants entering and leaving the range areas. The Range Control Officer would also communicate with other agencies as required. USAKA/RTS Flight Safety would continue to ensure protection of aircraft through the application of standard range safety procedures and risk standards.

2.2.2 INTERCEPTOR MISSILE SYSTEMS

Test participants and the activities proposed to prepare for and execute a series of flight tests such as FTI-01 and FTO-01 are described in the following sections. The interceptor missiles being proposed for use in the integrated flight test are depicted in Figure 2-2.

2.2.2.1 Aegis Ballistic Missile Defense

Aegis BMD is the sea-based component of the MDA BMDS. The Aegis combat system is an integrated collection of sensors, computers, software, displays, weapon launchers, and weapons.

Aegis BMD Missiles

Standard Missile-2 (SM-2) Interceptor

SM-2 is the U.S. Navy's primary surface-to-air air defense weapon. It is an integral part of the Aegis Weapon System (AWS) aboard Ticonderoga-class cruisers and Arleigh Burke-class destroyers, and is launched from the MK 41 Vertical Launcher System (Figure 2-3). The SM-2 uses tail controls and a solid fuel rocket motor for propulsion and maneuverability. Major exhaust components resulting from ignition of the SM-2 Block II (SM-2 Blk II) solid propellant motors include aluminum oxide, carbon dioxide, carbon monoxide, hydrogen, hydrogen chloride, nitrogen, and water.

Standard Missile-3 (SM-3) Interceptor

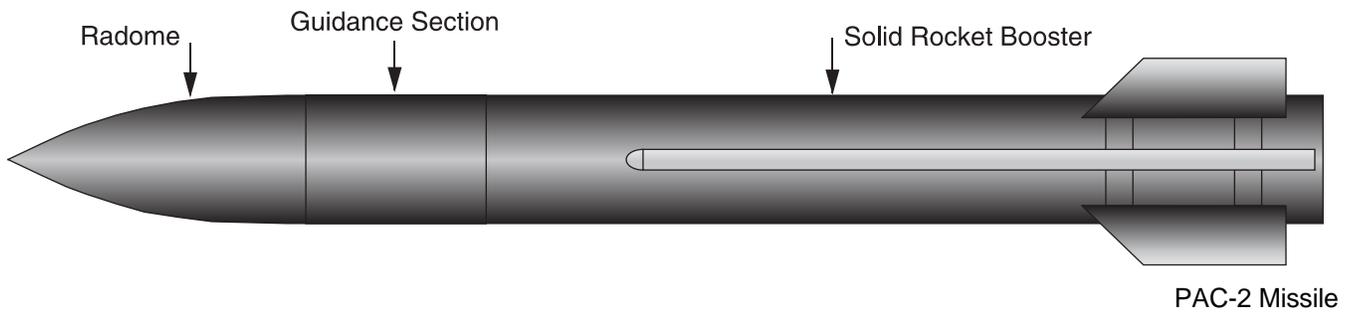
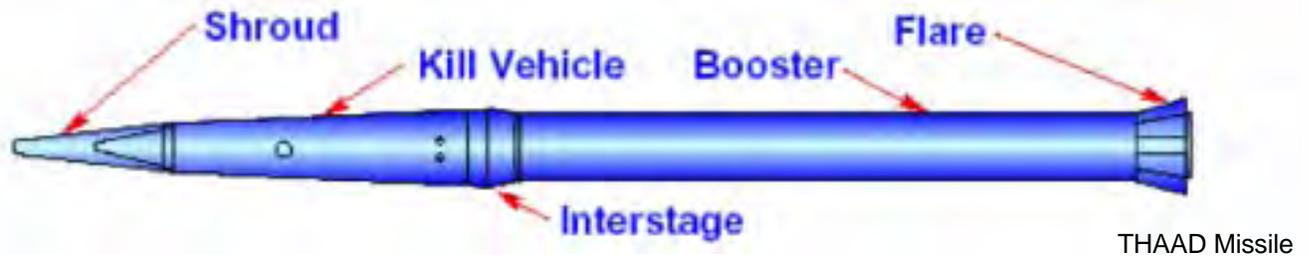
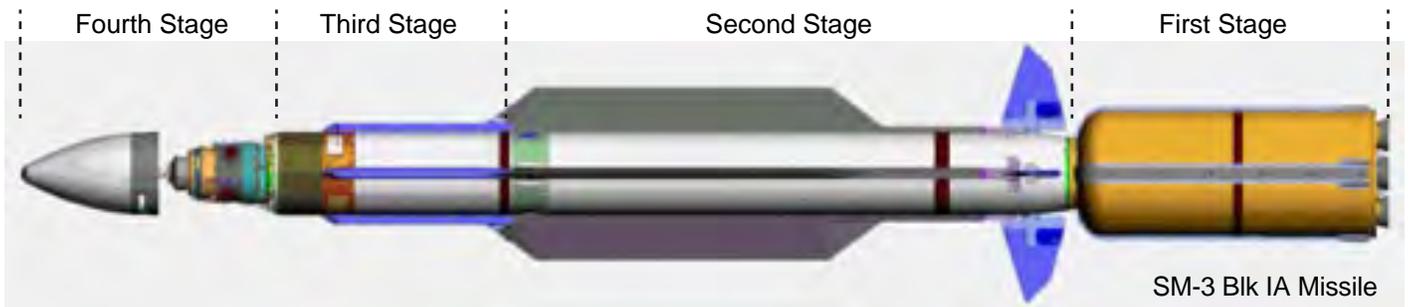
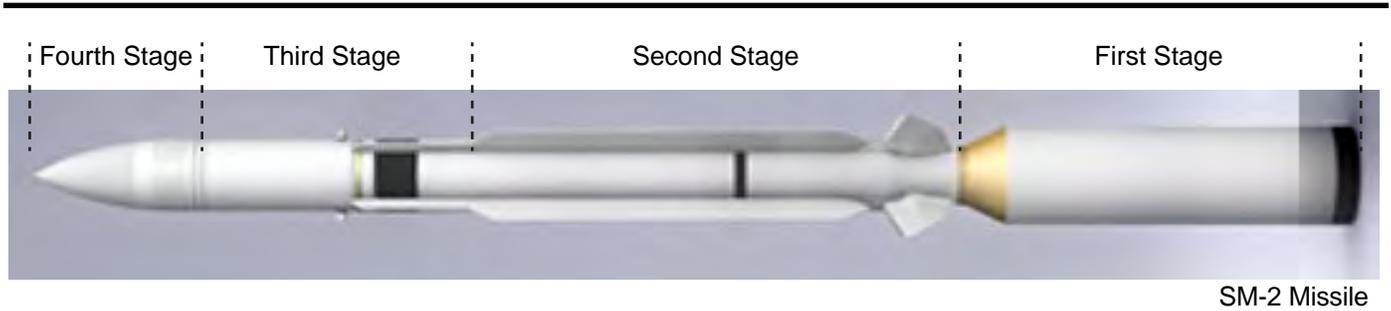
The SM-3 is a four-stage, solid-propellant, vertically launched interceptor missile capable of engaging targets in the exo-atmosphere using hit-to-kill technology (kinetic warheads without explosives) at long ranges (see Figure 2-2).

The SM-3 Blk IA interceptor's four stages contain approximately 2,400 pounds of solid propellant. Major components of the propellants include aluminum, ammonium perchlorate, and HMX, a powerful and relatively insensitive high explosive. Major exhaust components resulting from ignition of the SM-3 Blk IA SRMs include aluminum chloride, aluminum oxide, ammonia, carbon dioxide, carbon monoxide, ferric chloride, ferric oxide, hydrogen, hydrogen chloride, nitric oxide, nitrogen, and water.

Aegis BMD Radar

The ship mounted AN/SPY-1 is an S-band multi-function phased array radar with four fixed arrays and is the primary sensor for the Aegis BMD system. The AN/SPY-1 radar is capable of search; automatic detection; transition to track; tracking of ballistic missiles, air and surface targets; and missile engagement support.

The four fixed arrays of the radar transmit beams in all directions, continuously providing a search and tracking capability for multiple ship targets at the same time. All targets tracked by the AN/SPY-1 radar are monitored by the ship's Command and Decision system.



**Proposed Interceptors
for Integrated Flight
Tests**

Figure 2-2

Not to Scale



**Interceptor Launch on
Aegis Ballistic Missile
Defense Vessel**

Broad Open Ocean

Figure 2-3

Aegis BMD Transportation

The Aegis BMD system is totally contained on guided missile cruisers or destroyers homeported in Pearl Harbor, Hawaii or Yokosuka, Japan. The Aegis BMD ship would leave home port approximately 10 days before the test date.

Aegis BMD Pre-Flight Activities

Several weeks before the test date and while still in home port, the Aegis BMD ship would begin conducting waterfront integration tests to ensure the Aegis BMD system and personnel operating the system were fully prepared for the test mission. Preventive and corrective maintenance would be performed, as necessary, and training for system operators would be conducted.

Approximately 10 days before the test date, the Aegis BMD ship would leave home port and begin steaming toward the test area. While underway, the crew would participate in tests and drills to verify that the ship's various communications and weapons systems were functioning properly and were integrated with the appropriate USAKA/RTS test and safety systems. Approximately 3 days before the test date, the Aegis BMD ship would arrive at the test support position located in the BOA between Wake and Kwajalein Atoll. The ship and crew would respond to integrated flight test messages received by assuming higher readiness conditions and preparing for simulated combat operations.

Aegis BMD Flight Test Activities

At some time after the test scenario begins, the Aegis BMD ship's radar would detect the launch of a SRBM target missile and flight of an air-breathing target and would begin tracking them to determine if they posed a threat. If the target's flight paths were determined to be threats, the Aegis weapons system would calculate appropriate firing solutions for the SM-2 Blk II and SM-3 Blk IA interceptors. Based on the target's paths and knowing the interceptor missiles' flight characteristics, the Aegis weapons system would determine the correct time and direction in which to launch the interceptor missiles so they would intercept the targets. At the appropriate time, the crew aboard the Aegis ship would launch the SM-2 Blk II and SM-3 Blk IA missiles. After launch, the crew would continue to monitor and update the status of the targets and the interceptors to determine if the engagements were successful and the targets were destroyed. The ship's crew would remain at heightened alert status through the end of the exercise.

Aegis BMD Post-Flight Activities

At the conclusion of testing activities, the Aegis ship would return to home port.

2.2.2.2 Terminal High Altitude Area Defense

THAAD units provide the BMDS with a globally transportable, rapidly deployable capability to intercept and destroy ballistic missiles inside or outside the atmosphere during their final (or terminal) phase of flight.

THAAD Missile

The THAAD missile is intended to intercept and destroy incoming short and medium range ballistic missiles. See Figure 2-2 for an example configuration of a THAAD missile. The

THAAD missile booster is a single-stage SRM with a flare. The flare consists of overlapping petals that lock into position after deployment. The booster solid propellant is a hydroxyl-terminated polybutadiene (HTPB) composition that is rated as a Class 1.3 explosive.

The THAAD launcher is based on the U.S. Army Model M1120 Load Handling System Heavy Expanded Mobility Tactical Truck (HEMTT) variant, a four-axle, 8X8 all wheel drive vehicle with two-axle steering. The Missile Round Pallet (MRP) with or without missile rounds is loaded onto the transporter. This variant includes THAAD-specific MRP erection cylinders, generator mounting provisions, outrigger stabilization system, as well as various electrical components, an integral 3-kilowatt (kW) power generation unit, data processing, and communication equipment.

THAAD Fire Control and Communications

THAAD Fire Control and Communications (TFCC) equipment controls THAAD Battery tactical operations. For integrated flight tests at USAKA/RTS, the TFCC configuration would consist of one Tactical Operation Station (TOS) and one Launch Control Station (LCS) supported by System Support Group (SSG) and 30-kW Generator Sets.

The TOS includes data processing, voice and data terminal equipment. It is designed to be a component of a technical support group and is not intended for use as a standalone equipment item. The LCS includes TFCC communications processing, switching and voice and data transmission equipment. The LCS, once initialized, is designed to operate automatically.

The TFCC Station Support Group (SSG) is used to transport equipment that cannot be transported on the TOS and LCS. The SSG includes two prime movers and a trailer, and transports antenna groups, fiber optic and other cables, ancillary equipment. The SSG uses a HMMWV as the prime mover. Each technical support group has an associated SSG.

AN/TPY-2 (TM)

The radar is an AN/TPY-2 Terminal Mode radar, designated AN/TPY-2 (TM). It is a ground transportable, wide-band, X-band, single-faced, phased array radar system of modular design. It performs surveillance, tracks the target, and controls firing functions. The radar communicates with the interceptor while it is in flight.

The AN/TPY-2 (TM) consists of four units: Antenna Equipment Unit (AEU), Electronic Equipment Unit (EEU), Cooling Equipment Unit (CEU), and Prime Power Unit (PPU). Each individual unit is housed on a separate trailer interconnected with power and signal cabling, as required.

The AEU transmits and receives radio frequency energy to support search, track, and communication with the interceptor. The AEU includes all transmitter and beam steering components as well as power distribution and cooling systems. The EEU houses the signal and data processing equipment, operator workstations, and communications equipment. The CEU contains the fluid-to-air heat exchangers and pumping system to cool the AEU and EEU. The fluid-to-air heat exchanger contains a reservoir with approximately 380 gallons of a water propylene glycol mixture in the CEU. The CEU has approximately 270 gallons and the AEU has approximately 110 gallons of a water propylene glycol mixture in their systems. The PPU delivers 1.3 megawatts (MW) of electrical power at 4,160 volts.

Operation of the AN/TPY-2 (TM) system uses approximately 70 gallons of JP-5 fuel per hour. The AN/TPY-2 (TM) deploys with a 2,500-gallon fuel truck. An external fuel tank with a capacity of up to 10,000 gallons to supply fuel for day-to-day operations would be used at Meck for the mission. The day tanks and external tank would be filled using the fuel truck as necessary.

THAAD Transportation

The THAAD components would be transported from their home base to a designated air base or port for transport to USAKA/RTS via aircraft and/or ship. THAAD personnel and equipment would arrive at USAKA/RTS approximately 5 to 6 weeks before the actual test date. Materials arriving via aircraft would be received at Bucholz Army Airfield, USAKA/RTS. Materials arriving via ship or barge would be received at the Kwajalein marine facilities. Missiles would be stored in an ammunition storage area after arrival regardless of how they were shipped to USAKA/RTS. Before test day, the missiles on their MRPs would be taken to Meck by existing marine transportation and stored in the missile assembly building (MAB). Other components of the THAAD launcher would also be transported to Meck by existing marine transportation.

For aircraft transportation, FAA and Air Force Joint Manual 24-204, Preparing Hazardous Materials for Military Shipment, would be followed. THAAD missiles would be stored in accordance with the appropriate portions of AR 385-64 Ammunition and Explosive Safety Standards and DoD 6055.9-STD DOD Ammunition and Explosives Safety Board.

To minimize safety concerns involved with transporting THAAD missiles, which include the transportation of hazardous materials, Class 1.3 explosives, and a small amount of hypergolic chemical located in the Divert and Attitude Control System (DACS), MDA will comply with all applicable guidelines. The canister would serve as a limited duration containment barrier for the hypergolic chemicals. The canister would be equipped with passive and active sensors to detect any leak that may occur. Should a leak occur during transportation, the aircraft would land at designated airfields where trained personnel would be standing by to handle the leaking missile.

All transportation within the Continental United States would be performed in accordance with Department of Transportation (DOT)-approved procedures and routing as well as Occupational Safety and Health Administration (OSHA) requirements, U.S. Army safety regulations, and U.S. Air Force regulations. Liquid propellants would be transported in DOT-approved containers based on the issuance of a Certificate of Equivalency. Appropriate safety measures would be followed during transportation of the propellants as required by the DOT and as described in 49 CFR 171-180, Hazardous Materials Regulations of the Department of Transportation. For ship or barge transportation, U.S. Coast Guard and/or applicable U.S. Army transportation safety regulations would also be followed.

THAAD Pre-Flight Activities

THAAD personnel and equipment would be transported from Kwajalein to Meck approximately 4 to 5 weeks before the actual test date. Approximately 70 soldiers and other test personnel would deploy to Meck to perform pre-test operations and operate the THAAD weapons system during the flight test. Temporary living, billeting, and sanitary facilities are available for the soldiers and test personnel during the test period. The existing dining facility would be used to provide all meals during the test period.

Final integration and preflight testing of the THAAD weapon components would occur at the THAAD launch sites on Meck and could include system integration and checkout, integrated element testing, and communication/link exercises. This integration and testing would begin shortly after the weapons components are emplaced and continue until the test begins. THAAD hardware and equipment that would be located on site include the THAAD launchers, AEU, CEU, EEU, PPU, TFCC, THAAD Battery Command Post, and associated fiber-optic and other cabling.

THAAD ground vehicles would use existing vehicle maintenance and fueling facilities to the extent practicable. Although no major maintenance is expected to occur, small quantities of used motor oil and/or coolant could be generated through normal operations. These non-hazardous wastes and any hazardous wastes generated during vehicle maintenance would be handled by USAKA/RTS in accordance with the requirements of the UES. The MRP would be moved from its storage bunker and mounted on the THAAD launcher during this time. Movement of the Missile Round Pallet with live THAAD missiles would occur in compliance with USAKA/RTS policy and procedures.

Grounding rods would protect the AN/TPY-2 (TM) and associated communications and SATCOM components. THAAD grounding rods would consist of three 3-foot sections, ½-inch diameter, Type III, Class B rods that would be hammered into the soil. Fiber-optic cables would be laid on the ground or along existing road rights of way. If fiber-optic cables require additional protection from vehicle and foot traffic, they would be placed in cable raceways. No trenching of fiber optic or other cables is anticipated. To protect cultural and archaeological resources from impacts associated with ground disturbing activity, personnel would receive the standard briefing provided by USAKA/RTS for new projects before activities commence on the significance of these types of resources and the penalties associated with their disturbance or collection. If, during the course of program activities, cultural and/or historic materials (particularly human remains) are discovered, activities in the immediate vicinity of the cultural materials would be halted and coordination/consultation required by the UES would be done.

The AN/TPY-2 (TM) would require checkout and calibration before test activities begin. Checkout and calibration activities would include observation of targets of opportunity that may occur on the range and observation of existing overhead satellites. These activities are expected to require fewer than 4 hours per day.

THAAD equipment may be affected by the salt environment at USAKA/RTS. To minimize adverse impacts, up to 1,000 gallons of fresh (non-salt) water would be used to wash down selected THAAD equipment. THAAD personnel would use fresh water and brushes to wash down only exterior equipment surfaces. Fresh water would not contact any surfaces subject to petroleum, oil, or lubricant use.

THAAD Flight Test Activities

THAAD interceptors would be launched as part of the Proposed Action. The principal exhaust emissions resulting from THAAD launches include aluminum oxide, carbon monoxide, hydrogen chloride, hydrogen, nitrogen, and water. Up to four THAAD interceptors could be launched as part of integrated flight testing. Based on 10 hours of support time, the THAAD PPU, launcher generator, and TFCC generators (two each) would require approximately 600 gallons of JP-5 fuel per day of operation on tactical power.

Standard protective procedures would be followed during test activities to provide hearing protection for soldiers and other personnel. Missile impact zones would be confined to open areas at sea. Standard operating and safety procedures for missile launching and testing would be implemented to minimize the risk of any adverse health or safety impacts associated with the program.

The required radiation hazard keep-out area for the AN/TPY-2 (TM) is approximately 1,640 feet to the front and 90 degrees each side of the radar face. Before activating the radar, a visual survey of the area would be conducted to verify that all personnel are outside the hazard zone, and a warning beacon would be illuminated when the radar is operating.

THAAD Post-Flight Activities

At the conclusion of testing activities, THAAD personnel would remove all mobile equipment/assets brought to the range. Facilities and support equipment provided for the test would be returned to the provider in accordance with established procedure. Hazardous materials/wastes would be handled in accordance with the UES. Transportation for removal of THAAD equipment would be the same as when it was brought into the installation.

2.2.2.3 Patriot

The only combat proven hit-to-kill weapon system of the BMDS is the PAC-3 unit, which is operational and fielded by the U.S. Army.

Patriot Missiles

Patriot Advanced Capability-2

The PAC-2 missile (see Figure 2-2) is equipped with four clipped-delta movable control surfaces mounted on the tail. The missile propulsion is furnished by a single-grain, solid rocket motor (SRM). A high explosive warhead provides target-kill. The PAC-2 missile consists of the radome, guidance section, warhead section, propulsion section, and the control actuator section.

The radome provides an aerodynamic shape for the missile and microwave window and thermal protection for electronic components. The guidance section contains an antenna mounted on an inertial platform, navigational electronics, a computer that provides steering commands, a transmitter, and a receiver.

The propulsion section is composed of the rocket motor, external heat shield, and two external conduits and contains a conventional solid propellant. The control actuator section is located at the aft end of the missile. It receives commands via the missile autopilot and positions the fins to steer and stabilize the missile in flight.

Patriot Advanced Capability-3

The PAC-3 interceptor missile (see Figure 2-2) uses an SRM, aerodynamic controls, and a guidance system to navigate to an intercept point specified by its ground-based Fire Solution Computer before launch. The PAC-3 missile consists of the seeker assembly, Attitude Control Section, mid-section assembly, SRM section, and the aft section assembly.

The PAC-3 missile seeker assembly is mounted at the forward end of the PAC-3 missile. It consists of a protective ceramic cover called a radome, an active Ka Band Radar, an aluminum and graphite composite assembly and housing, and associated electronics.

The Attitude Control Section contains a number of small, short duration, solid propellant (aluminum and ammonium perchlorate and HTPB) rocket motors (side thrusters) that enable the PAC-3 missile to maneuver to achieve an intercept of a target in response to the instructions provided by the onboard guidance processor. It also contains one lithium thermal battery.

PAC-3 Launching Station

The PAC-3 Launching Station (LS) is a remotely operated, fully self-contained unit that has integral power. Each LS can carry up to 4 PAC-2 missiles or up to 16 PAC-3 missiles; however, there can be no mixing of PAC-2 and PAC-3 missiles on a single LS. The LS is mounted on an M-860 semi-trailer towed by an M983 HEMTT.

The generator for the LS is located on the yoke assembly of the trailer and includes an integral 15-gallon fuel tank (auxiliary capable). The unit is a diesel engine-driven generator, providing 15-kW, four-wire, 400-Hertz (Hz), 120/208-volt power.

Patriot Engagement Control Station

The Patriot Engagement Control Station (ECS) is mounted on either a 5-ton truck or Light Medium Tactical Vehicle (LMTV) and contains the computers, man-machine interfaces, and various data and communication terminals used to accomplish Fire Unit operations. The Radar Station (RS), Antenna Mast Group (AMG), and LS are remotely controlled through this shelter. All tactical decisions are executed by the operators in the shelter.

Electric Power Plant

The Electric Power Plant (EPP) is the prime power source for the Patriot ECS, AMG, and RS. Each EPP consists of two 150-kW, 400-Hz diesel engine generators that are interconnected through the power distribution unit and are mounted on a 10-ton M977 HEMTT. Each generator has a 100-gallon fuel tank.

Patriot Information Coordination Center

The Patriot Information Coordination Center (ICC) is mounted on either a 5-ton truck or LMTV and contains the computers, man-machine interfaces, and various data and communications terminals used to accomplish management of the Fire Unit's engagement operations functions.

Patriot Tactical Control Station

The Tactical Control Station (TCS) accommodates the battalion commander and up to 10 staff personnel, and provides automated equipment to support field operations. The TCS is housed in a modified M934 expandable van, which is co-located with the battalion ICC. It provides mobility in concert with the ICC.

Patriot Communications Relay Group

The Communications Relay Group (CRG) consists of a weather tight, Chemical, Biological, Radiological, and Nuclear proof shelter attached to a 5-ton cargo truck, similar to the ECS. It provides a secure data relay capability, as well as voice communications between the ICC, its assigned fire units, and between adjacent units. The CRG can also operate as an LCS, which is critical for remote launch operations.

AN/MPQ-65 Station

The Patriot RS consists of an AN/MPQ-65 multifunction phased array radar mounted on an M860 semi-trailer towed by a HEMTT and is powered by the EPP. The RS has a personnel exclusion area established 395 feet to the front and extending 60 degrees to each side of the center of the radar during radar operations.

Patriot Transportation

Transportation of Patriot unit personnel and equipment from a U.S. military installation in the continental United States to USAKA/RTS using ground, air, and marine transportation means would be virtually identical to that described for the THAAD unit in Section 2.2.2.2.

Patriot Pre-Flight Activities

Patriot personnel and equipment would be transported from Kwajalein to Meck or Gellinam about 4 to 5 weeks before the actual test date. Approximately 50 Patriot soldiers and related test personnel would deploy to perform pre-test operations and operate the AN/MPQ-65 and ICC equipment during flight test activities.

If MDA chooses to locate the AN/MPQ-65 and ICC equipment on Meck, temporary living and sanitary facilities for the Patriot soldiers and related test personnel would be sited on previously disturbed land. A smaller mancamp to accommodate transient personnel may be located on Kwajalein, also sited on previously disturbed land. The existing dining facility would be used to provide all meals during the test period.

AN/MPQ-65 and ICC equipment would be moved from the landing site on Meck to the south end of the runway for emplacement and subsequent operations. Depending on the alternative that MDA chooses, PAC-3 LS and required communications equipment could be further transported by existing marine assets to Omelek or Gellinam.

If MDA chooses to locate the PAC-3 LS on Omelek, the equipment would be transported from Meck using existing marine assets. Once the Patriot LS arrives on Omelek, the equipment would be moved in place by the M983 HEMTT. LS-1 would be sited adjacent to the southwest corner of the helipad approximately 30 feet from a protective habitat area (i.e., Littoral Forest) (U.S. Army Space and Missile Defense Command/Army Forces Strategic Command, 2011). In coordination with the U.S. Fish and Wildlife Services (USFWS) and the National Marine Fisheries Services (NMFS), vegetation removal has occurred in this area to allow for the clearing of the helicopter landing zone. As a mitigation measure, a re-planting effort of indigenous species of coastal plants will be implemented on the eastern shoreline of Omelek at a 2:1 ratio of re-plants to removal of trees/shrubs. USAKA/RTS would coordinate replanting with USFWS and NMFS. The blast area from LS-1 would not adversely affect any remaining vegetation in the southwest point of the island. LS-2 would be located approximately 312 feet

northeast of LS-1. The blast zone associated with LS-2 would not adversely affect the nearest wildlife habitat since it would be approximately 150 feet from LS-2.

There will be portable toilets on Omelek which will be pumped out and the waste transported to Kwajalein to be treated in the Wastewater Treatment Plant. Trash generated on Omelek will be collected and transported to Meck to be treated in the incinerator or transported to Kwajalein to be incinerated, in the event the Meck incinerator is not operational.

Approximately 6 to 10 Patriot soldiers would be on Omelek during set-up, check-out, dry runs, rehearsals, and on firing day. The soldiers on Omelek would be transported from Meck daily using existing marine transportation. They would be housed and fed in the same manner as the Patriot personnel on Meck. These soldiers would be evacuated from Omelek during actual firing.

MDA could choose to locate the Patriot unit (AN/MPQ-65, ICC equipment, and PAC-3 LSs) on Gellinam. In this alternative, the unit would be transported from Meck to Gellinam using existing marine transportation. On Gellinam, the AN/MPQ-65 and ICC equipment would be moved to a location approximately 410 feet south-southeast of the helipad for emplacement and subsequent operations. One PAC-3 LS would be located on a trail north of the helipad in an area overgrown with vegetation. Vegetation may be removed by mowing, hand cutting, or other mechanical control equipment. If Gellinam is selected, additional analysis would be performed, if required, to determine the amount of vegetation to be removed. Any replanting would be conducted in coordination with USAKA/RTS, USFWS, and NMFS. The second PAC-3 LS would be located in a cleared area near the helipad. The Patriot soldiers would be transported from Meck to Gellinam daily on existing marine transportation. They would use the temporary billeting and sanitary facilities on Meck, and they would use the existing dining facility on Meck for meals during the entire test period. Personnel would be evacuated prior to the test. If Gellinam is used for the integrated flight test mission, the toilets and trash would be managed in the same manner as described for Omelek.

According to Patriot Technical Manuals, all Patriot systems must be grounded with grounding rods provided as part of the tactical equipment. Grounds must achieve a 25-ohm resistance rating. The most common method of Patriot grounding is emplacing three grounding rods a minimum of 8 feet into the ground per major end item. Each major end item must have its own grounding cable running directly to a single ground rod. Each grounding cable may be no longer than 15 feet long. Alternative grounding may consist of five 3-foot grounding rods emplaced in a star configuration. No special provisions are provided for lightning protection. Use of existing USAKA/RTS grounding and lightning protection would be considered. Any required ground disturbing activities would require a dig permit to be submitted and approved prior to the activity.

Patriot ground vehicles would use existing vehicle maintenance and fueling facilities to the extent practicable. Although no major maintenance is expected to occur, small quantities of used motor oil and/or coolant could be generated through normal operations. These non-hazardous wastes and any hazardous wastes generated during vehicle maintenance would be handled by USAKA/RTS in accordance with UES requirements.

Fiber-optic cables would be laid on the ground or along existing road rights of way. If fiber-optic cables require additional protection from vehicle and foot traffic, they would be placed in cable raceways. No trenching for fiber optic or other cables is anticipated. If, during the course of program activities, cultural and/or historic materials (particularly human remains) are discovered, activities in the immediate vicinity of the cultural materials would be halted and the USAKA/RTS environmental office notified. Coordination/consultation required by the UES would occur.

Patriot unit integration activities would be conducted before the actual test date to ensure the radar set, ICC, and launchers communicate properly. After unit integration is completed and verified, the Patriot unit would conduct range integration activities to verify that the unit can communicate with range safety and other required communications and control networks.

Fuel and lubricants would be required for Patriot LS generators, EPPs, prime movers, and organic vehicles. Specialized support requirements would not be anticipated. Patriot tactical generators would require JP-5 fuel on a daily basis. A reserve fuel pod would be positioned on-site to handle any emergency fuel requirements. The average daily usage for a Patriot Fire Unit during a test environment is approximately 300 gallons of JP-5 per day. Patriot refuel operations are normally accomplished with a HEMTT fueller that is used to refuel equipment in the morning and evening during 24-hour operations. The Patriot generators would be used on average, less than 10 hours per day for 60 days.

Based on past deployments, Patriot equipment may be affected by the salt environment at USAKA/RTS. To minimize adverse impacts, up to 1,000 gallons of fresh (non-salt) water would be used every 2 days to wash down selected Patriot equipment. Fresh water would be delivered to the island. Patriot personnel would use fresh water and brushes to wash down only exterior equipment surfaces. Fresh water would not contact any surfaces subject to petroleum, oil, or lubricant use. Any remaining rinse water would be disposed of in accordance with the UES.

Patriot Flight Test Activities

Patriot interceptors would be launched as part of the Proposed Action. Aluminum oxide, carbon monoxide, hydrogen chloride, nitrogen, and water are the main emission constituents for each Patriot interceptor launch. Up to two Patriot interceptors could be launched at each target and the launchers would be remotely controlled from the ECS. No personnel are in the launch area hazard zone during launch.

Patriot Post-Flight Activities

At the conclusion of testing activities, Patriot soldiers would remove all mobile equipment/assets brought to the range. Facilities and support equipment provided for the test would be returned to USAKA/RTS in accordance with established procedure. Hazardous materials/wastes would be handled in accordance with the UES. Transportation for removal of Patriot equipment would be the same as when it was brought into the installation.

2.2.3 TARGET SYSTEMS

Integrated flight tests at USAKA/RTS could involve up to five threat-representative targets per test. The following sections describe representative targets that could be used to support integrated flight testing. Targets proposed for use are depicted in Figure 2-4.



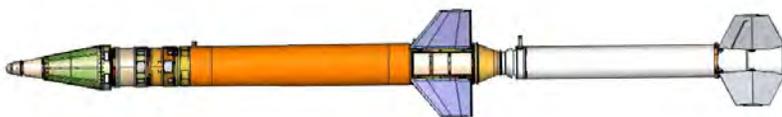
eMRBM



E-LRALT



FMA



ARAV-B SRBM



MQM-107E



BQM-74E

EXPLANATION

**Proposed Targets for
Integrated Flight Tests**

Figure 2-4

2.2.3.1 Medium Range Ballistic Missile Targets

Medium Range Ballistic Missiles

MRBM target vehicles can be provided in several different configurations with various options depending on mission requirements. Configurations being considered for integrated flight tests include the Extended Long Range Air Launched Target (E-LRALT) and the Extended Medium Range Ballistic Missile (eMRBM); both configurations would be launched from a C-17 aircraft. Figure 2-5 illustrates these MRBM targets.

The E-LRALT and eMRBM targets are similar in that both employ a SR-19 SRM first stage and a SR-19 solid rocket motor second stage. In addition, the E-LRALT contains a third stage Orbus SRM. The main combustion products produced by these SRMs include aluminum oxide, hydrogen chloride, carbon monoxide, nitrogen, and water.

Each MRBM is supported with a Carriage Extraction System (CES), Command Control and Communication (C3) Pallet; Air Launch Equipment and Air Launch Support Equipment for operation and support onboard a government C-17 aircraft; and Common Test Set and Mechanical Ground Support Equipment for ground operations.

The CES provides the capability for transport, aircraft loading, pre-launch testing, and deployment of the fully assembled aerial vehicle. The CES supports extraction of the target vehicle from the C-17A aircraft and descent prior to vehicle ignition. The C3 Pallet provides mission situational awareness and communications support for the air launch operators.

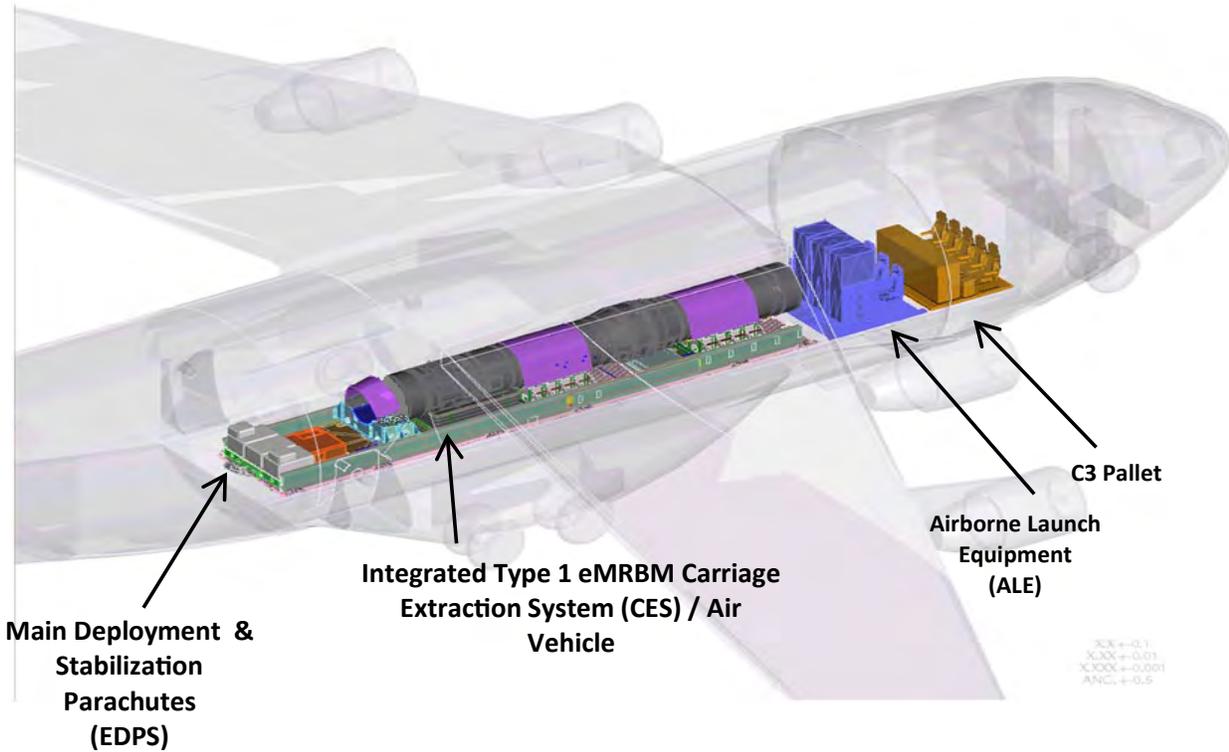
The Air Launch Equipment consists of the necessary hardware and software to provide target vehicle communication, control, and power during system integration, test, and launch. The Air Launch Equipment also has the capability to record and monitor the status of the target vehicle during system integration, test, and launch operations.

The MRBM vehicle is equipped with an FTS. The FTS may be initiated by command of flight safety personnel, or it can be initiated by the missile itself if an anomaly is detected during flight.

Figure 2-5 shows how the palletized MRBM target vehicle and other support equipment would be configured on the aircraft while in transport and before launch.

MRBM Transportation

Each MRBM would be assembled, tested, and shipped as a single piece from integrated contractor facilities in the United States. The payload and experiment packages would be assembled, tested, and shipped from the providing contractor facilities as separate modules and integrated with the flight vehicle at the Single Integration Center. The completed vehicles on the CESs would be shipped overland by truck from integrated contractor facilities in the United States to Redstone Arsenal, AL, where they would be loaded on a government C-17 aircraft for air transport to the forward staging area (FSA). Existing roads and air routes would be used. All transportation within the United States would be performed in accordance with appropriate DOT approved procedures and routing, as well as OSHA requirements and appropriate DoD safety regulations.



C-17 - Target Vehicle and Support Equipment

Figure 2-5

MRBM Pre-Flight Activities

Pre-drop range integration and launch operations consist of those integration activities using the fully assembled CES/MRBM aboard the aircraft including aircraft/target compatibility checks, target/range integration checks, mission dress rehearsals/dry runs, mission planning and support, and the actual conduct of the airdrop missions. Tests with the target vehicle on the CES in the C-17, prior to countdown operations for air launch, would include broadcasts of S-Band and L-Band downlinks, range acquisition of downlinks, and processing of same to verify re-entry vehicle and launch vehicle functional integrity.

MRBM Flight Test Activities

The FSA for aircraft launching the MRBM targets would be an existing military installation such as Joint Base Hickam/Pearl Harbor, Wake Island, or Andersen Air Base, Guam, which routinely handle the types of aircraft necessary for deploying the air launched targets.

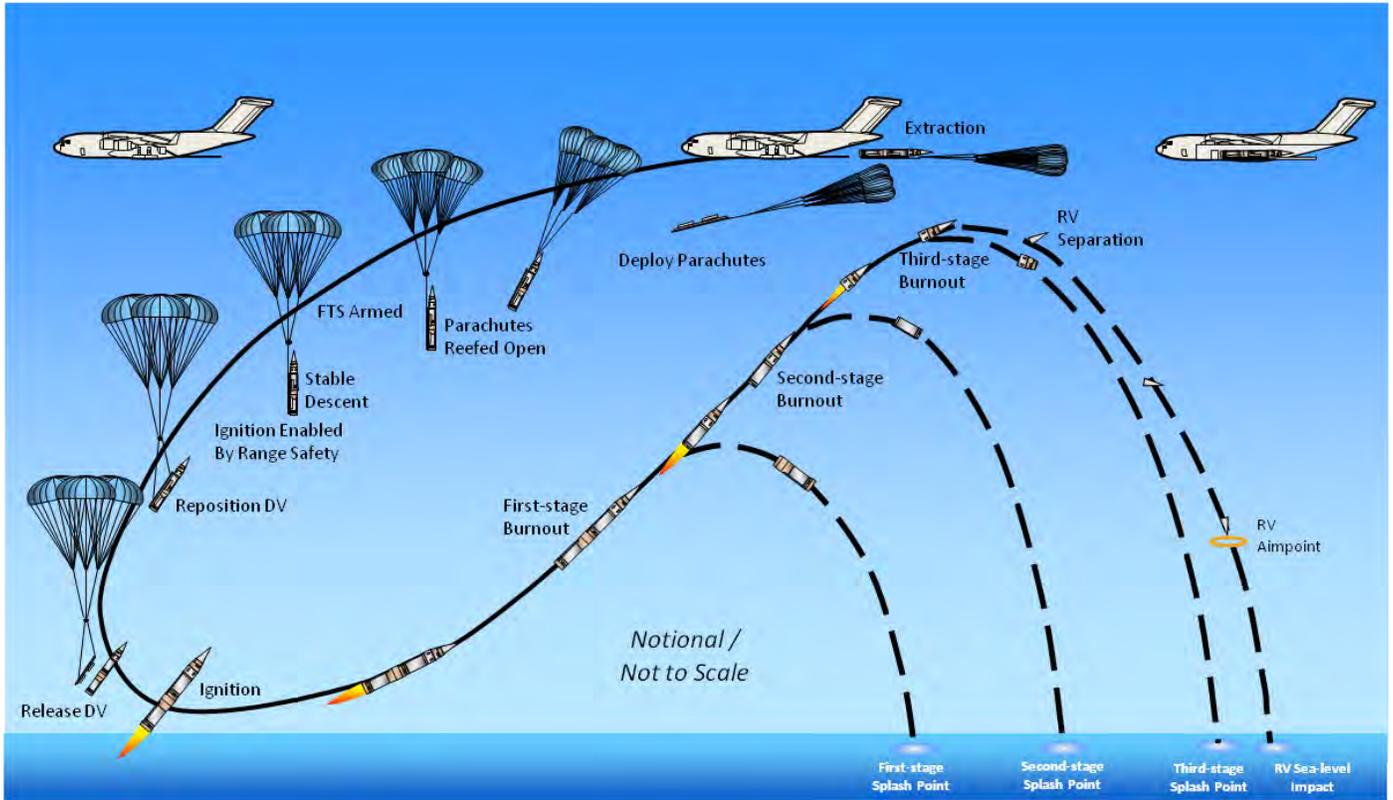
During MRBM launch (Figure 2-6), the CES would be pulled from the aircraft by parachute and dropped. A total of up to 10 parachutes would be used to deploy the MRBM target vehicle from the aircraft in preparation for actual launch. The parachutes may use a ring-slot design with multiple panel openings or a ribbon parachute made of a nylon/Kevlar composition. They would range from approximately 15 to 94 feet in diameter.

The MRBM target vehicle contains ordnance in the form of solid-rocket motor propellant, parachute reefing cutters, FTS, and detonation cord. Air launched MRBM targets are held to the extraction pallet with a blanket made of nylon or similar material that is released at a predetermined time after the target and its extraction pallet are pulled from the C-17 aircraft. The pallet and parachutes, which are weighted, then fall to the ocean surface and sink.

The target missile would separate from the pallet, fall free toward the earth, and first stage ignition would occur. When the first stage's propellant is expended, that booster would be dropped to fall to the ocean in a predetermined booster drop area and the second stage booster motor would ignite. If a two-stage eMRBM target is used, near the end of the second stage's burn, the re-entry vehicle would separate from the booster and would follow its flight path to interception or to splash down within a designated ocean impact area. The second stage, meanwhile, would fall to the ocean in a second predetermined booster drop zone. If a three-stage E-LRALT target is used, the re-entry vehicle would separate from the third stage booster and follow its flight path to interception or splash down within a designated ocean impact area as illustrated below.

MRBM Post-Flight Activities

After launching the MRBM target missile, the C-17 aircraft would return to the Forward Staging Area for crew rest and refueling before returning to home base. Depending on the final test execution schedule, the C-17 aircraft could return to USAKA/RTS for crew rest and refueling before returning to home base.



C-17 - Notional MRBM Target Flight Profile

Broad Open Ocean

Figure 2-6

2.2.3.2 Short Range Ballistic Missile Targets

Short Range Ballistic Missiles

Two SRBMs would be used in IFT (Figure 2-4). One, the FMA, is a single-stage, liquid-propellant target missile that would be launched from the Mobile Launch Platform (MLP) in the BOA northeast of USAKA/RTS. The second SRBM, Aegis Readiness Assessment Vehicle-B (ARAV-B), is a two-stage solid propellant target that would be launched from a pre-existing launch facility located on Wake.

Foreign Military Asset Target

The FMA target is a single-stage, liquid-propellant missile with a non-separating payload section (Figure 2-3). The missile flies a preprogrammed trajectory. FMA sea launch operations would involve using a surrogate Transporter/Erector and a Surrogate Launcher to erect and launch the target vehicle from the MLP while at sea. The MLP would be towed from its home port on the west coast of the United States to the test area by an ocean-going tug boat.

The main fuel for the FMA target is a domestic blend of coal tar distillate and other phenolic compounds that match the combustion properties of the native fuel. Approximately 268 gallons of main fuel are used per flight. The oxidizer is Inhibited Red Fuming Nitric Acid (IRFNA). Approximately 485 gallons are used per flight. The oxidizer is hypergolic with the starter fluid, which is a 50/50 mixture of triethylamine/dimethylanilines. Approximately 9 gallons are used per flight. The starter fluid is compatible with the main fuel, and the two can be stored together.

FMA Transportation

The FMA target would be prepared at a contractor facility in Huntsville, AL. The unfueled target would be trucked from Huntsville to a port on the U.S. west coast where it would be loaded onto the MLP. The fuel is transported to the port via surface transportation and transloaded onto the MLP. Liquid propellants would be transported in DOT-certified transport/storage containers and transferred from these containers into the missile. Existing roads would be used. All transportation within the United States would be performed in accordance with appropriate DOT approved procedures and routing, as well as OSHA requirements and appropriate DoD safety regulations.

FMA Pre-Flight Activities

The FMA would be fueled on the MLP, which would be under tow in the BOA by the Narragansett ocean tug. This task would be accomplished while at sea in transit to the test. Fueling would take place over a period of several days.

A closed loop propellant transfer system has been developed for fueling the FMA target missile. Under normal operating conditions, a negligible amount of fuel vapors would be released into the atmosphere during fuel transfers. Spill prevention, containment, and control measures have been developed for the propellant loading process. Because the propellants are hazardous, personnel protection equipment must be worn when fueling the vehicle and specified propellant handling procedures strictly followed. All hazardous operations would be in accordance with pre-approved safety plans. All fueling would be conducted using impermeable barriers appropriate for this type of activity. Spill containment for the propellant transfer operation would be provided by a temporary containment system that is impervious to each particular propellant.

One set of temporary containment barriers would be used for fuel transfer operations, and a second set would be used for oxidizer transfer operations. The propellant storage locations would be periodically monitored for leaks by visual inspection.

After completion of the transfer operations, the transfer equipment would be flushed to decontaminate it. During normal operations, flushing of the transfer equipment would generate approximately 100 gallons of ethyl alcohol with about 6.8 ounces of main fuel in solution, approximately 50 gallons of ethyl alcohol with about 6.8 ounces of initiator fuel in solution, and approximately 200 gallons of neutralized oxidizer rinsate consisting of a weak nitric acid solution.

Should it become necessary to remove the propellant from the booster, the propellant would be transferred into empty bulk liquid propellant containers. The propellant containers would then be transported back to the respective propellant storage areas for reuse in the next mission. The defueled oxidizer tank would be flushed with deionized water, and the fuel tank would be flushed with ethyl alcohol. The material generated from flushing the fuel and oxidizer systems would be handled as hazardous waste and would be disposed according to appropriate procedures at a U.S. military facility or commercial facility permitted to accept the waste. The booster would be disposed of or returned to service per the applicable procedures.

FMA Flight Test Activities

Launch activities include rocket motor ignition and flight of the missile along the flight path. Because of the mobile nature of missiles, only a small portion of the launch exhaust and launch-related noise would occur near the launch location. Main FMA combustion products include carbon monoxide, carbon dioxide, nitrogen, and water.

Impact zones for IFTs would be delineated based on detailed launch planning and trajectory modeling. This modeling would include analysis and identification of a flight corridor. Launches would be conducted when trajectory modeling verifies that flight vehicles and debris would be contained within predetermined areas, all of which would be located over the BOA and removed from land and populated areas. Debris resulting from FMA flight test activities would conform to RCC-321 criteria.

FMA Post-Flight Activities

Post-launch activities would involve a visual inspection of the MLP deck area and collection of any debris on the deck. The fuel burned during the buildup of thrust and lift-off could scorch coatings and insulation materials on the MLP and leave carbon residues on the deck. Debris including any water produced from cleaning the deck would be disposed of in accordance with applicable regulations or brought back to port for disposal.

The MLP would be transported from the test event location to the ordnance loading port or home port as appropriate.

Aegis Readiness Assessment Vehicle-B

The ARAV-B target configuration (Figure 2-3) is composed of a Terrier MK 70 as the kick stage and an Oriole motor as the booster stage, spin motors for dispersion reduction, and a

separating conical nose tip. Once the nose tip is separated, four retro motors would be ignited to allow the nose tip to move away from the spent Oriole booster.

ARAV-B Transportation

Up to two ARAV-B SRBM targets would be shipped to Wake for integrated flight tests, a primary test vehicle and a back-up. The back-up vehicle would be used if there is a problem or malfunction of the primary vehicle or if a second launch is needed. All hardware would be shipped together on a Special Assignment Airlift Mission from Holloman Air Force Base, NM approximately 5 weeks before the test date. Upon arrival at the Wake Island airfield, the hardware would be moved into a missile assembly building for integration and testing prior to launch.

ARAV-B Pre-Flight Activities

The ARAV-B vehicle is built up in three pieces, (1) a MK-70 Terrier booster or kick stage, (2) a GEM-22 Oriole booster, and (3) a separating nose tip. The payload would be built up and integrated onto the booster on its handling cart. The vehicle would then be loaded onto the launch rail in two pieces, kick stage and upper stage, and the pieces would be mated on the rail. All pre-flight assembly and integration activities would be conducted in accordance with applicable ground safety and ordnance handling procedures.

ARAV-B Flight Test Activities

At a pre-planned time on the day of the integrated flight test, the ARAV-B would be launched in a southerly direction from the rail on Wake. It would be engaged by the Aegis BMD ship firing an SM-3 Blk 1A interceptor. The SM-3's kinetic warhead would intercept and destroy the ARAV-B by force of impact. Debris resulting from the intercept would be deposited on the BOA north of USAKA/RTS. All debris would conform to the risk guidelines in RCC 321. No debris hazardous to human health would be deposited on inhabited land.

ARAV-B Post-Flight Activities

After the integrated flight test concludes, the unused back-up vehicle would be de-integrated in a missile assembly building on Wake. It would then be loaded onto a government aircraft and returned to White Sands Missile Range via Holloman Air Force Base in the reverse of the process used to ship it to Wake.

2.2.3.3 Air-Breathing Targets

Integrated flight testing may include the use of air-breathing targets to simulate a threat. These targets may be launched from land locations within USAKA/RTS or from airborne platforms over the BOA. They are remotely piloted from a control station near the launch site. The air-breathing targets considered for use in integrated flight tests contain turbojet engines that burn JP-5 or similar fuel. These targets carry no explosives. If they are not destroyed during the flight test, the air-breathing targets can deploy a parachute that allows them to descend and be recovered from water or land locations. Following recovery, air-breathing targets can be disassembled, cleaned, and reused.

MQM-107E Target

The MQM-107E (Figure 2-3) is a medium to high performance remotely controlled target. The target is a semi-monocoque fuselage, swept-wing monoplane with conventional aircraft style tail assembly. Its mission is to provide a realistic and economical aerial target, capable of simulating the performance of enemy aircraft, to aid in research, development, test, and evaluation of surface-to-air and air-to-air weapons systems. Flight control is accomplished by telemetry up linked from a remote control station.

MQM-107E Transportation

The MQM-107E target is shipped from the United States to the test location in a sealed container that includes the fuselage, wing and stabilizer, nose section, gyro, and turbojet engine (Figure 2-7). Up to eight MQM-107E targets may be used to support each integrated flight test. The containers would be shipped to USAKA/RTS by C-17 aircraft or they may transit on the MLP. After arrival at USAKA/RTS, the containers would be transferred to existing marine transportation assets for further movement to an assembly and launch area on Roi-Namur, Kwajalein, or Illeginni.

MQM-107E Pre-Flight Activities

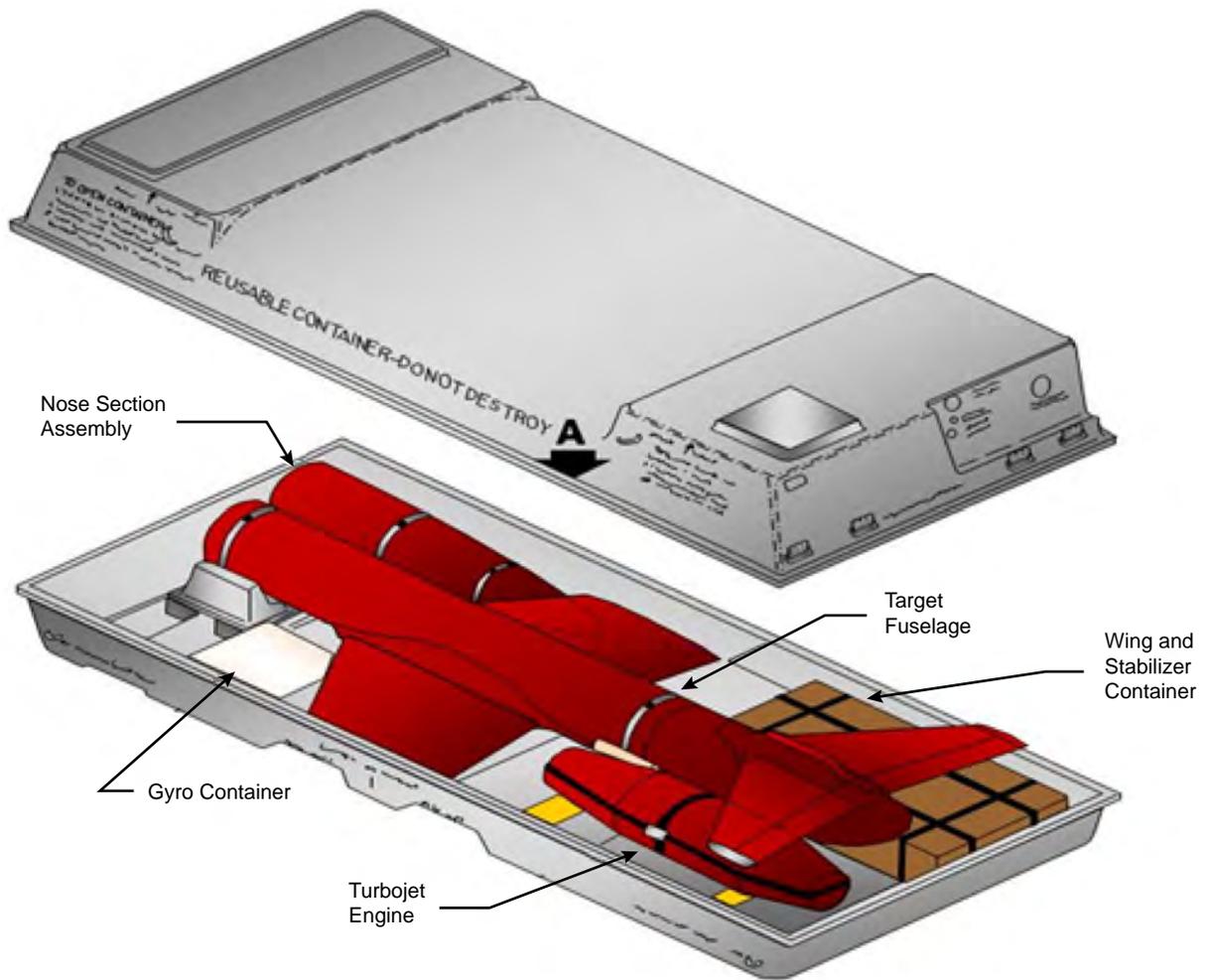
The MQM-107 target would be unpacked from its shipping container near the launch site and assembled. Once assembled, pre-flight checks would be conducted to ensure communications and control systems function properly. An antenna and remote relay would be used to extend the range over which the MQM could be controlled. The antenna would be temporarily installed on an existing tower at Gagan. Power to the relay would be provided by a small portable generator.

MQM-107E Flight Test Activities

The MQM-107E target would be launched from a trailer that is staked to the ground. Staking would require augering four holes about 4 feet deep and about 6-8 inches in diameter in a previously disturbed area. A small SRM would propel the target off the launch trailer and into the air until the turbojet engine generates enough thrust to sustain flight. The expended rocket motor would drop off the target approximately 2,200 feet away from the launch trailer and would not be recovered. Once airborne, the target is flown by a controller situated in a transportable control shelter located near the launch site. In a typical flight, the MQM-107E would quickly gain altitude and fly to a designated engagement area where it would commence flying in a "racetrack" pattern that would provide an opportunity to be detected and engaged by one of the weapon systems being tested. Engagements would be planned to occur over the BOA and any debris resulting from a successful intercept would fall to the ocean surface. If no intercept occurs, the target would fly to a planned area, deploy a parachute, and descend to the Kwajalein lagoon where it would be recovered. Flight planners would tailor the flight profile so that all fuel would be expended before the target descends to the lagoon.

MQM-107E Post-Flight Activities

After integrated flight tests conclude, unused and recovered targets would be disassembled, flushed with fresh water if needed, and cleaned. The target components would be repacked in their shipping containers and returned to the United States in the reverse process of their shipment to USAKA/RTS.



MQM-107E Shipping Container

Figure 2-7

BQM-74E Target

The BQM-74E is a turbojet-powered aerial target with high performance capabilities. Threat emulation is the primary mission. Others include simulation of aircraft for training naval aviators in air-to-air combat and support of the test and evaluation of new weapon systems. The BQM-74E and its ground support system are highly portable.

The BQM-74E can be used with multiple command and control systems, including the Integrated Target Control System, Multiple Aircraft GPS Integrated Command Control, Vega, and System for Naval Target Control. It can be employed in either a manual mode or a pre-programmed (hands off) mode.

BQM-74E Transportation

To support integrated flight tests, up to four BQM-74 targets (one primary target, one back-up target, and two spares) would be packed into shipping containers in the United States and transported by government aircraft or surface shipping to Wake or Kwajalein. After arriving at Wake or Kwajalein, the shipping containers would be moved using existing material handling equipment to a storage and buildup facility.

BQM-74E Pre-Flight Activities

In the buildup facility, the primary and back-up target vehicles would be unpacked and checked for damage. The primary and back-up target vehicles would then be prepared for flight. Ground checks of communication and control systems would be completed before fueling the targets and loading them onto the Gulfstream aircraft.

BQM-74E Flight Test Activities

The BQM-74E target would be launched from a Gulfstream aircraft over the BOA. The Gulfstream would stage from Wake or Kwajalein. Once airborne and under its own power, the target would be controlled from Wake. The BQM-74E would fly toward the Aegis BMD ship in a profile that emulates a threat. The Aegis BMD ship would detect the BQM target and determine if it posed a threat. If the BQM target was determined to pose a threat to the Aegis BMD ship, the ship would engage the BQM-74E and launch a SM-2 Blk IIA interceptor missile. The SM-2 would fly close to the BQM target but no collision between the SM-2 and BQM is planned. Once it has passed the BQM target, the SM-2 would be detonated by command and the resulting debris would fall into the BOA. The BQM target would fly into a stall attitude, deploy a parachute, and descend to the ocean surface where it would be recovered. If the SM-2 did contact the BQM target, the resulting debris would fall into the BOA.

BQM-74E Post-Flight Activities

At the conclusion of integrated flight testing, the recovered BQM target would be returned to the assembly building on Wake or Kwajalein where it would be flushed with fresh water, cleaned, and prepared for transportation to the United States. The target components would be repacked in their shipping containers and returned to the United States in the reverse process of their shipment to Wake or Kwajalein.

2.2.4 SENSOR AND COMMUNICATION SYSTEMS

2.2.4.1 Army-Navy Transportable Radar Surveillance 2 (Forward Based Mode)

The AN/TPY-2 Forward Based Mode (FBM) or AN/TPY-2 (FBM), is a transportable X-band, high resolution, phased-array radar designed specifically for ballistic missile defense. It is based on the AN/TPY-2 (TM) hardware and software design. The AN/TPY-2 (FBM) includes modified software algorithms for tracking and discrimination from a forward-based perspective. In this role, the radar acts as advanced “eyes” for the BMDS, detecting ballistic missiles early in their flight and providing precise tracking information for use by the system.

The AN/TPY-2 (FBM) consists of four units: AEU, EEU, CEU, and PPU. For use in integrated flight tests, the AN/TPY-2 (FBM) PPU would be replaced with either shore power provided by RTS or by Mobile Electric Power (MEP)-810A/B generator sets and appropriate switching gear. Each MEP-810A can provide up to 840 kW of 2400/4160 VAC 60-Hz, or 766 kW of 2200/3800 VAC 50-Hz, electrical power using two independent diesel-engine powered generator sets equipped with electronic control systems. Each MEP-810 would have a drive-through spill containment barrier. If existing shore power is used, MEP-810A generator sets may still be installed to serve as a back-up power source to ensure reliable power is available for the test.

Like the AN/TPY-2 (TM), the AN/TPY-2 (FBM) requires a relatively flat area about 108 feet by 108 feet to locate the AEU, EEU, and CEU. If site preparation activities were necessary for the AN/TPY-2 (FBM), they would begin approximately 2 months before the actual test date. All efforts will be made to locate the AN/TPY-2 (FBM) on an area where no site preparation is required. However, site preparation activities might include minor work to level the ground surface, removal of vegetation, and limited clearing of lines of sight. All site preparation would be conducted in accordance with USAKA/RTS and UES requirements.

AN/TPY-2 (FBM) radar operation requires 1.3 MW of electric power, which would be met using two MEP-810A/B generator sets with a third generator set in standby to serve as backup. A total of seven generator sets would be kept on-site. On average, generators would be used less than 10 hours per day, 5 days per week. This power generation configuration is expected to require approximately 1,000 gallons of diesel fuel per day. Daily operations would be fueled using 3,000–5,000-gallon portable fuel bladders that would be contained inside a drive-through spill containment barrier. Resupply would be performed as necessary using a fuel truck. All cabling and fuel lines would be laid directly on the ground or in protective cable trays. The AEU, EEU, CEU, and all MEP-810A/Bs would have drive-through spill containment barriers.

AN/TPY-2 (FBM) equipment may be affected by the salt environment at USAKA/RTS. To minimize adverse impacts, fresh (non-salt) water would be used to wash down selected AN/TPY-2 (FBM) equipment. AN/TPY-2 (FBM) personnel would use fresh water and brushes to wash down only exterior equipment surfaces. Fresh water would not contact any surfaces subject to petroleum, oil, or lubricant use.

Roi-Namur

The AN/TPY-2 (FBM) radar components would be transported from either Hawaii or Wake to Roi-Namur using either government C-17 aircraft or barges. The radar antenna would be emplaced on the western side of Roi-Namur aligned in a north–northeasterly direction. The EEU and ECU would be sited directly behind the AEU. The area is relatively flat and paved.

Seven MEP 810As and switch gear would be located behind the AEU. Portable fuel bladders would be located near the MEP 810s and would have secondary containment. All cabling and fuel lines would be laid directly on the ground or in protective cable trays. Although only a small portion (the southeastern tip) of Roi-Namur has been left relatively undisturbed since World War II, maximum effort would be made to locate the AN/TPY-2 (FBM) radar and communications equipment to avoid areas of herbaceous strand and littoral forest vegetation. Figure 2-8 shows the AN/TPY-2 (FBM) layout on Roi-Namur.

Each MEP-810 generator set is powered by two diesel engines. Current plans call for up to five of the MEP-810As to be running and two MEP-810As to be kept in reserve. No more than five diesel engines would operate simultaneously at any given time during flight test operations. The existing Document of Environmental Protection (DEP) for air quality will be modified to document the additional air emissions resulting from operation of the MEP-810s during integrated flight tests.

Satellite communications (SATCOM) capability would be provided by two AN/USC-60A units. They would be located in the SATCOM east and SATCOM west areas shown in Figure 2-8. Approximately 30 individuals would be required to set up and break down, operate, and provide security for the AN/TPY-2 (FBM) radar, C2BMC, and SATCOM units. These individuals will be housed in the Bachelor Officer's Quarters on Roi Namur and will use the Roi-Namur Dining Facility. At the conclusion of testing activities, SATCOM personnel would remove all mobile equipment/assets brought to Roi-Namur. Facilities and support equipment provided for the test would be returned to USAKA/RTS in accordance with established procedure. Hazardous materials/wastes would be handled in accordance with the UES. Transportation for removal of SATCOM equipment would be the same as when it was brought into the installation. The site would be returned to its pre-test condition to the extent practicable.

Wake

The AN/TPY-2 Radar and supporting equipment layout alternative location would be within the missile defense area at Peacock Point on Wake as shown on Figure 2-9.

As shown on Figure 2-9, the AN/TPY-2 Radar and power generation system (generators, switch gear, and fuel bladders) would be located adjacent to Building 1654, an existing missile assembly building situated in a large open area at the southeastern end of Peacock Point. The radar would be placed southeast of Building 1654, in a large open area created as part of the construction of Building 1654, approximately 250 yards from the ocean (along the proposed radar bore sight).

The entire tactical footprint of MDA's layout would be less than 2.4 acres. The AN/TPY-2 Radar and power generating system would occupy less than 2 acres. The supporting equipment would be located in a cleared and largely paved area near Launch Pad 1, and occupies less than 0.4 acre. The area is previously disturbed, relatively flat, and covered with grasses and vines over coral/rock.

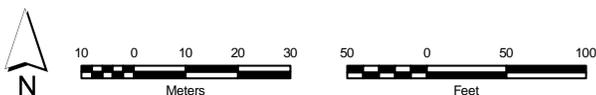


EXPLANATION	
	Existing Power Manhole
	Existing COMMS Manhole
	Existing Fence (Approx.)
	Structure / Equipment
	Radar PTL
	TPY-2 100 M Denied Occupancy Zone (DOZ)
	SATCOM Area
	SATCOM Center Point
	SATCOM Azimuth

Roi-Namur - Notional AN/TPY-2 Radar and Communications Site Layout

Kwajalein Atoll

Figure 2-8





EXPLANATION

- | | | |
|------------------|---------------|---------------------------|
| TPY-2 Structure | Existing Pad | Solar Awning |
| CDIN Structure | CDIN Area | CE-2 Anchor Point (Datum) |
| SATCOM Structure | Radar Azimuth | Light Pole |
| Site Boundary | Spill Berm | |
| CE-2 Pad | Soft Shelter | |

Wake - Notional AN/TPY-2 Radar, SATCOM, and CDIN Site Layout

Wake Atoll



Figure 2-9

Two 5,000-gallon portable fuel bladders would be located in a compacted, crushed coral/earthen-bermed area approximately 50 feet north of the generators. The radar would be powered by the generators, while all other equipment and administrative requirements (office, lighting, and air conditioning) would be powered by the Wake Island power plant. All cabling and fuel lines would be laid directly on the ground in protective cable trays, and the AEU, EEU, and CEU would have drive-through spill containment barriers. The keep-out-zone associated with the radar would be demarked with temporary metal barriers (or possibly stanchions and rope/wire).

Existing facilities on Wake would be used to provide billeting space and sanitary facilities, and the existing dining facility would be used to provide all meals during the test period.

2.2.4.2 High Frequency Radar

A separate HF Radar would be used to observe and collect target and intercept data. The radar system operates in the high frequency range (approximately 32 megahertz [MHz]) and consists of a transmit array, a separate receive array, and Container Express (Military Shipping Container) (CONEX)-type box to house equipment and operators. The transmit array consists of 10 small antennas, electronic equipment contained in a 20-foot CONEX shelter, and a 100-kW 50-Hz generator to power the transmitter. The receive array consists of an array of several antenna elements, receiver equipment, and a 30-kW 50-kilohertz (kHz) generator to power the receiver. The receive array would be placed in a rectangular formation, approximately 590 feet long by 82 feet wide. The transmitter array would be placed in a rectangular formation, 164 feet long by 115 feet wide. A separate 30-foot CONEX shelter, collocated with one of the arrays, would house two radar operators. Grounding rods would be required for both the transmitter and receiver. The radar would be located on Roi-Namur or on Kwajalein. Placement of the radar arrays, equipment, and shelters would be on previously disturbed ground and would require no trenching.

The proposed locations are Roi-Namur or Kwajalein (Figures 2-10 and 2-11). Illeginni is a distant third alternative location due to logistics.

2.2.4.3 Transportable Telemetry System

Two Transportable Telemetry System (TTS) units would be used to collect integrated flight test data. One system, designated TTS-3, would be located on Wake. The other system, designated TTS-4, would be sited on Kwajalein.

Each TTS consists of a 24-foot telemetry antenna, a telemetry shelter, spares shelter, and a power shelter. The shelters are 8 feet wide and 20 to 40 feet in length. Each TTS has a 175 kW diesel-powered generator associated with it and a bank of batteries that serves as an uninterruptible power source.

TTS-3 and TTS-4 are configured to operate on shore power. The generator can provide power in the event of a shore power failure. Running continuously, the generator would consume about 375 gallons of JP-5 fuel per 24 hours of operation. The battery-powered uninterruptible power supply provides power while the system is switched from shore power to generator power if shore power is lost.



EXPLANATION

-  Receiver or Transmitter
-  Transmitter

**Roi-Namur -
High Frequency Radar
Potential Sites**

Kwajalein Atoll

Figure 2-10



EXPLANATION

-  Receiver
-  Transmitter

**Kwajalein -
High Frequency Radar
Potential Sites**

Kwajalein Atoll

Figure 2-11

The units would be transported from the United States by air or surface craft and would arrive at their respective support areas approximately 8 weeks before the test event. Preflight activities would include transportation from their point of arrival to their final support locations, setting up the antenna, connecting power, communications, and data lines to the shelters, and conducting pre-flight tests to confirm proper operations.

During integrated flight tests, the TTS units would collect telemetry data from selected flight vehicles. The collected data would be transmitted via fiber optic cable or satellite communications to a data center for processing.

TTS-3 and TTS-4 would be powered down and disassembled at the conclusion of integrated flight tests. The units would be prepared for transport from Wake and Kwajalein, respectively, to the United States using air or surface craft.

2.2.4.4 Command, Control, Battle Management, and Communication

The Command, Control, Battle Management, and Communications (C2BMC) node would be transported to Roi-Namur using existing marine transportation assets. It would be located around the Tactical Operations Center (TOC) tent. The C2BMC Deployable Interface Node (CDIN) and supporting Storage Container Express, CONEXs would be located adjacent to the northeast side of Building 1654. Four diesel-engine power generators and switch gear would be located approximately 60 feet from the northwest side of Building 1654.

A C2BMC node would be co-located with the AN/TPY-2 (FBM) radar on Roi-Namur or the alternate location on Wake. C2BMC is a network of computer hardware, software, and communications capabilities that provides the rules, tools, and connectivity that enable the BMDS to engage threat missiles. C2BMC receives, processes, and displays tracking and status data from multiple elements, components, and sensors so that local commanders at various locations have the same integrated operating picture and can make coordinated decisions about deploying weapons. C2BMC equipment with power applied (virtually everything except an equipment shelter) must be grounded. C2BMC could use the established grounding grid if available or would use grounding rods similar to THAAD (three 3-foot sections of ½-inch diameter rod).

The C2BMC node would consist of four shelters: the 3-1 TOC, C2BMC Equipment Shelter, Mission Support Shelter (MSS), and CONEX. The TOC contains workstations, printers, and safes to be used by operations personnel during preparation for and participation in exercises. The CES contains the C2BMC High Availability Communications Nodal Equipment, Intrusion Detection System, Communications Network Interface Processors, network security, routing, switching, and crypto equipment in transit cases. The MSS contains additional spares and tables for hardware assembly, test, and maintenance. The Storage CONEX contains additional spare equipment and administrative support materials. In addition to the four shelters, the C2BMC node includes two Power Distribution Illumination Systems, Electrical and seven environmental control units (ECUs). There are no generators specific to the C2BMC node.

Approximately 30 individuals would be required to set up and break down, operate, and provide security for the AN/TPY-2 (FBM) radar, C2BMC, and SATCOM units. Upon completion of an integrated flight test, all personnel and equipment would depart by aircraft and/or barge to a

designated location, and the area would be returned to its pre-test condition to the extent practicable.

The MDA is considering two potential sites for locating the AN/TPY-2 (FBM), C2BMC, and SATCOM equipment, Roi-Namur (Figure 2-8) and Wake (Figure 2-9). Preliminary studies indicate that the site on Roi-Namur is preferable because it better supports the accomplishment of integrated flight test objectives. Since the decision regarding where to locate THAAD and Patriot units is not affected by the location of the AN/TPY-2 (FBM), C2BMC, and SATCOM, the potential radar sites are presented above and referenced in the alternatives discussion later in this section.

2.2.5 ADDITIONAL TEST ASSETS

A variety of fixed and mobile test infrastructure assets, currently on USAKA and/or Wake, if available, would be used in the execution of integrated flight tests. These assets may include fixed or mobile radars, communications assets, telemetry systems, range safety aircraft, and mobile launch and safety platforms. Potential environmental impacts resulting from the use of these assets were considered in a variety of documents including the *Mobile Sensors Environmental Assessment* and the *Proposed Actions at U.S. Army Kwajalein Atoll Final Supplemental Environmental Impact Statement*, among others.

2.3 ACTION ALTERNATIVES

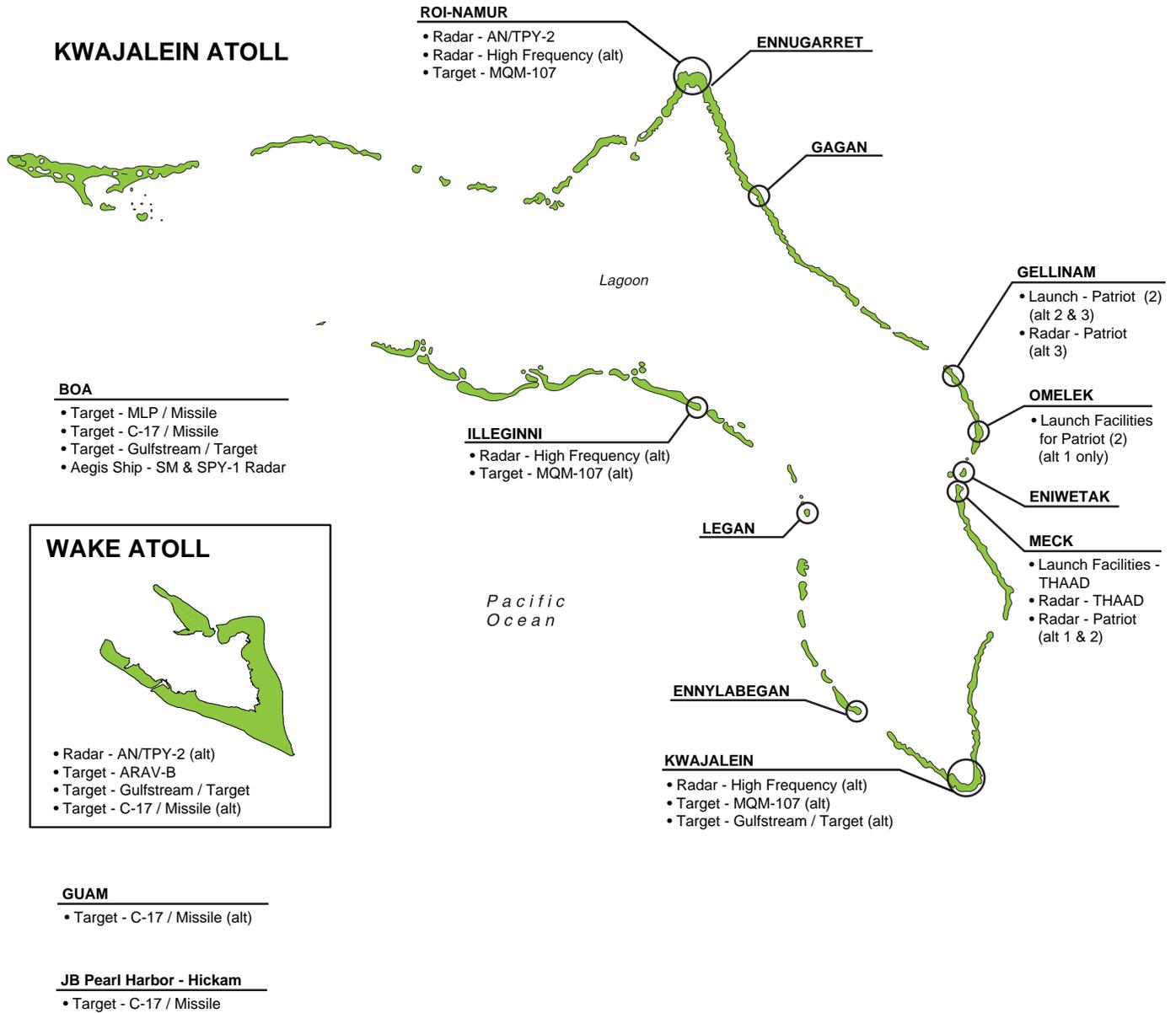
Three action alternatives are being proposed to perform the Proposed Action. In all three alternative test configurations, the MDA proposes to operate the Aegis BMD ship in the BOA north of USAKA/RTS and an AN/TPY-2 FBM radar at Roi-Namur (or Wake). Figure 2-12 shows IFT component locations.

2.3.1 ALTERNATIVE 1

For Alternative 1, THAAD launchers and radar and the AN/MPQ-65 would be located on Meck, PAC-3 LSs would be on Omelek, and the AN/TPY-2 (FBM) radar would be on Roi-Namur. The following sections describe the location of these test assets.

2.3.1.1 Meck

Before integrated flight test activities, the THAAD unit's equipment would be transported from Kwajalein to Meck by existing marine transportation. THAAD missiles on their MRPs would be stored in the MAB. Ground transportation on Meck would be accomplished with organic unit vehicle assets augmented by USAKA/RTS assets.



Source: Modified from U.S. Army Space and Strategic Defense Command, 1993

Integrated Flight Test Component Alternative Locations

Pacific Ocean

Figure 2-12

For integrated flight tests, up to two THAAD launchers would be sited on the north end of Meck and aligned on a north-northeast azimuth (Figure 2-13). One launcher could be located at the edge of existing pavement to the north of launch hill. A second launcher could be located in the north-central part of Meck on existing pavement. This location allows the second launcher azimuth to pass to the east of launch hill. Each launcher requires a cleared, relatively flat area approximately 26 feet by 49 feet. A 984-foot keep out area would be established around each of the THAAD launchers to ensure personnel and equipment safety from launcher back blast.

The AN/TPY-2 (TM) would be located on the runway southeast of building 5050. An electromagnetic radiation (EMR) hazard exclusion area for personnel would be established for the THAAD AEU extending 1,640 feet in front and to the side of the radar. The EEU, CEU, and PPU would be arrayed behind the AEU's radiating face. Figure 2-14 shows a notional layout of the AN/TPY-2 (TM) and communications equipment. The AN/TPY-2 (TM) and associated equipment would be sited on existing paved surface to the extent practicable. Soldier safety and tactical realism considerations may require an equipment configuration where certain items would be located off the existing paved surfaces. If this were to occur, migratory bird habitat, bird nesting areas, and sea turtle nesting and haul-out areas would be avoided to the maximum extent. Prior to placement off the existing paved areas coordination will be conducted with the USAKA/RTS Environmental Office and appropriate agencies as necessary.

The AN/MPQ-65, with its associated vehicles and equipment, would be transported from Kwajalein to Meck using existing marine transportation. Ground transportation on Meck would be accomplished with organic unit vehicles or by vehicles provided by the USAKA/RTS. Associated vehicles and equipment deployed to Meck would include the TCS (a 5-ton truck mounted expandable shelter); ICC (a lightweight weather-tight shelter mounted on an LMTV or a 5-ton cargo truck); ECS (a lightweight weather tight shelter mounted on an LMTV) or a 5-ton cargo truck; EPP (prime power source for the ECS and radar set mounted on a 10-ton M977 HEMTT); Small Repair Parts Transporter; and up to three EPU's (trailer mounted 30-kW generator).

The AN/MPQ-65 system would be located at the south end of the runway on Meck (Figure 2-15). A personnel exclusion area would be established 395 feet to the front and extending 60 degrees to each side of the center of the radar during radar operations. As with the AN/TPY-2 (TM), the AN/MPQ-65 and associated equipment and vehicles would be located on existing paved surface to the extent practicable. In the event that soldier safety and tactical realism considerations require an equipment configuration where certain items would be located off the existing paved surfaces, the siting would include coordination with the USAKA/RTS environmental staff and the appropriate agencies. Migratory bird habitat, bird nesting areas, and sea turtle nesting and haul-out areas would be avoided to the maximum extent.

Approximately 120 soldiers and other test-related personnel would be deployed to Meck to support THAAD and Patriot participation in integrated flight test activities. Temporary housing and sanitary facilities would be sited on previously disturbed land to provide billeting and sanitary services to personnel deployed to Meck. The existing dining facility would be used to provide all meals during the entire test period.

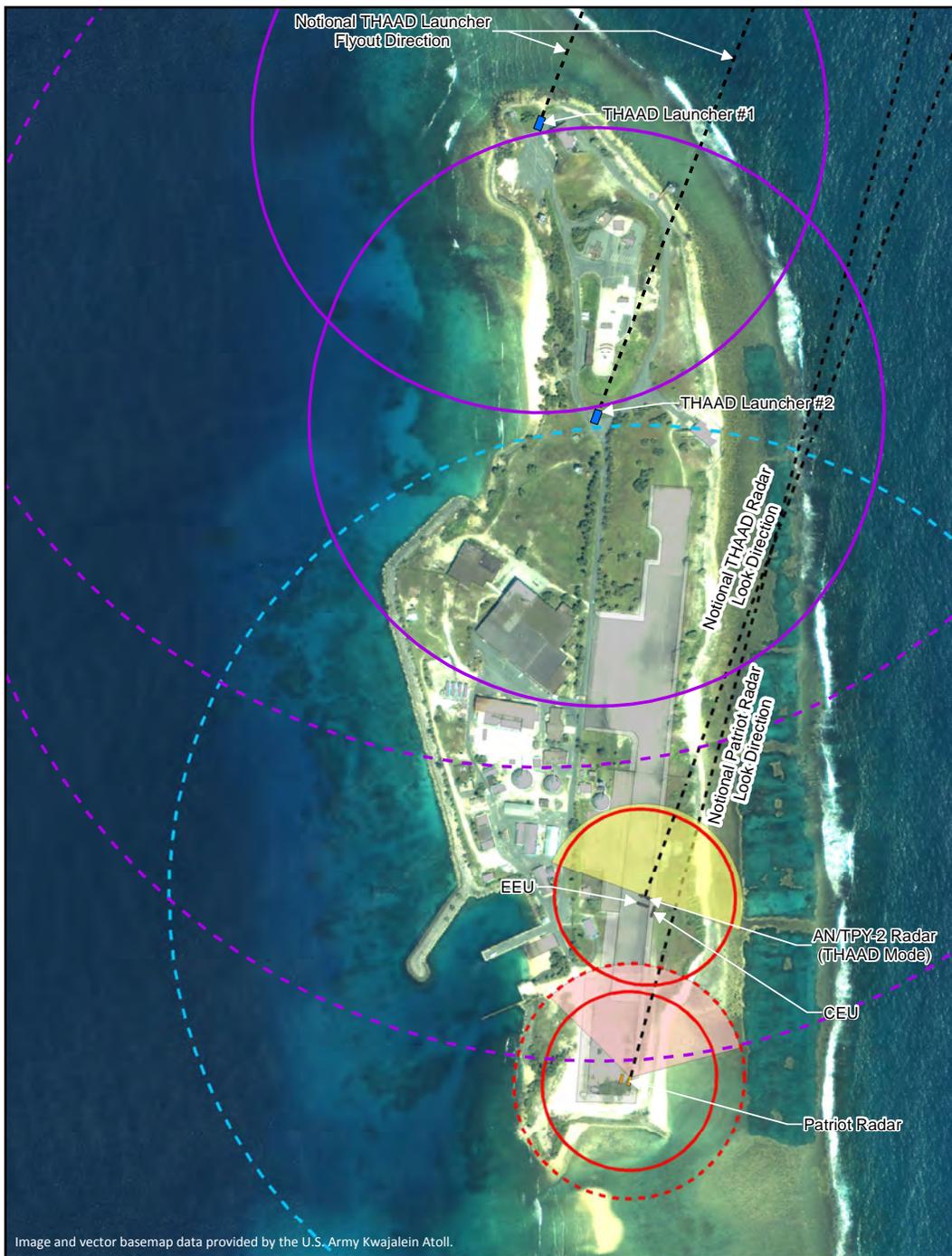


Image and vector basemap data provided by the U.S. Army Kwajalein Atoll.

EXPLANATION

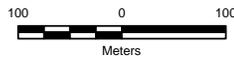
- THAAD Launcher
- AN/TPY-2 Radar (THAAD Mode)
- TPY-2 100 M Denied Occupancy Zone (DOZ)
- Patriot Radar
- Patriot 120 M Denied Occupancy Zone (DOZ)

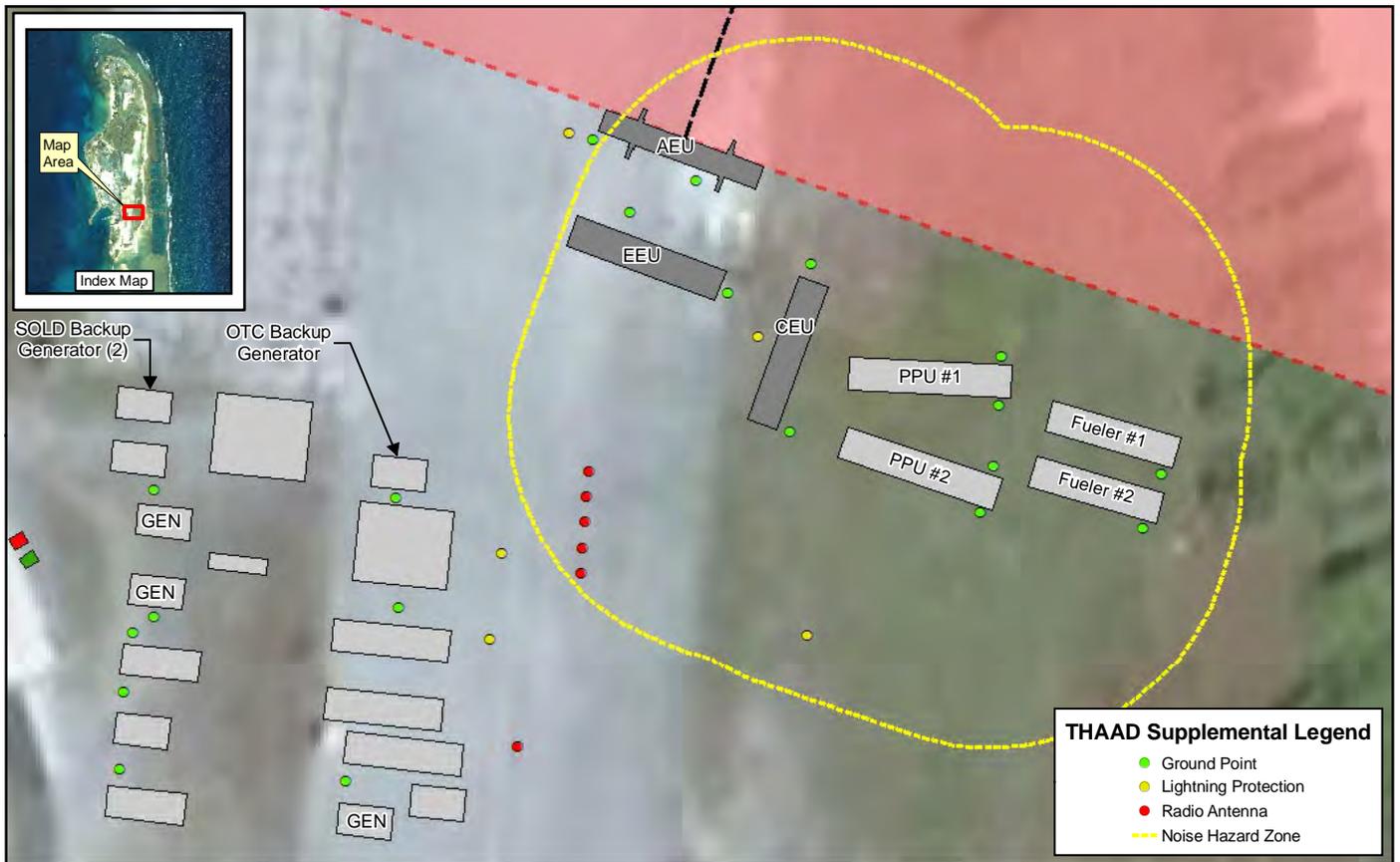
- - - Patriot 120 M Radar/Launcher Minimum Separation Distance
- 90 M AN/TPY-2 to CFG3 Radar Minimum Separation Distance
- - - AN/TPY-2 to Launcher 500 M Minimum Separation Distance
- 300 M THAAD Launcher Minimum Separation Distance
- - - 678 M THAAD Launcher HAZMAT Keep Out Zone

**Meck -
Notional THAAD and
Patriot Equipment Site
Layout**

Kwajalein Atoll

Figure 2-13





EXPLANATION

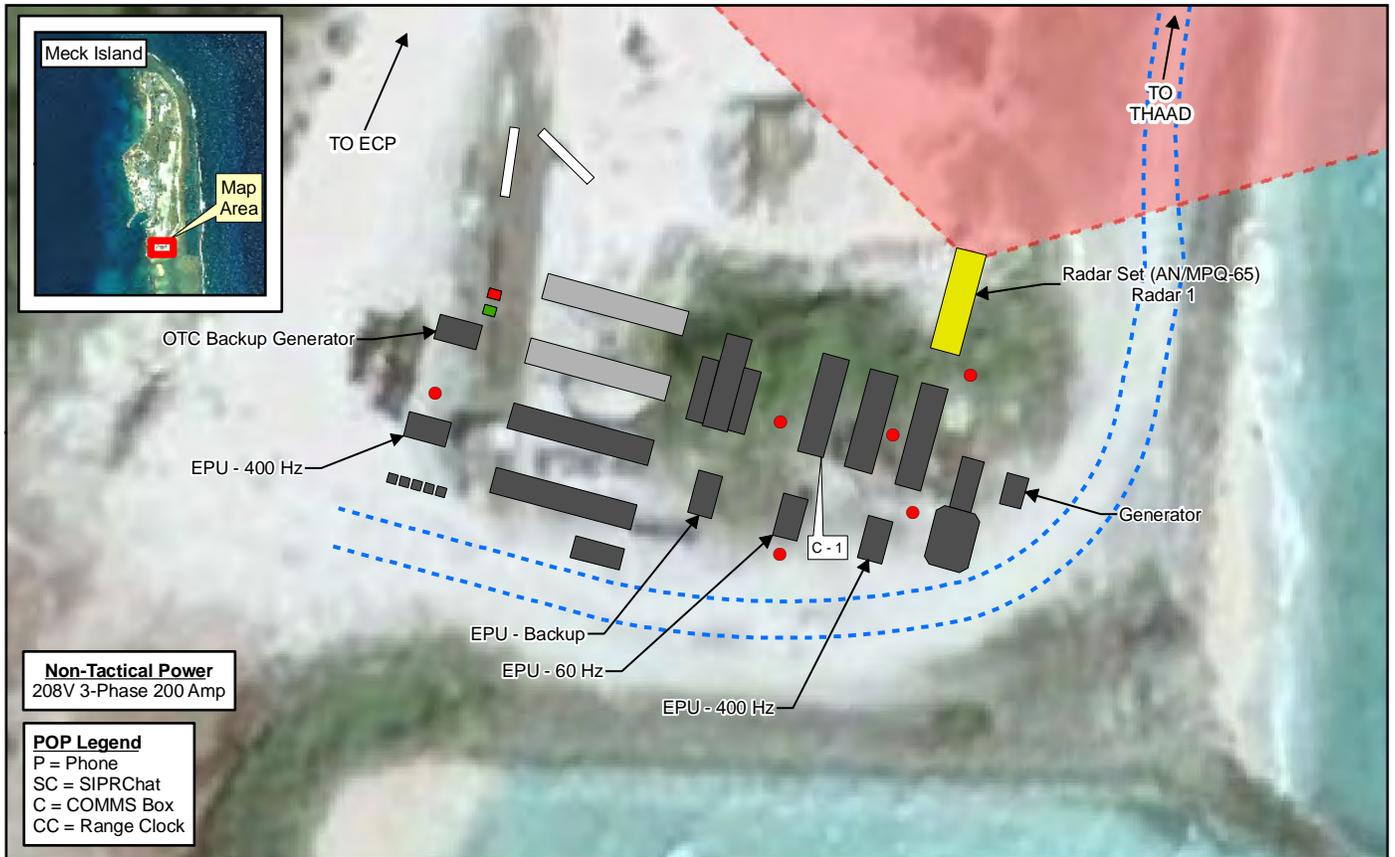
- AN/TPY-2 (TM) Facility
- THAAD Support Facility
- Non-Tactical Power Panel
- COMMS Panel
- 100 M Denied Occupancy Zone (DOZ)
- Notional Radar Look Direction

**Meck - Notional
AN/TPY-2 (TM)
Site Layout**

Kwajalein Atoll



Figure 2-14



EXPLANATION

- Patriot Radar Support Facility
- Non-Tactical Powered
- Tactical Powered
- Non-Tactical Power Panel
- COMMS Panel
- Fuel Truck Route
- Grounding Pole Location
- 120M Denied Occupancy Zone (DOZ)

Meck - Notional AN/TPY-2 (TM) and AN/MPQ-65 Site Layout

Kwajalein Atoll

Figure 2-15



2.3.1.2 Omelek

Omelek is a small island with minimal infrastructure. It has a helipad and several small buildings. Figure 2-16 provides the notional component array.

Up to two Patriot launchers, associated vehicles, and equipment would be transported from Kwajalein to Omelek for integrated flight tests using existing marine assets. Ground transportation on Omelek would be accomplished using organic unit assets augmented by USAKA/RTS vehicles. LS-1 would be sited adjacent to the southwest corner of the helipad. LS-2 would be located northeast of the helipad approximately 312 feet northeast of LS-1. Approximately four to six Patriot soldiers would be on Omelek during rehearsals and on firing day. These soldiers would be evacuated from Omelek during actual firing.

2.3.1.3 Roi-Namur

Layout of the AN/TPY-2 (FBM), associated C2BMC and SATCOM, transportation, and test activities would be identical to those described in Section 2.2.4.1. Figure 2-8 illustrates the equipment layout on Roi-Namur. A land launched target, MQM-107E on a trailer, could also be operated from Roi-Namur.

An alternative AN/TPY-2 location is on Wake. Alternate land launched target locations are on Kwajalein or Illeginni. C-17 target delivery system staging area alternatives are JBPHH, Wake, or Guam. See Section 2.2.3 for other target support locations.

2.3.2 ALTERNATIVE 2

In Alternative 2, the THAAD unit and the AN/MPQ-65 and ICC equipment would be located on Meck. The PAC-3 LS would be located on Gellinam and the AN/TPY-2 (FBM) radar, C2BMC, SATCOM, and TTS would be on Roi-Namur.

2.3.2.1 Meck

THAAD unit transportation and test activities and locations for emplacement would be identical to those described for the Alternative 1 in Section 2.3.1.1.

AN/MPQ-65, ICC equipment transportation, test activities, and locations for emplacement would be identical to those described for Alternative 1 in Section 2.3.1.1.



EXPLANATION

- Patriot Launcher
- Patriot Launch Area
- 90 M Launcher Minimum Separation Distance
- Notional Launcher Flyout Direction
- 90 M Back Blast Area

**Omelek -
Notional Patriot
Launcher Sites Layout**

Kwajalein Atoll

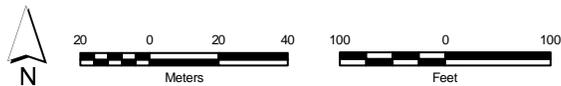


Figure 2-16

2.3.2.2 Gellinam

Up to two PAC-3 LSs (Figure 2-17), associated vehicles, and equipment would be transported from Kwajalein to Gellinam for integrated flight tests using existing marine assets. Ground transportation would be accomplished using organic unit assets or vehicles supplied by USAKA/RTS. One launcher would be located on a narrow trail north of the helipad in an area overgrown with vegetation. Any clearing needed to establish lines of sight would be coordinated with the USAKA/RTS Environmental Office and appropriate agencies, as necessary. The second launcher would be located in a cleared area near the helipad. This site has an unobstructed trajectory. Littoral forest vegetation, shoreline habitat, herbaceous strand, migratory bird habitat, and sea turtle nesting/haul-out areas would be avoided to the maximum extent possible.

Approximately four to six Patriot soldiers would be on Gellinam during rehearsals and on firing day. These soldiers would be transported from Meck to Gellinam each day on existing marine transportation. While on Meck, they would use the temporary housing and sanitary facilities described earlier. The existing dining facility on Meck would provide meals during the test period.

2.3.2.3 Roi-Namur

AN/TPY-2 (FBM) and associated C2BMC and SATCOM transportation and test activities would be identical to those described in Section 2.2.4.1. A land launched target, MQM107 on a trailer, could also be operated from Roi-Namur.

An alternative AN/TPY-2 location is on Wake. Alternate land launched target locations are on Kwajalein or Illeginni. C-17 target delivery system staging area alternatives are JBPHH, Wake, or Guam. See Section 2.2.3 for other target support locations.

2.3.3 ALTERNATIVE 3

For Alternative 3, the THAAD unit would be located on Meck, the Patriot unit would be located on Gellinam, and the AN/TPY-2 (FBM) radar and associated C2BMC and SATCOM would be on Roi-Namur.

2.3.3.1 Meck

THAAD unit transportation and test activities would be identical to those described for Alternative 1 in Section 2.3.1.

2.3.3.2 Gellinam

In this alternative (Figure 2-18), the Patriot unit would be transported from Meck to Gellinam using existing marine transportation. On Gellinam, the AN/MPQ-65 and ICC equipment would be moved to a location approximately 125 meters south southeast of the helipad for emplacement and subsequent operations. One Patriot launcher would be located on a trail



EXPLANATION

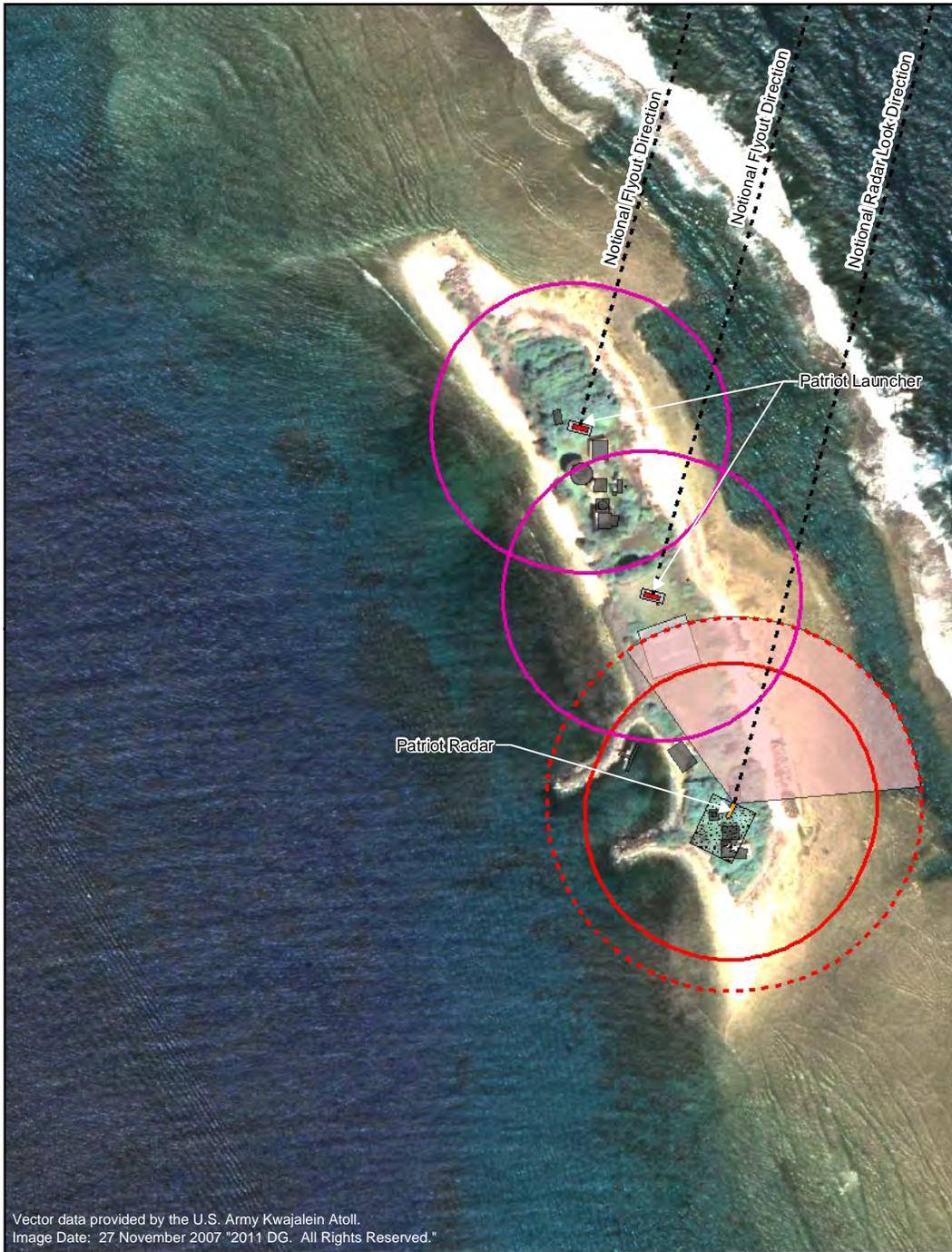
- Patriot Launcher
- Patriot Launch Area
- 90 M Launcher Minimum Separation Distance
- COMMS Relay Group
- - - Notional Flyout Direction

**Gellinam -
Notional Patriot
Launcher Sites
Layout**

Kwajalein Atoll

Figure 2-17





EXPLANATION

- Patriot Radar
- Patriot Launcher
- Patriot Launch Area
- Denied Occupancy Zone (DOZ)
- 120 M Radar/Launcher Minimum Separation Distance
- 90 M Launcher Minimum Separation Distance
- Patriot Parcel (30m x 35m)

**Gellinam –
AN/MPQ-65 and
Notional Patriot
Launcher Sites Layout**

Kwajalein Atoll



Figure 2-18

north of the helipad in an area overgrown with vegetation. Any clearing needed to establish lines of sight would be coordinated with the USAKA/RTS environmental office and appropriate agencies, as necessary. The second Patriot launcher would be located in a cleared area near the helipad. Approximately 50 Patriot soldiers would be transported from Meck to Gellinam daily on existing marine transportation. They would use the temporary housing and sanitary facilities on Meck, and they would use the existing dining facility on Meck for meals during the entire test period.

2.3.3.3 Roi-Namur

Layout of the AN/TPY-2 (FBM) and associated C2BMC and SATCOM, transportation, and test activities would be identical to those described in Section 2.2.4.1. A land launched target, MQM107 on a trailer, could also be operated from Roi-Namur.

An alternative AN/TPY-2 location is on Wake. Alternate land launched target locations are on Kwajalein or Illeginni. C-17 target delivery system staging area alternatives are JBPHH, Wake, or Guam. See Section 2.2.3 for other target support locations.

2.4 NO-ACTION ALTERNATIVE

The No-action Alternative would be not to conduct integrated flight tests at the action alternative sites. MDA would not be able to demonstrate integrated BMDS effectiveness against SRBM, MRBM, and other threats in an operationally realistic flight test. Previously planned and on-going activities at the alternative sites for which environmental effects have been analyzed and documented would continue.

2.5 ALTERNATIVES CONSIDERED BUT NOT CARRIED FORWARD

A siting study was initiated in February 2011 to develop and evaluate alternative locations for siting the system elements involved in integrated flight tests at USAKA/RTS. Analysis and weighting of the siting criteria resulted in a rank-ordered set of locations that allowed test objectives to be met and identification of location sets that would not allow test objectives to be met. The following four alternative location and configuration scenarios were considered but not carried forward for additional analysis.

- In this not-carried-forward alternative, the THAAD unit would be located on Meck and the Patriot unit, the AN/TPY-2 (FBM) with associated C2BMC, and SATCOM equipment would be sited on Roi-Namur. This alternative was not carried forward for additional analysis due to the potential for interference between the existing sensors on Roi-Namur and the Patriot unit, the AN/TPY-2 (FBM) with associated C2BMC, and SATCOM equipment that would be sited on Roi-Namur in this option.
- In this not-carried-forward alternative, the THAAD unit would be sited on Meck, the AN/MPQ-65 and ICC equipment would be sited on Illeginni, the PAC-3 LSs would be sited on Gagan, and the AN/TPY-2 (FBM) with associated C2BMC and SATCOM

equipment would be sited on Roi-Namur. This alternative was not carried forward for additional analysis due to logistical concerns and potential environmental impacts associated with tree clearing for the PAC-3 LSs.

- In this not-carried-forward alternative, a potential test configuration would have located the THAAD unit on Meck with the AN/MPQ-65 set and launchers. This configuration was determined not to support the accomplishment of operational test objectives. Meck lacks sufficient space for two THAAD launchers when both THAAD and Patriot systems are collocated. MDA determined that two THAAD launchers are required for operational tests just as they would be required for operation of the system. Therefore, site configurations that would collocate THAAD launchers and PAC-3 LSs on Meck were removed from further consideration.
- In this not-carried-forward alternative, integrated flight test siting initially focused on Wake for emplacement of an AN/TPY-2 Radar (FBM), the THAAD weapon system, and the Patriot weapon system. A siting analysis demonstrated that the integrated flight test components could be physically emplaced on Wake; however, the maturing of test requirements and objectives indicated that Wake lacked sufficient land/space and resources to accommodate all of these components simultaneously. As a result, Wake was not carried forward for further analysis. Early in the integrated flight test planning, PMRF was considered as an alternative site from which to launch THAAD and PAC-3 interceptor missiles. Because integrated flight tests may include operational testing, THAAD could employ tactical interceptor missiles that do not have a flight termination system. PMRF could not support such operational testing, so it was not carried forward for additional analysis.

3.0 Affected Environment

3.0 AFFECTED ENVIRONMENT

This chapter describes the environmental characteristics that may be affected by the Proposed Action and Alternative Actions. The information provided serves as a baseline point of reference for understanding any potential impacts. The affected environment is concisely described; any components of concern are described in greater detail. The EA evaluates the potential environmental impacts of performing IFT at USAKA/RTS, Wake Island, and the BOA.

Available reference materials, including EAs and environmental impact statements (EISs) were reviewed. To fill data gaps and to verify and update information, questions were directed to program and facility personnel, federal and local regulatory agencies, and private individuals.

Environmental Resources

Thirteen broad resources 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, visual aesthetics, and water resources. These areas were analyzed as applicable for the proposed locations or activity. Each proposed location is discussed under each resource area unless the proposed activities at that location would not foreseeably result in an impact. Explanations are given under each resource for the elimination of a resource of environmental consideration.

Environmental Setting

Kwajalein Atoll

The Kwajalein Atoll is located in the western chain of the RMI in the West Central Pacific Ocean. Eleven islands in the RMI are used under the terms of the Military Use and Operating Rights Agreement by USAKA/RTS: Kwajalein Island and the islands of Ennylabegan (Carlos), Legan, Illeginni, Roi-Namur, Ennugarret, Gagan, Gellinam, Omelek, Eniwetak, and Meck. The proposed USAKA/RTS locations for the integrated flight tests include Meck, Roi-Namur, Omelek, Kwajalein, Gellinam, and Illeginni.

Wake Island

Wake Island is a part of the Wake Atoll. The Atoll consists of three islands: Wake, Wilkes, and Peale. Wake Island is less than 3 square miles in area and lies in the middle of the Pacific Ocean, roughly halfway between Hawaii and Japan. Wake was developed as a stopover and refueling site for military and commercial aircraft transiting the Pacific. The island's airstrip has been used by the U.S. military and some commercial cargo planes, as well as for emergency landings. It is primarily an emergency divert airfield or planned stopover location on cross-Pacific military flights.

Broad Ocean Area

The BOA is the area within the Proposed Action locations that is greater than 12 nm offshore of the proposed locations. U.S. Government activities within the BOA, as part of the high seas outside 12 nm from land, are subject to EO 12114.

3.1 AIR QUALITY

Air quality in a given location is described by the concentrations of various pollutants in the atmosphere, expressed in units of parts per million, or micrograms per cubic meter ($\mu\text{g}/\text{m}^3$). Pollutant concentrations are determined by the type and amount of pollutants emitted into the atmosphere; the physical characteristics, including size and topography; and meteorological conditions related to prevailing climate.

3.1.1 U.S. ARMY KWAJALEIN ATOLL/RONALD REAGAN BALLISTIC MISSILE DEFENSE TEST SITE (USAKA/RTS)

3.1.1.1 Meck, Roi-Namur, Omelek, Kwajalein, Gellinam, and Illeginni—Air Quality

Ambient air quality standards are provided in the UES (U.S. Army Space and Missile Defense Command, 2011). Table 3-1 lists these standards. Any future stationary sources exceeding the thresholds in Table 3-2 will require coverage under a DEP to ensure continued achievement of the UES air quality standards.

Region of Influence

For the air quality analysis, the region of influence for the Proposed Action and alternatives is Meck, Roi-Namur, Omelek, Kwajalein, Gellinam, and Illeginni.

Table 3-1. USAKA Ambient Air Quality Standards

Pollutant	Averaging Period	USAKA Ambient Standard ($\mu\text{g}/\text{m}^3$)	USAKA Increment Degradation Standards ($\mu\text{g}/\text{m}^3$)
Carbon Monoxide (CO)	8-hour	8,000 $\mu\text{g}/\text{m}^3$ (7.2 ppm)	2,500
	1-hour	32,000 $\mu\text{g}/\text{m}^3$ (28 ppm)	10,000
Nitrogen Dioxide (NO ₂)	Annual	80 $\mu\text{g}/\text{m}^3$ (0.04 ppm)	25
Ozone (O ₃)	8-Hour	120 $\mu\text{g}/\text{m}^3$ (0.06 ppm)	37.5
Sulfur Oxide (SO _x)	3-hour	1,040 $\mu\text{g}/\text{m}^3$ (0.05 ppm)	325
	24-hour	292 $\mu\text{g}/\text{m}^3$	91
	Annual	64 $\mu\text{g}/\text{m}^3$	20
Lead (Pb)	3 months	0.12 $\mu\text{g}/\text{m}^3$	0.375
Particulate Matter (PM-2.5)	24-hour	28 $\mu\text{g}/\text{m}^3$	8.75
	Annual	12 $\mu\text{g}/\text{m}^3$	3.8
Particulate Matter (PM-10)	24-hour	120 $\mu\text{g}/\text{m}^3$	37.5

Source: U.S. Army Space and Missile Defense Command, 2011, Table 3-1.6.1

$\mu\text{g}/\text{m}^3$ = micrograms per cubic meter

PM-2.5 = particulate matter equal to or less than 2.5 microns in size

PM-10 = particulate matter equal to or less than 10 microns in size (also called respirable particulate and suspended particulate)

ppm = parts per million

Table 3-2. USAKA Air Pollutant Thresholds for Major Stationary Sources

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

Source: U.S. Army Space and Missile Defense Command, 2011, Table 3-1.5.2

PM-10 = particulate matter equal to or less than 10 microns in size (also called respirable particulate and suspended particulate)

PM-2.5 = particulate matter equal to or less than 2.5 microns in size

Affected Environment

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

The average annual precipitation is 101 inches, 75 percent of which is recorded from mid-May to mid-December (the rainy season). During this time, light, easterly winds and frequent moderate to heavy showers prevail. During the drier season, light showers of short duration occur, and cloud cover is at a minimum. The relative humidity is uniformly high throughout the year, with values almost always between 70 and 85 percent. (U.S. Army Space and Strategic Defense Command, 1995)

Northeasterly trade winds ranging from 9 to 16 miles per hour are dominant during most of the year. The summer months can bring relatively calm conditions.

Typhoons occasionally occur at Kwajalein Atoll; however, the atoll is considered to be outside the main areas of typhoon occurrence in the Western Pacific. (U.S. Army Kwajalein Atoll, 2006)

3.1.2 WAKE ISLAND—AIR QUALITY

Region of Influence

The region of influence for the Proposed Action is Wake and its adjacent offshore areas.

Affected Environment

No ambient air quality monitoring data is known to be available for Wake Island; however, it is believed that there are no air pollution problems at Wake Island due to the strong trade winds quickly dispersing any local emissions. Additionally, there are no other islands within several hundred miles of Wake Atoll that could be affected by pollutants generated on Wake Island.

3.1.3 BROAD OCEAN AREA—AIR QUALITY

Region of Influence

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

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

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

According to the Kyoto Protocol and Hawaii's Global Warning Solution Act 234, there are six GHG:

- Carbon dioxide (CO₂)
- Nitrous oxide (N₂O)
- Methane (CH₄)
- Hydrofluorocarbons
- Perfluorocarbons
- Sulfur hexafluoride

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

Although the direct GHG (CO₂, CH₄, and N₂O) 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 CO₂ have increased globally by 35 percent. Within the United States, fuel combustion accounted for 94 percent of all CO₂ emissions released in 2005. On a global scale, fossil fuel combustion added approximately 30 x 10⁹ tons of CO₂ 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 1.2–1.4°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).

3.2 AIRSPACE

Airspace, while generally viewed as being unlimited, is finite in nature. It can be defined dimensionally by height, depth, width, and period of use (time). The FAA is charged with the overall management of airspace and has established criteria and limits for use of various sections of this airspace in accordance with procedures of the International Civil Aviation Organization (ICAO).

3.2.1 U.S. ARMY KWAJALEIN ATOLL/RONALD REAGAN BALLISTIC MISSILE DEFENSE TEST SITE (USAKA/RTS)

3.2.1.1 Meck, Roi-Namur, Omelek, Kwajalein, Gellinam, and Illeginni—Airspace

Region of Influence

The region of influence for airspace at USAKA/RTS includes the airspace over and surrounding all 11 islands in the Atoll used under the terms of the Military Use and Operating Rights Agreement including any proposed launch stations on Meck, Gellinam, and Omelek.

Affected Environment

Controlled and Uncontrolled Airspace

USAKA/RTS is located in international airspace. Marshall Islands, Bucholz Army Airfield (AAF) on Kwajalein Island is considered Class D airspace: that airspace extending upward from the surface to and including 2,500 feet mean sea level within a 4.3-mile radius of Bucholz. This Class D airspace area is effective during the specific dates and times established in advance by a Notice to Airmen (NOTAM). The effective date and time will thereafter be continuously published in the Pacific Chart Supplement. (U.S. Department of Transportation, Federal Aviation Administration, 2011)

It is also considered within Class E airspace. The ceiling of Class E extends upward from the surface within 2.2 miles each side of the Bucholz AAF 249° bearing, extending from the 4.3-mile radius of Bucholz AAF to 5.2 miles west of the Bucholz AAF, and within 3 miles each side of the 077° bearing from the Kwajalein RBN, extending from the 4.3-mile radius to 9.6 miles east of

the RBN. This Class E airspace area is effective during the specific dates and times established in advance by a NOTAM. The effective date and time will thereafter be continuously published in the Pacific Chart Supplement. (U.S. Department of Transportation, Federal Aviation Administration, 2011)

The procedures of the ICAO outlined in ICAO Document 4444, *Rules of the Air and Air Traffic Services*, are followed (International Civil Aviation Organization, 2008). 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 and 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 Air Route Traffic Control Center (ARTCC) in its Oceanic Control-6 Sector, the boundaries of which are shown in Figure 3-1.

Special Use Airspace

There is no special use airspace in the region of influence. USAKA/RTS issues NOTAMs through the FAA prior to missile launch activities in the region that could impact aircraft.

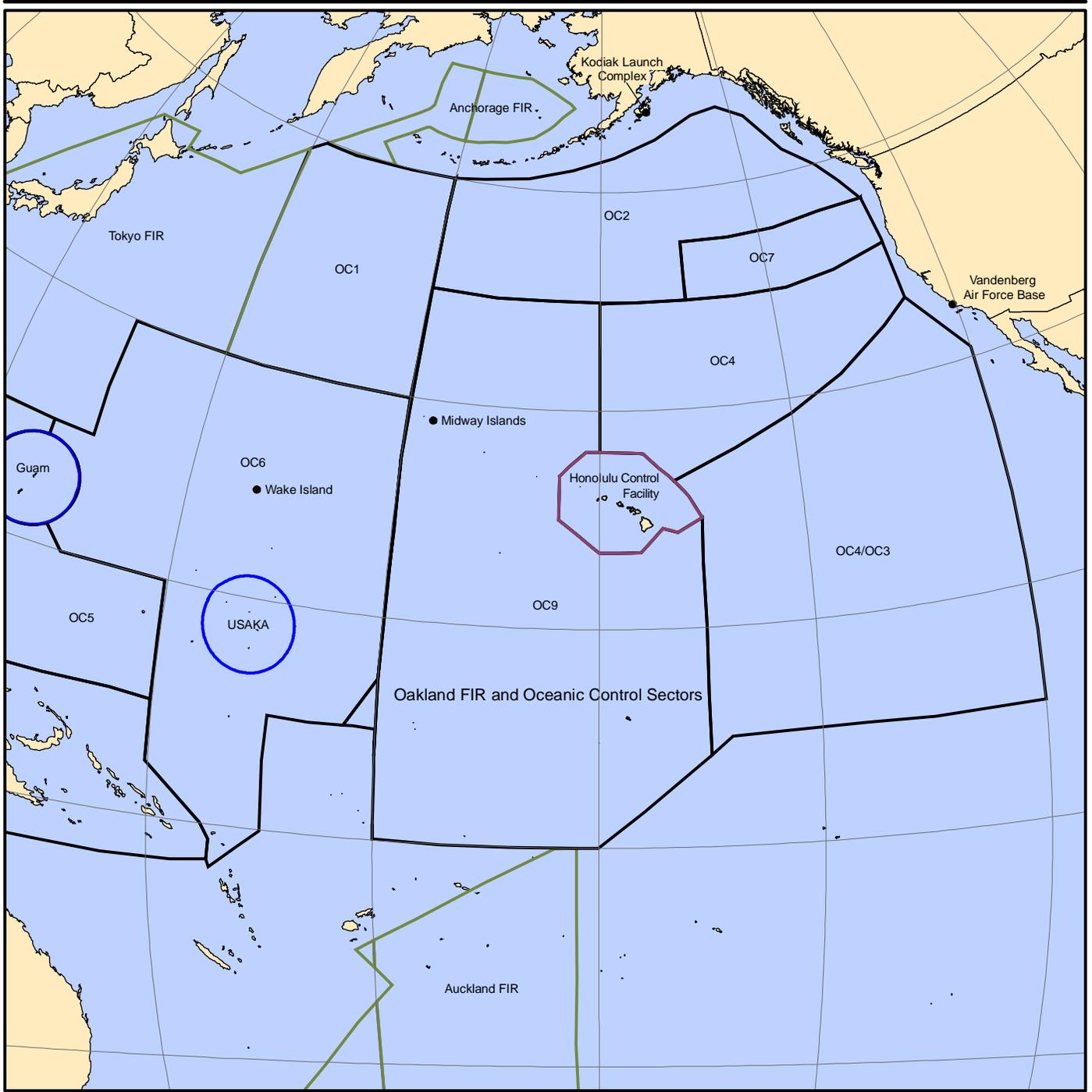
En Route Airways and Jet Routes

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). 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/RTS islands. In 2004, flight activity through Bucholz Army Airfield was about 25 flights per day (Sims, 2004a). Bucholz Army Airfield received only over 3,000 flights in 2010, which is relatively low density compared to most military airfields in the United States. The majority of these flights were daily intra-atoll fixed wing (Metroliners) and helicopters (LUH-72A) which are run directly by USAKA/RTS and their contractors. Commercial flights are much less frequent. Dyess Army Airfield on Roi-Namur provides service to a variety of aircraft and helicopters.



EXPLANATION

- Honolulu Control Facility
 - Radar Control Area
 - Oakland FIR and Oceanic Control (OC) Sector
 - Flight Information Region (FIR)
 - Land
- Note:
 USAKA = U.S. Army Kwajalein Atoll
 ARTCC = Air Route Traffic Control Center

**Airspace Managed by
 the Oakland Oceanic
 Control Area
 Administrative
 Boundaries**

Pacific Ocean

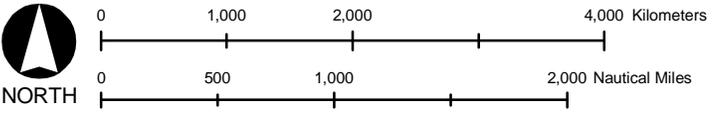


Figure 3-1

3.2.2 WAKE ISLAND—AIRSPACE

Region of Influence

The region of influence for airspace at Wake Atoll includes the airspace over and surrounding Wake Island.

Affected Environment

Wake Island is located in the Oakland Oceanic Control-6 Sector, in international airspace (Figure 3-1). Prior permission is required to land on Wake Island, and the airspace is controlled by the FAA ARTCC at Oakland, so aircraft without the knowledge and permission of an aircraft control authority are not permitted to fly within controlled airspace.

3.2.3 BROAD OCEAN AREA—AIRSPACE

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

Region of Influence

The region of influence is defined as those portions of the international airspace over the open Pacific Ocean that would potentially be affected by the Proposed Action.

Affected Environment

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

Controlled and Uncontrolled Airspace

Because the airspace over the BOA beyond the territorial limits of the United States and the RMI is in international airspace, the procedures of the ICAO are followed. The FAA acts as the U.S. agent for aeronautical information to the ICAO. Most of the airspace within the region of influence is in international airspace, and air traffic is managed by the Honolulu Control Facility. The Honolulu Control Facility includes the ARTCC, the Honolulu Control Tower, and the Combined Radar Approach Control collocated in a single facility. Airspace outside that managed by the Honolulu Control Facility is managed by the Oakland ARTCC.

Special Use Airspace

There is no special use airspace in the BOA region of influence.

En Route Airways and Jet Routes

The BOA airspace use region of influence has several en route high altitude jet routes (A331, A332, A450, R463, R464, R465, R 584, Corridor V 506, and Corridor G 10), which pass through

the region of influence. Most of the BOA airspace use region of influence is well removed from the jet routes that currently crisscross the North Pacific Ocean (Figure 3-2).

As an alternative to aircraft flying above 29,000 feet following published, preferred instrument flight rules routes, the FAA is gradually permitting aircraft to select their own routes. This Free Flight program is an innovative concept designed to enhance the safety and efficiency of the National Airspace System. The concept moves the National Airspace System from a centralized command-and-control system between pilots and air traffic controllers to a distributed system that allows pilots, whenever practical, to choose their own route and file a flight plan that follows the most efficient and economical route. (Federal Aviation Administration, 1996)

Free Flight is already underway, and the plan for full implementation will occur as procedures are modified, and technologies become available and are acquired by users and service providers. This incremental approach balances the needs of the aviation community and the expected resources of both the FAA and the users. Advanced satellite voice and data communications are being used to provide faster and more reliable transmission to enable reductions in vertical, lateral, and longitudinal separation, more direct flights and tracks, and faster altitude clearances (Federal Aviation Administration, 1996). With full implementation of this program, the amount of airspace in the region of influence that is likely to be clear of traffic will decrease as pilots, whenever practical, choose their own route and file a flight plan that follows the most efficient and economical route, rather than following the published jet routes.

All en route airways and jet routes that are predicted to pass through the missile intercept debris areas are identified before a test to allow sufficient coordination with the FAA to determine if the aircraft on those routes could be affected, and if so, if they would need to be re-routed or rescheduled. Routing around the debris areas is handled in a manner similar to severe weather. The additional time for commercial aircraft to avoid the area is generally less than 10 minutes at cruising altitudes and speeds.

The numerous airways and jet routes that crisscross the BOA airspace use region of influence have the potential to be affected by missile testing. However, missile launches and missile intercepts are conducted in compliance with DoD Directive 4540.01 that 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. An exception to this operating procedure may be made when it can be ascertained that aircraft are operating above the maximum ordinate of the trajectory" (DoD Directive 4540.01, 2007). (DoD Directive 4540.01, 2007). Before conducting a missile launch and/or intercept test, NOTAMs are sent in accordance with the conditions of the directive specified in the primary responsible test range requirements.

Air Traffic Control

Air traffic in the region of influence is managed by the Honolulu Control Facility and Oakland ARTCC. Control of oceanic air traffic from/to the United States is carried out from oceanic centers in Anchorage, Oakland, and New York. The Oakland Oceanic Flight Information Region is the world's largest, covering approximately 18.7 million square miles and handling over 560 flights per day. (Federal Aviation Administration, 2000)

3.3 BIOLOGICAL RESOURCES

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 agencies or the UES, to assess their sensitivity to the effects of the No-action Alternative and Proposed Action.

3.3.1 U.S. ARMY KWAJALEIN ATOLL/RONALD REAGAN BALLISTIC MISSILE DEFENSE TEST SITE (USAKA/RTS)

The UES provide 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, 2011).

In addition to the protection provided to vegetation and wildlife by the Endangered Species Act and Marine Mammal Protection Act, the UES protect species at USAKA/RTS that are listed or are candidates, proposed, or petitioned for designation as endangered or threatened and their critical habitats under the U.S. process; incorporate procedures for evaluating effects on fish, wildlife, and plants; and expand protection of marine mammals, migratory birds, and habitats of local or regional significance. (U.S. Army Space and Missile Defense Command/Army Forces Strategic Command, 2011)

Water quality and reef protection standards at USAKA/RTS are in UES Section 3-2. 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. Endangered Species Act (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. Endangered Species Act (as amended)
- 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 are 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, 2011)

Applicable descriptions of threatened, endangered, and candidate species that are present at USAKA/RTS and the adjacent Lagoon and ocean are provided in Section 3.3.1.1, Meck, since it

is the first island discussed. Species specific to a particular island are discussed under that island's section.

3.3.1.1 Meck—Biological Resources

Region of Influence

The region of influence for biological resources includes areas of Meck and the surrounding waters that may be affected by the proposed activities. Figure 3-3 shows the categories of biological resources observed during recent surveys around Meck and the adjacent lagoon.

Affected Environment

Vegetation

Very little native vegetation remains on Meck due to its managed state. The eastern three-quarters of Meck consist of an abandoned airfield and various buildings. Herbaceous strand and traces of littoral shrub land occur in a mosaic on the east and northwest coasts. The majority of Meck's coastline is composed of rip-rap. (U.S. Department of the Army Space and Missile Defense Command, 2011)

Threatened and Endangered Plant Species

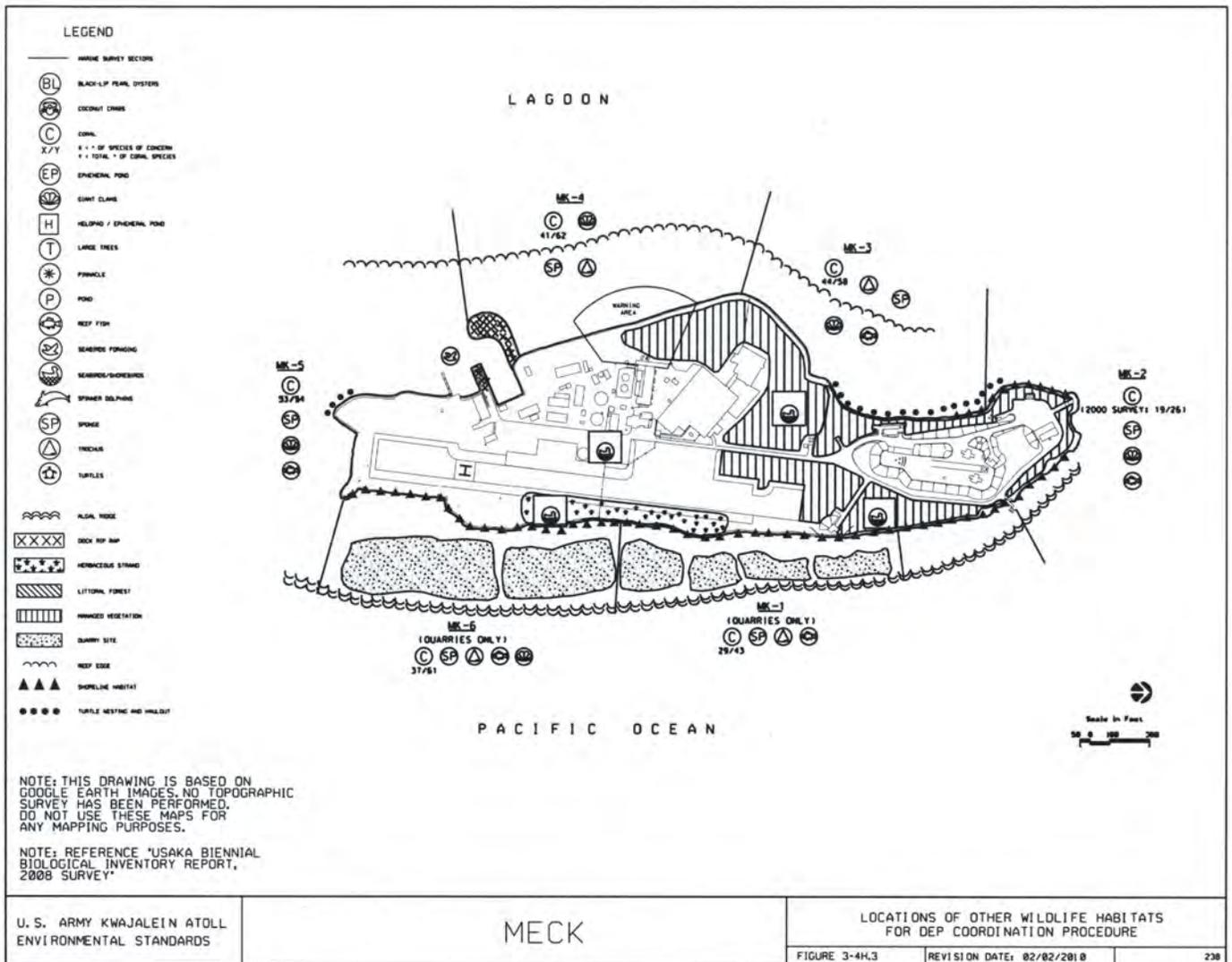
No threatened or endangered vegetation species have been identified on Meck.

Wildlife

The 2008 biennial survey conducted by NMFS covered 6 transects representing the western and eastern offshore areas of southern Meck Island. Twenty species of corals representing 9 genera were identified in three 75-square foot transect areas (east) at an approximate depth of 5 to 6 feet, MK-A, -B, and -C. Three hundred-and-four corals were recorded, including 248 attached colonies and 56 live fragments. Attached coral densities were dominated by *Acropora digitifera*. A single ridge not selected for sampling appeared dominated by *Montipora digitata* for a large portion of its length. Colony sizes ranged from 0.2 to more than 126 inches with an average size of 4 to less than 8 inches diameter. (U.S. Department of the Army Space and Missile Defense Command, 2011)

The reef platform bordering the lagoon side (west) of Meck was sampled at three sites, including: MK-D (43-square foot belt transect), MK-E (75- square foot transect) and MK-F (75-square foot transect). Fifty-six species of Scleractinian corals representing 20 genera and one Alcyonarian species were identified within these transects. Four-hundred-forty-four corals were recorded, including 423 attached colonies and 21 live fragments. Attached coral densities were dominated by *Acropora* spp. Colony sizes ranged from 0.2 inch (limit of visibility) to less than 126 inches, with an average size of less than 2 inches in diameter. (U.S. Department of the Army Space and Missile Defense Command, 2011)

Sponges were observed from 16 families. The conch shells *Lambis lambis* and *L. truncata* and the giant clam *Tridacna maxima* were also observed during the 2008 inventory. Cowry shells, cone shells, urchins, and sea cucumbers were also observed. There were a few large crown of thorns starfish feeding on live coral colonies in the MK-F transect. (U.S. Department of the Army Space and Missile Defense Command, 2011)



Meck - Biological Resources

Kwajalein Atoll

Figure 3-3

The barred flagtail, palenose parrotfish, cardinalfish, squirrelfish, gobies and groupers are several of the fish observed during the inventory. A juvenile saddleback coral grouper (*Plectropomus laevis*) was observed in MK-F.

A breeding colony of black-naped terns is located on the eastern side of the helicopter pad in the herbaceous strand between the high-tide line and upland areas of managed vegetation. USAKA environmental personnel demarcated the tern colony. In the early 1990s, USAKA roped off the colony and has since tried intermittently to protect it from adverse impacts. The number of nests has varied somewhat among years and appears to have declined since the mid-1990s. This may be due to variation in the timing of surveys among years, variation in the timing of nesting each year, or to differences in human activity and disturbance to nesting birds. (U.S. Department of the Army Space and Missile Defense Command, 2011)

In 2004, two eggs and eight chicks were identified in seven nests within the colony. In 2006, only one chick was observed, whereas in 2008 no active colony or signs of active nests were observed. No juveniles were seen; however, two adults carried fish presumably for chicks. The differences in observations could be due to timing since the 2008 surveys were conducted about a month late than the earlier surveys. (U.S. Department of the Army Space and Missile Defense Command, 2011)

The rip-rap along the shores is of limited use to foraging shorebirds. The exposed reef flats to the eastern side of Meck are used more often by foraging shorebirds such as whimbrels and tattler sp. During the low tide at 1000 hours, exposed reef flats almost connected Meck to its neighbor Kwadack. Pacific golden plovers and ruddy turnstones used the managed vegetation surrounding the structures. (U.S. Department of the Army Space and Missile Defense Command, 2011)

UES-protected cetacean species which may be present in the area, based on either historical range or anecdotal information are also considered in this EA. These include: Coastal spotted dolphin (*Stenella attenuata graffmani*); common dolphin (*Delphinus delphis*); Costa Rican spinner dolphin (*Stenella longirostris centroamericana*); Eastern spinner dolphin (*Stenella longirostris orientalis*); offshore spotted dolphin (*Stenella attenuata attenuata*); striped dolphin (*Stenella coeruleoalba*); Hawaiian (also known as whitebelly) spinner dolphin (*Stenella longirostris longirostris*); bottlenose dolphin (*Tursiops* sp.); Pacific bottlenose dolphin (*Tursiops truncata gilli*); Risso's dolphin (*Grampus griseus*); spinner dolphin (*Stenella longirostris*); and melon headed whale (*Peponocephala electra*).

Threatened and Endangered Wildlife Species

The following coral species have been observed offshore of Meck and are listed as Candidate species under the Endangered Species Act: *Acropora dendrum*, *A. horrida*, *A. paniculata* (fuzzy table coral), *A. listeri*, *A. microclados*, *A. paniculata*, *A. polystoma*, *Alveopora allingi* (daisy flowerpot coral), *Heliopora coerulea*, *Pavona cactus* (cactus coral), and *P. venosa*.

Green Turtle

The green turtle (*Chelonia mydas*) is the largest member of the marine turtle family Cheloniidae and is found throughout the Pacific, Indian, and Atlantic oceans and the Mediterranean Sea. Green turtles are distinguished from other sea turtles by their smooth carapace with four pairs of

lateral scutes (horny plate), a single pair of prefrontal scutes, and a lower jaw-edge that is coarsely serrated. Adult green turtles can weigh more than 220 pounds and exceed 3 feet in carapace length. The common name of this turtle refers to the green color of its subdermal fat. (U.S. Fish and Wildlife Service, 2010)

The green turtle was listed in 1978 as threatened under the Endangered Species Act throughout its Pacific range because of overexploitation, habitat loss, lack of regulation and adequate enforcement, and evidence of declining numbers. Adult green turtles are typically resident in foraging areas (e.g., seagrass or macro-algae habitats), although periodically turtles migrate long distances to breeding areas. Reproductive females generally make nesting migrations every two or more years. Green turtles may lay up to six clutches in one season, and each clutch may contain about 100 eggs which incubate in the soil for up to 2 months. The green turtle nesting concentration in the French Frigate Shoals is the largest in the Central Pacific. Green turtles prefer areas where surface water temperatures are no lower than about 68 degrees Fahrenheit in the coldest month. While most sea turtles warm themselves by swimming close to the surface of shallow waters, the Eastern Pacific green turtle basks in the sun on land. It is one of the few marine turtles known to leave the water other than at nesting times (National Geographic, undated). Most green turtles appear to have a nearly exclusive herbivorous diet, consisting mainly of seagrass and algae, but in some areas, such as along the eastern Pacific coast, green turtles feed on mollusks and polychaetes, fish, fish eggs, and jellyfish.

Hawksbill Turtle

Hawksbill turtles (*Eretmochelys imbricata*) are recognized by their relatively small size (carapace length less than 3 feet), narrow head with tapering beak, and strongly serrated posterior margin of the carapace and thick overlapping shell scutes. The hawksbill turtle is threatened with extinction throughout its range. The hawksbill turtle is protected as an endangered species under the U.S. Endangered Species Act, for Pacific territories (Guam and American Samoa) and commonwealths (Northern Marianas Islands) of the United States. Protection afforded to species in the RMI are provided by RMI statute and, for USAKA activities in the RMI, the UES. (National Marine Fisheries Service, Office of Protected Resources, 2012)

The hawksbill turtle has the potential to be a long-range migrant. It is likely that adult hawksbills perform regular migratory movements among a preferred nesting beach, a breeding ground, and a persistent foraging territory. The distances between these territorial locations vary greatly and appear to be of random length among individuals. Once a foraging or nesting site is chosen, hawksbill turtles tend to be persistent in the continuing use of that site. Hawksbill turtles have been classified as opportunistic feeders on a wide variety of marine invertebrates and algae. Hawksbill turtles appear to be specialist sponge carnivores, selecting just a few genera of sponges throughout the Caribbean Sea for their principal diet. There are very few vertebrates capable of digesting sponges without being injured by the sponges' silicate spicules (needles), but hawksbill turtles apparently can. (National Marine Fisheries Service and Pacific Region U.S. Fish and Wildlife Service. 1998)

Other threatened and endangered marine species that may possibly occur in and around USAKA/RTS include the blue whale (*Balaenoptera musculus*), finback whale (*Balaenoptera physalus*), humpback whale (*Megaptera novaeangliae*), sei whale (*Balaenoptera borealis*), sperm whale (*Physeter macrocephalus*), leatherback sea turtle (*Dermodochelys coriacea*), loggerhead sea turtle (*Caretta caretta*), and olive ridley sea turtle (*Lepidochelys olivacea*). The

sperm whale is the most likely cetacean to be seen offshore of USAKA/RTS and is briefly described below.

Sperm Whale

Unless otherwise indicated, the following information comes from the National Oceanic and Atmospheric Administration (NOAA) Office of Protected Resources web site (National Oceanic and Atmospheric Administration, 2012). Sperm whales are the largest of the toothed whales, with males considerably larger than females. Adult females may grow to lengths of 36 feet and weigh 15 tons. Adult males, however, reach about 52 feet and may weigh as much as 45 tons.

The sperm whale is distinguished by its extremely large head, which takes up to 25 to 35 percent of its total body length. It is the only living cetacean that has a single blowhole asymmetrically situated on the left side of the head near the tip. Sperm whales have the largest brain of any animal, but when compared to their large body size, the brain is not exceptional in size. Sperm whales are mostly dark gray, but often the interior of the mouth is bright white, and some whales have white patches on the belly. Their flippers are paddle-shaped and small compared to the size of the body, and their flukes are very triangular. They have small dorsal fins that are low, thick, and generally rounded.

Because sperm whales spend most of their time in deep waters, their diet consists of many organisms that also occupy deep waters of the ocean. Their principal prey are large squid weighing between 3.5 ounces and 22 pounds, but they will also eat large sharks, skates, and fish. The average dive lasts about 35 minutes and is usually down 1,312 feet; however, dives may last over an hour and reach depths over 3,280 feet.

While females generally stay with the same unit all their lives in and around tropical waters, young males will leave when they are between 4 and 21 years old. As males get older and larger, they begin to migrate to higher latitudes (toward the poles), and slowly bachelor schools become smaller, until the largest males end up alone. Large, sexually mature males that are in their late 20s or older will occasionally return to the tropical breeding areas to mate.

Summer/fall surveys in the eastern tropical Pacific show that although sperm whales are widely distributed in the tropics, their relative abundance tapers off markedly westward towards the middle of the tropical Pacific and tapers off northward towards the tip of Baja California. This high level of "take," the sperm whale remains the most abundant of the large whale species. Currently, the best estimate of population, between 200,000 and 1,500,000 sperm whales, is based on extrapolations from only a few areas that have useful estimates.

The principal cause of the decline in sperm whales was commercial whaling, and prohibitions on their harvest by the International Whaling Commission have reduced the magnitude of the threat. No activities in waters under U.S. jurisdiction are known to be adversely affecting recovery of this species at the present time.

Environmentally Sensitive Habitat

Extensive dredging and the deposition of fill on the lagoon and reef flat have greatly altered the marine environment of Meck. Most of Meck is surrounded by riprap intended for shoreline protection, which is of limited use to foraging shorebirds. These foraging shorebirds use the

exposed reef flats on the eastern side of Meck. Giant clams are found on the reef. (U.S. Department of the Army Space and Missile Defense Command, 2006)

Marine and terrestrial habitats of significant biological importance on and offshore of USAKA/RTS include marine habitats of lagoon-facing reef slope and reef flat, interisland reef flat lagoon floor ocean-facing reef slope and reef flat intertidal zone and reef pass; and terrestrial habitats of seabird colonies and shorebird sites (U.S. Department of the Army Space and Missile Defense Command, 2011)

3.3.1.2 Roi-Namur—Biological Resources

Region of Influence

The region of influence for biological resources includes areas of Roi-Namur and the surrounding waters that may be affected by the Proposed Action. Figure 3-4 shows categories of biological resources observed during recent surveys around Roi-Namur.

Affected Environment

Vegetation

The types of vegetation currently found on USAKA/RTS islands, including Roi-Namur, consist of managed vegetation, herbaceous (green, leaf-like) strand, littoral (relating to the shore) shrubland, littoral forest, and coconut plantation. Managed vegetation is frequently disturbed vegetation dominated by alien weeds that is usually maintained by mowing. Herbaceous strand is a narrow zone of vegetation on upper sandy or rocky beaches dominated by grasses, sedges, and vines. Littoral shrubland consists of vegetation in coastal areas dominated by widespread shrubs adapted to seawater dispersal and harsh, saline conditions. Littoral forest is usually the most common type of vegetation on tropical islands dominated often by a single tree species.

Coconut plantations are disturbed areas dominated by planted coconut palms. (U.S. Department of the Army Space and Missile Defense Command, 2004; Oak Ridge Institute for Science and Education and U.S. Army Environmental Center, 1999)

All five vegetation types described above are found on Roi-Namur. Non-native grasses and weeds dominate the open areas of the island and are maintained by mowing. Most of Roi-Namur (i.e., open grassy areas, golf course, runway, and housing areas) is maintained, and a sizable portion is used for radar operations, has been recently cleared, and/or is used as a repository for plant debris/compost and is overgrown with vines (e.g., beach sunflower and beach morning glory). Herbaceous strand is found in some coastal areas such as the west end of the runway and is dominated by beach sunflower, hurricane grass, and sickle grass. Some littoral shrubland, consisting mainly of tree heliotrope and beach naupaka, and littoral forest are found along the eastern coast outside the region of influence. (U.S. Department of the Army Space and Missile Defense Command, 2004; Oak Ridge Institute for Science and Education and U.S. Army Environmental Center, 1999; U.S. Army Space and Strategic Defense Command, 1995)

A small wetland connected to the sea at high tide is located in the center of Roi-Namur (inland water shown in Figure 3-4) and is enclosed by thick stands of *Pemphis* shrub. (U.S. Department of the Army Space and Missile Defense Command, 2011)

A seagrass (*Halophila minor*) meadow is located in the lagoon along the southern shore of Roi-Namur. It serves as an important foraging habitat for juvenile and adult green turtles. (U.S. Department of the Army Space and Missile Defense Command, 2011)

Threatened and Endangered Plant Species

No threatened or endangered plant species have been identified on Roi-Namur. (U.S. Army Space and Strategic Defense Command, 1995; U.S. Army Space and Missile Defense Command, 2004)

Wildlife

Great crested terns, black noddies, and white terns forage in the water directly off the sandy beaches on the south, west, and north shores. Rocky intertidal areas on the east and northeast shores also provide foraging habitat for these birds. Shorebirds including Pacific golden plovers, ruddy turnstones, whimbrels, and tattler species actively use the reef platform and rocky intertidal area along the north shore. Pacific golden plovers, ruddy turnstones, and whimbrels have also been observed on managed vegetation adjacent to the runway and mowed lawns in the residential areas. The catchment areas along the east side of the runway provide important loafing areas, roosting sites, and fresh water sources for migrant shorebirds and waterfowl. Nesting terns use the southern tip of Roi-Namur, and assorted shorebirds roost in the shrubs along the western shore. Reef herons feed in the shore flats and tidepools east of the runway. The only seabird that appeared to be nesting during the 1998 inventory was the white tern (U.S. Department of the Army, 2001). A long-tailed cuckoo was possibly sighted in the interior of the island during the 2002 inventory. (U.S. Department of the Army Space and Missile Defense Command, 2004; 2011)

Additional wildlife present includes rats, coconut crabs, clams, conchs, black-lipped pearl oysters, sponges, green tree skinks, feral cats, butterflies, and five species of ants. Although coconut crab burrows were noted in 2008, no activity was observed during a night-time survey (U.S. Department of the Army Space and Missile Defense Command, 2011). Benthic species such as crabs and sea cucumbers are found in the adjacent offshore area. (U.S. Department of the Army Space and Missile Defense Command, 2004; 2011)

Hundreds of species of coral, as well as 250 species of reef fish, can be found in the atolls of the Marshall Islands. Food cultivation on these islands is limited; as a result, fish and other seafood are staples of the Marshallese diet. (Pacific Island Travel, 2002) Fish species observed in the region of influence during the 2002 inventory included rays, jacks, rabbitfish, goatfish, and spadefish (U.S. Department of the Army Space and Missile Defense Command, 2004).

Threatened and Endangered Wildlife Species

The following Candidate species of coral have been observed offshore of Roi-Namur: starry cup coral (*Acanthasrea c. brevis*); staghorn corals (*Acropora lisleri*, *A. horrida*, *A. microclados*, *A. Polystoma*, and *A. vaughani*); stony coral (*Alveopora verrilliana*); mound coral (*Cyphastrea agassizi*); blue coral (*Heliopora coerulea*); porcelain coral (*Leptoseris incruslans*); pore coral (*Montipora caliculata*); cactus coral (*Pavona venosa*); yellow scroll coral (*Turbinaria reniformis*); and coral (*Turbinaria stellula*).

Two UES protected molluscan species—top-shell snail (*Trochus niloticus*) and black-lip mother of pearl oyster (*Pinctada margaritifera*)—have been observed offshore of Roi-Namur.

***Trochus niloticus*.** *T. niloticus* is a member of the family Trochidae, a large family of marine gastropod mollusks containing several hundred species. It is a conical shaped shell that inhabits shallow tropical reefs and usually reaches a maximum diameter of 4.7 to 6 inches at the base of the shell or the shell width. (Secretariat of the Pacific Community, 2008)

Top-shell snails are dioecious, having separate sexes, but the sexes cannot be differentiated by external morphology. Sexes are readily distinguished by histological examination of the gonads. The average life span for *Trochus* is 15–20 years, and most animals reach reproductive maturity by 2 years of age in the wild and 12 months in captivity. The size at which *Trochus* first become sexually mature is between 2 and 2.5 inches in diameter. (Secretariat of the Pacific Community, 2008)

Trochus are dioecious broadcast spawners, and fertilization takes place in the water column. Spawning is initiated by the males, and females spawn in response to the presence of sperm in the water. Females generally spawn for 5–10 minutes, with individuals releasing more than one million eggs. Spawning generally occurs at night and within one or two nights of either a full or new moon. Spawning occurs throughout the year in low latitudes and only during the warmer months in high latitudes. The larval phase lasts approximately 3 to 5 days, and the veligers then settle onto the reef substrate and begin grazing on fine filamentous algae and microorganisms. Larger specimens are usually visible on the reef. (Secretariat of the Pacific Community, 2008)

Trochus is one of the most important coastal resources of the Pacific Islands, providing a significant source of income for communities such as the Cook Islands, Federated States of Micronesia, Palau, French Polynesia, and Marshall Islands. *Trochus* shell has been used for centuries by the indigenous people of the Pacific for ornaments and jewelry, while the meat has been a source of protein. The eastern islands of Polynesia and much of Micronesia do not have *Trochus* naturally but now have an established fishery that was created through past introduction activities. This demonstrates the ease and success of relocating this species. (Secretariat of the Pacific Community, 2008)

Transplantation is used extensively to establish new breeding populations in the Federated States of Micronesia, Marshall Islands, Cook Islands, and French Polynesia. Like most gastropods, *Trochus* can survive for more than a day out of water. As long as they are kept damp in a cool place, *Trochus* can survive for up to 36 hours. Movement of adult *Trochus* from one reef to another is a form of management that is used where recipient reefs either are deficient in the species naturally or overfished to a level where spawning aggregation has become difficult. Movement of adult animals is known to be the most effective means of introducing *Trochus* to a new location. (Secretariat of the Pacific Community, 2008)

Trochus niloticus is a highly sought after resource in the Pacific and Indo-Pacific regions. This has resulted in the species being over-harvested. By 2007 the Solomon Islands, Fiji, and Papua New Guinea have the most depleted stocks, with four surveyed sites in the Solomon Islands in 2006 averaging a density of 11 *Trochus* per 2.5 acres. (Lasi, 2010)

Pinctada margaritifera. *P. margaritifera* (black-lipped pearl oysters) were observed during the 2005 monitoring survey (U.S. Fish and Wildlife Service, 2009) and both surveys performed for the Roi-Namur outfall repair (National Marine Fisheries Service, 2012; U.S. Fish and Wildlife Service and National Marine Fisheries Service, 2012). The following information was obtained from <http://animals.jrank.org/pages/1903/Bivalves-Bivalvia-BLACK-LIPPED-PEARL-OYSTERPinctada-margaritifera-SPECIES-ACCOUNTS.html>.

P. margaritifera have outside blackish round and flat valves with white to green spots. The inner valve surfaces can be blue, gray, green, pink, and yellow. The valves are 6 to 10 inches wide. The mantle is orange, while the foot is gray or black. They eat bits of plant and animal plankton. Hermaphroditic adults first develop into males, then females. Eggs and sperm released into the water are fertilized there. Foreign particles or parasites stuck between the valve and the body are encased in hard, shiny layers of calcium carbonate forming a pearl. Black-lipped pearl oysters live at depths of 3 to 130 feet and are attached to hard surfaces in and around coral reefs. This species prefers calm, clear waters often poor in nutrients.

This species occurs naturally in the Indian Ocean and the western to central Pacific, including the Hawaiian Islands. It is also raised commercially fairly widely in the Pacific, in French Polynesia, Tahiti, Cook Islands, Gilbert Islands, Marshall Islands (Jaluit, Namdrik, and Arno atolls), Solomon Islands, southern China, Japan, northern and Western Australia, Seychelles, and the Sudan. The College of The Marshall Islands has a *Pinctada* hatchery for use in the commercial cultivation of the species in the RMI (Marshall Islands Journal, 2012). The species has been shown to be adaptable to cultivation (handling and transport) with success, so the probability of successful transplantation is good for this project. *P. margaritifera* is also found at 40 percent of the other USAKA locations.

Black-lipped pearl oysters are a highly sought after resource in the Pacific and Indo-Pacific regions. This species is the most important source of mother-of-pearl used for carvings and inlays, as well as Tahitian black pearls.

Sea turtles frequently enter the lagoon and are commonly seen in the harbors at Roi-Namur. Some of the sandy beaches of Roi-Namur provide potential nesting habitat for the green and hawksbill sea turtles. Turtle nesting and haulout habitat is mainly located on the southwestern and southeastern areas of the island. At least two instances of nesting have been reported on Roi-Namur in recent years. No recent turtle pits or tracks were observed during the 2008 inventory (U.S. Department of the Army Space and Missile Defense Command, 2011).

A portion of the southern tip of Roi-Namur appears to provide suitable nesting habitat for sea turtles, but no evidence of nesting was found during the 2004 survey (U.S. Fish and Wildlife Service/National Marine Fisheries Service, 2004). Descriptions of the two most likely sea turtles to be observed in the area (green and hawksbill) are provided in Section 3.3.

The reef flats at the east and west ends of Roi-Namur support coral and giant clams but do not exhibit high coral coverage due to the strong current. The north, northwestern, and northeastern flats, with the exception of RN-9, do not exhibit high coral cover more due to low tide exposure and breaking wave action when the seas are up. The substrate in the vicinity of the fuel/supply pier is primarily broad sand flats with patches of hard reef sparsely to moderately covered by coral (U.S. Department of the Army Space and Missile Defense Command, 2002).

More active coral growth was observed on the southwestern corner of the island along the lagoon side. Coral growth is also on the existing piers.

Eight hard coral species representing five families were observed within 538 square feet of select reef habitats surveyed at Roi-Namur in 2008. This represents only 14 percent of the 56 species observed during the last inventory. Six of the eight species identified are currently listed in the UES as SOC. The staghorn coral (*Acropora aspera*), a UES consultation species has been observed offshore of Roi-Namur. This species occurs on shallow reef flats and shallow lagoons, also exposed upper reef slopes and deep water.

Marine Mammals

Population and density information for all cetaceans at USAKA/RTS are lacking. Therefore, only a qualitative analysis of the potential effects is possible for the following small cetacean species which could occur in the project area. Larger cetaceans are only very rarely seen in the Kwajalein Lagoon and are therefore not considered to be at risk of exposure to the potential effects of the Proposed Action. Small cetacean species may be present in the Kwajalein Lagoon area, based on either historical range or anecdotal information. These include: Coastal spotted dolphin; common dolphin; Costa Rican spinner dolphin; Eastern spinner dolphin; offshore spotted dolphin; striped dolphin; Hawaiian (also known as whitebelly) spinner dolphin; bottlenose dolphin; Pacific bottlenose dolphin; Risso's dolphin; spinner dolphin; and melon headed whale.

Environmentally Sensitive Habitat

Marine habitat of importance to biological resources on Roi-Namur includes the lagoon-facing and ocean-facing reef slopes and flats, inter-island reef flat, lagoon floor, seagrass beds, and intertidal zone. The reef flats at the east and west ends of Roi-Namur support coral and giant clams but do not exhibit high coral coverage due to the strong current. More active coral growth was observed on the southwestern corner of the island along the lagoon side. The seagrass beds along the lagoon side serve as a feeding area for green sea turtles and may serve as a juvenile fish nursery area. (U.S. Department of the Army, 2004; U.S. Army Space and Strategic Defense Command, 1995)

3.3.1.3 Omelek—Biological Resources

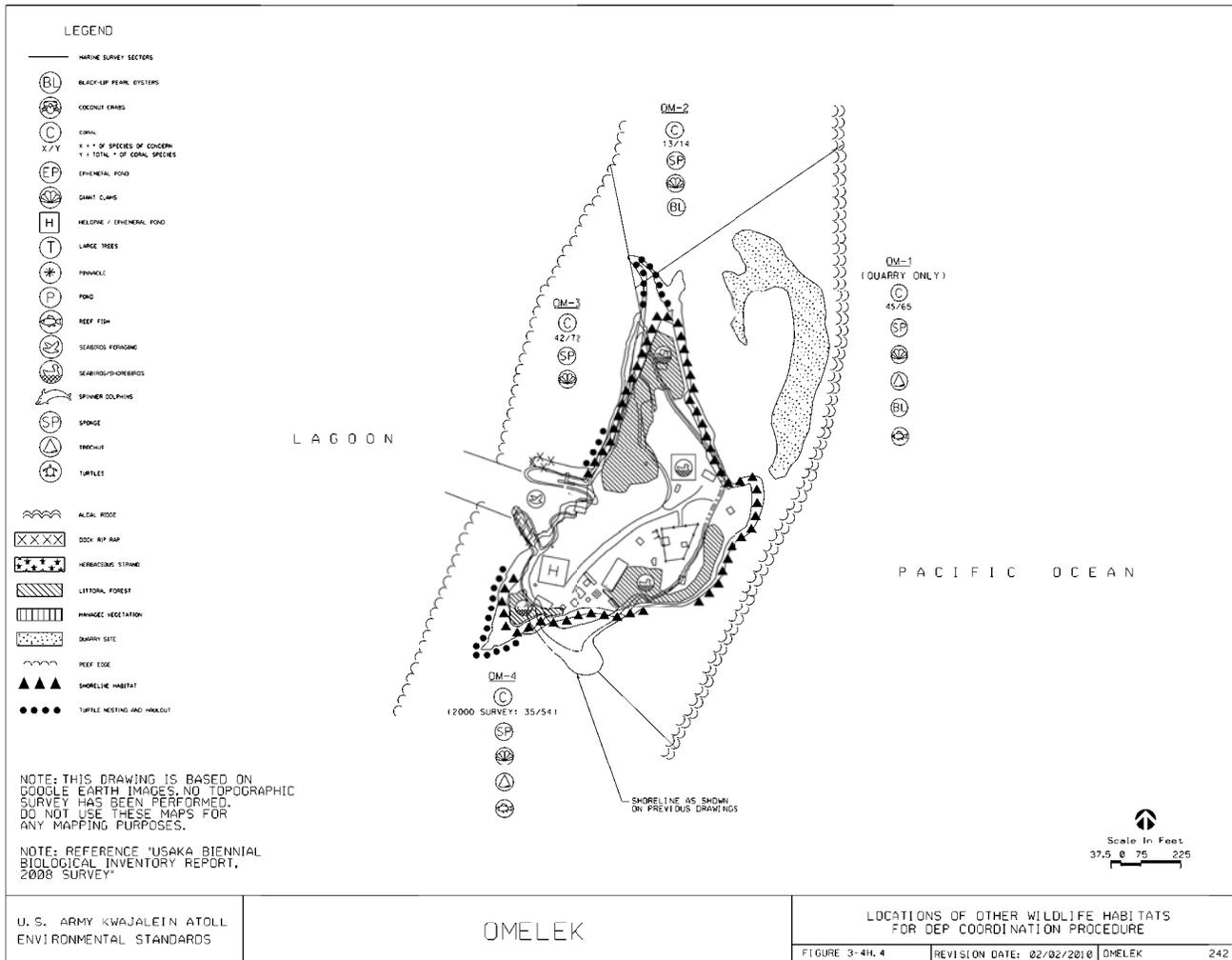
Region of Influence

The region of influence for biological resources includes Omelek and the surrounding waters that may be affected by the proposed activities. Figure 3-5 shows the categories of biological resources observed during recent surveys around Omelek and the surrounding reef flat.

Affected Environment

Vegetation

Omelek is a highly developed 8-acre island about halfway between Kwajalein and Roi-Namur. SpaceX recently ceased operations at this location, and the buildings have been evacuated. Much of the interior vegetation and that surrounding the buildings are now being managed sporadically. There is an area of diverse native littoral forest on the northern end of Omelek that



Omelek - Biological Resources

Kwajalein Atoll

Figure 3-5

is divided by a narrow road, dominated by *Pisonia*, *Tournefortia*, *Terminalia samoensis*, *Guettarda*, coconut, and *Pandanus*. There is also a small patch of native forest east of the helipad containing *Pisonia* and *Tournefortia* trees up to about 29.5 feet tall, and several scattered small patches of native vegetation south of the helipad consisting of coconut saplings, *Tournefortia*, and *Scaevola*. The vegetation around the helipad was mowed, but the remainder of the relatively open interior of Omelek was covered by a dense mat of vegetation 1.6–3.3 feet in height dominated by *Vigna marina* and *Eidens alba*. Three papaya seedlings were also observed. (U.S. Department of the Army Space and Missile Defense Command, 2011)

Threatened and Endangered Plant Species

No threatened or endangered vegetation species have been identified on Omelek.

Wildlife

The shoreline and reef flat provide foraging habitat for small numbers of migratory shorebirds, reef herons, and terns. The native littoral forest apparently provides suitable nesting habitat for seabirds. At least two brown noddies were observed in coconut trees and may have been nesting. The thick vegetation that covered much of the interior of Omelek also precluded foraging by shorebirds and nesting by ground-nesting seabirds. Offshore birds included noddies and terns. A few white terns displayed mobbing tactics which suggests that they had potential nests in the area as well. (U.S. Department of the Army Space and Missile Defense Command, 2011)

Azure-tailed skinks were abundant, and one brown island skink was observed, as well as many hermit crabs, and two species of land crabs in the native forest. One of the land crabs was purplish, and the other was yellowish-white. (U.S. Department of the Army Space and Missile Defense Command, 2011)

Recent surveys indicate the presence of a large number of ants (e.g., small and brownish) throughout Omelek. Only one species of ant was observed in 2003. No introduced vertebrates were observed. No evidence of rats was observed. No mosquitoes were present, and there were fewer ants compared to a prior survey. Footprints were observed, indicating human presence on site recently. There was a wasp with one light tan stripe, but the species was not identified. (U.S. Department of the Army Space and Missile Defense Command, 2011)

Giant clams, black-lipped pearl oysters, coral, sponges, and top-shell snails are species of concern that have been observed in the vicinity of Omelek. A wide variety of reef fish have been recorded in the waters surrounding Omelek. (U.S. Department of the Army Space and Missile Defense Command, 2004a; 2006)

Threatened and Endangered Wildlife Species

Acropora globiceps, *A. speciosa*, *A. vaughani*, and *Pavona venosa* are Candidate species of coral that have been observed offshore of Omelek.

During the most recent inventory, sea turtle nesting was not observed, but potential suitable nesting habitat was located above the high-tide mark on the small sandy beach near the south breakwater and in the sand and small coral rubble near the northern tip (U.S. Department of the Army Space and Missile Defense Command, 2011). However, an adult female hawksbill was observed digging a nest and dropping eggs on Omelek in mid-May 2009. On 5 July, several

hatchlings were observed leaving the nest and heading to the shoreline. For the Omelek nest, 101 empty egg shells were counted, 5 hatchlings were rescued and released, 13 infertile eggs were recovered from the nest, and 2 fully developed eggs (possibly crushed), were documented from the nest, for a total of 121 eggs. Information on hawksbill nesting in the RMI is scarce. This is probably due more to a lack of surveys than lack of nesting.

Environmentally Sensitive Habitat

Marine and terrestrial habitats on Omelek that are considered of significant biological importance include: (marine) the lagoon area facing the reef slope and reef flat; the interisland reef flat; lagoon floor; ocean area facing the reef slope and reef flat; quarry pits; and intertidal zone, and (terrestrial) mixed broadleaf forest areas; seabird colonies; and shorebird sites (U.S. Department of the Army Space and Missile Defense Command, 2011).

Although the harbor area has been dredged, the lagoon-facing reef flat on either side of the jetties provides good quality marine habitat with high to moderate coral diversity and giant clams (Figure 3-5). The large quarried area on the ocean side also exhibits a diversity of marine life; coral diversity has remained high. Both areas had been affected by storm damage prior to the 2004 inventory. (U.S. Department of the Army Space and Missile Defense Command, 2006)

An abundance of corals are in the area, but some areas show signs of stress, while still others have areas of dead coral, particularly off the north point on the lagoon side (Sims, 2004b).

3.3.1.4 Kwajalein—Biological Resources

Region of Influence

The region of influence for biological resources includes areas of Kwajalein and the surrounding lagoon and ocean waters that may be affected by the proposed activities. Figure 3-6 shows the categories of biological resources observed during recent surveys around Kwajalein and the adjacent lagoon.

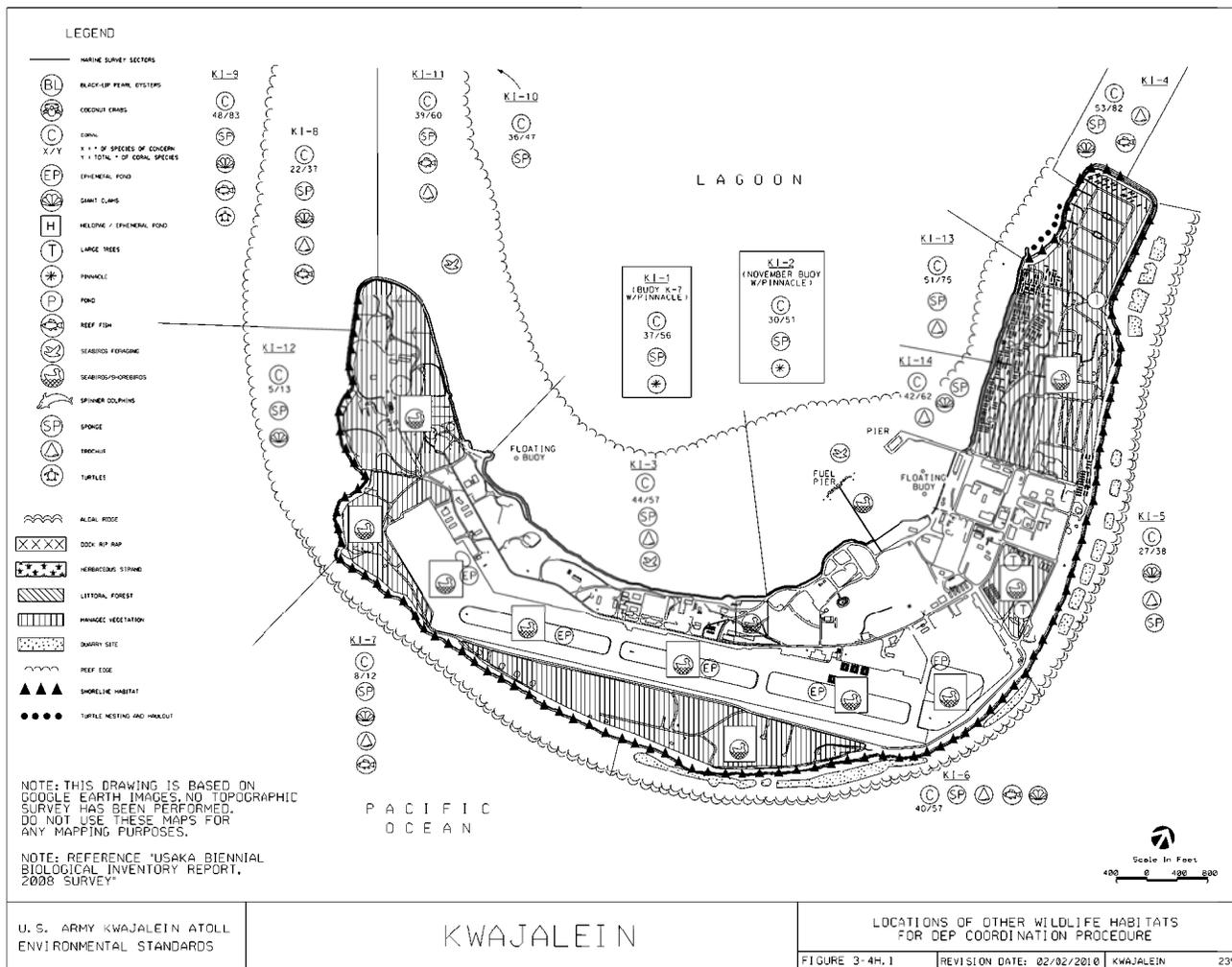
Affected Environment

Vegetation

Much of Kwajalein has been cleared and paved, including the large runway occupying the entire center (southern) portion of the island. Non-native grasses and weeds dominate the open areas and are maintained by mowing. A small amount of herbaceous strand still exists in some places along the coastline, and patches of littoral shrubland are present. Since the 1930s, the island has been enlarged over the years with dredged landfill and consequently exhibits vegetation characteristic of heavily disturbed areas. The locations proposed for the IFT activities are within areas of managed vegetation and are similar to other open managed areas on Kwajalein. (U.S. Army Space and Missile Defense Command, 2002; U.S. Department of the Army Space and Missile Defense Command, 2006)

Threatened and Endangered Plant Species

No threatened or endangered vegetation species have been identified on Kwajalein.



Kwajalein - Biological Resources

Kwajalein Atoll

Figure 3-6

Wildlife

Coral diversity (i.e., species richness) and abundance are actually very high on the south side of Illeginni, especially at depths approaching 20 or more feet. The community there is fairly spectacular, but often is not surveyed. The shallow, often exposed reef strata do appear to have lower coral “diversity” and abundance. In addition to low tide exposure, high wave energy, missile impacts and related cleanup activities appear to limit community development.

During the 1996, 1998, and 2000 inventories performed at USAKA/RTS by the USFWS and NMFS, a total of 32 species of seabirds, shorebirds, and land birds (including one introduced sparrow) and two species of domesticated birds were observed. Twenty-four species were observed during the 2004 inventory (U.S. Department of the Army Space and Missile Defense Command, 2006). Although the numbers of birds varied between inventories, black noddies, black-naped terns, white terns, Pacific golden plovers, ruddy turnstones, and tattlers were the most common species. All of the common birds at USAKA/RTS are either resident seabirds that nest on the ground or in trees or are migratory shorebirds that winter at USAKA/RTS and other Central Pacific islands. The largest numbers of birds were observed in water catchments, drainage ditches, and puddles near the runway. (U.S. Department of the Army Space and Missile Defense Command, 2002; 2006)

Kwajalein and Roi-Namur have the greatest diversity of birds of all the USAKA/RTS islands. Most of these birds have been observed in the managed vegetation around the airport runway and adjacent catchment areas. Shorebirds use the shoreline and exposed reef flat during low tide, but also use the golf course grounds, airport runway, and mowed lawns. Birds commonly observed include black noddies, great crested terns, brown noddies, and white terns. Since 1996, white terns have been the only species observed nesting on Kwajalein. However, in 2002 black-naped terns were observed nesting on the concrete pier structures at the harbor fuel loading docks. A broken black-naped tern egg was found in 2004. Common greenshanks were also observed on Kwajalein for the first time. Migratory birds use the region of influence for loafing and resting. (U.S. Department of the Army Space and Missile Defense Command, 2004; 2006)

Dogs, cats, and black rats are present on Kwajalein. A wide variety of reef fish including sharks, herring, mullets, squirrelfish, groupers, and jacks have been recorded in the water surrounding the island. (U.S. Department of the Army Space and Missile Defense Command, 2006)

Threatened and Endangered Wildlife Species

The following species of corals currently listed as candidate species have been observed off shore of Kwajalein: *Acanthastrea brevis* (starry cup coral), *Acropora dendrum*, *A. horrida*, *A. listeri*, *A. microclados*, *A. paniculata*, *A. polystoma*, *A. tenella*, *A. vauhani*, *A. verweyi*, *Heliopora coerulea*, *Montipora caliculata* (pore coral), *Pavona cactus*, *P. venosa*, and *Turbinaria reniformis* (yellow scroll coral). (U.S. Department of the Army Space and Missile Defense Command, 2011)

Sea turtles frequently enter the lagoon and are commonly seen in the harbors at Kwajalein and Roi-Namur, and in the waters surrounding Meck. Green and hawksbill sea turtles have been observed on and offshore of Kwajalein. (U.S. Army Space and Strategic Defense Command, 1995) Sea turtle haul-out and nesting has been observed on the northeast part of Kwajalein. No sea turtles were observed on Kwajalein during the 2008 inventory (U.S. Department of the

Army Space and Missile Defense Command, 2011). In 2010, four green turtle nests were discovered near the housing area. Three nests were facing inland on a steep hill and the hatchlings were possibly confused by lighting in the area and headed inland instead of out to sea. A fourth nest faced the ocean, and the hatchlings required no assistance. (Cable News Network, 2010)

Other threatened and endangered marine species that may possibly occur in and around Kwajalein include the blue whale, finback whale, humpback whale, sei whale, sperm whale, leatherback sea turtle, loggerhead sea turtle, and olive ridley sea turtle. Although whales are generally widely distributed, open water species, sperm whales and other whales are frequently sighted off Illeginni.

Environmentally Sensitive Habitat

Extensive dredge and fill activities since the 1930s have degraded the marine habitat surrounding Kwajalein, particularly on the lagoon side. A remnant of the original reef flat is located just north of Echo Pier, outside the harbor (U.S. Army Space and Missile Defense Command, 2001). According to the USAKA UES, seabird colonies and shorebird sites on Kwajalein are terrestrial habitat types that are potentially significant (U.S. Army Space and Missile Defense Command, 2006).

3.3.1.5 Gellinam—Biological Resources

Region of Influence

The region of influence for biology includes areas of Gellinam and the surrounding waters that may be affected by the Proposed Action. Figure 3-7 shows the categories of biological resources observed during recent surveys around Gellinam and the lagoon.

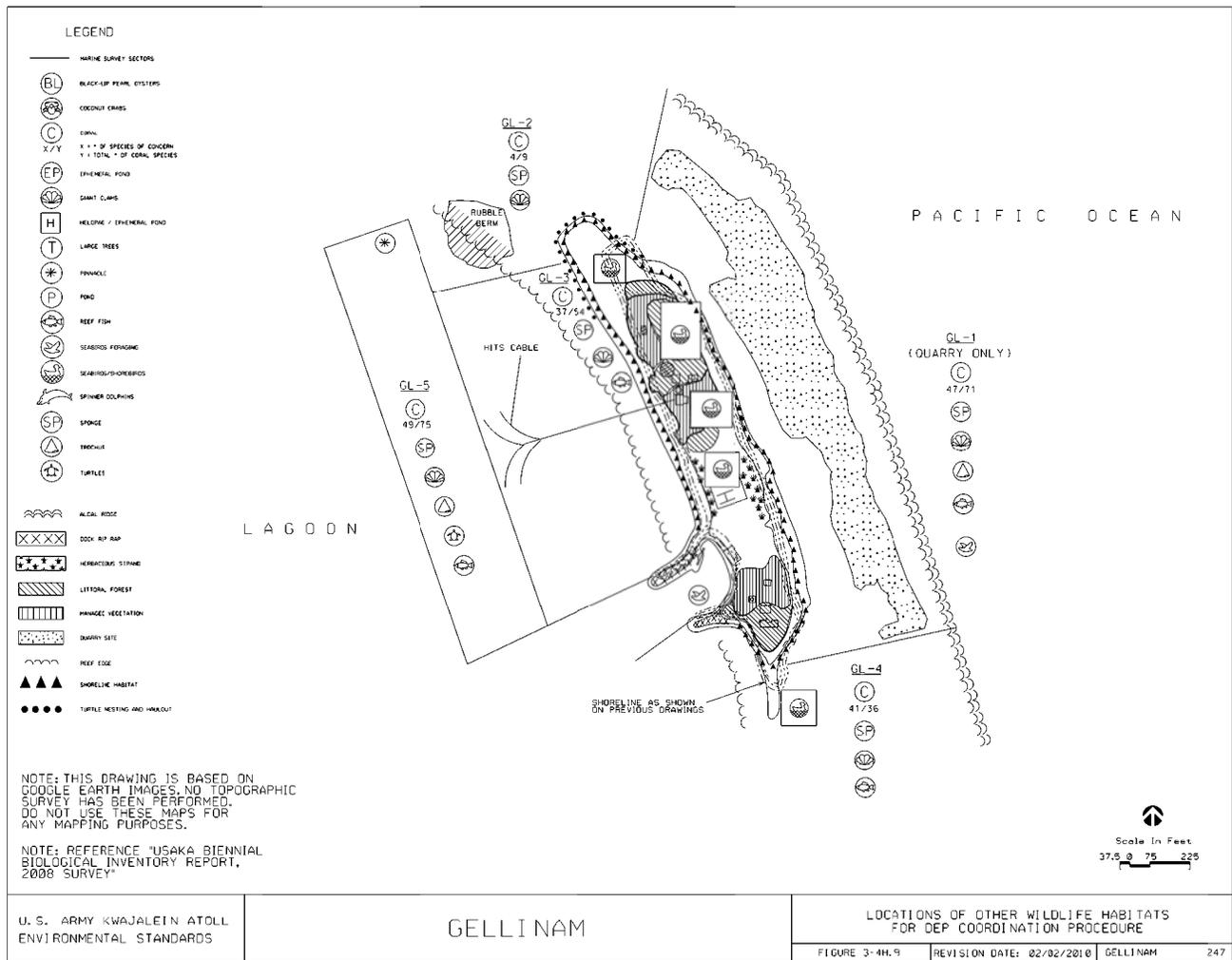
Affected Environment

Vegetation

Gellinam has been largely cleared of native habitat. A very small patch (approximately six trees) of mature littoral forest dominated by tall *Pisonia* and *Tournefortia* stands just north of the helicopter pad near the buildings. Immediately north of this patch is another, larger patch of littoral forest dominated by *Pisonia* and *Tournefortia*. The larger patch was estimated to be approximately 29.5 feet tall in 2002. This is roughly the same height estimated in 2000; this patch of forest is windward of the smaller patch of taller trees in Gellinam's interior, and its stature may be limited by wind and salt spray. (U.S. Department of the Army Space and Missile Defense Command, 2006)

Threatened and Endangered Plant Species

No threatened or endangered vegetation species have been identified on Gellinam.



EXPLANATION

Gellinam - Biological Resources

Kwajalein Atoll

Figure 3-7

Wildlife

Birds

Gellinam supports nesting colonies of black-naped terns, black noddies, and white terns. In 2004, more black-naped tern nests were observed on Gellinam than on any other USAKA/RTS island. Black-naped tern nests were concentrated in open areas just north and east of the helipad, but a few were also found among and upon buildings in the central part of Gellinam and among coral cobbles toward the southern end. Black-naped tern nests contained eggs, small chicks, and large, fully feathered chicks. Twelve active black noddy nests were located in large *Pisonia* and *Tournefortia* trees located near the buildings, and additional nests that appeared old and inactive were present. The shoreline and exposed reef provided foraging habitat for migratory shorebirds. The overgrown managed vegetation surrounding the structures on Gellinam was used by a few Pacific golden plovers. The helicopter pad may collect water during heavy rains and attract shorebirds and some seabirds. The rip-rapped shoreline was used by shorebirds for feeding and by black-naped terns for roosting. Terns also roosted on the metal railings of the small pier. (U.S. Department of the Army Space and Missile Defense Command, 2004; 2006)

During the 2004 survey no introduced vertebrates were observed at Gellinam. However, it is highly likely that rats are present. Also, one species of ant was observed (U.S. Department of the Army Space and Missile Defense Command, 2006).

Surgeonfish, triggerfish, snappers, jacks, goatfish, and butterflyfish are among the fish species that have been observed in the water surrounding Gellinam. The giant coral grouper, a SOC has also been seen. (U.S. Department of the Army Space and Missile Defense Command, 2006)

Threatened and Endangered Wildlife Species

The following species of corals currently listed as candidate species have been observed off shore of Gellinam: *Acropora dendrum*, *A. horrida*, *A. paniculata*, *Euphyllia cristata*, *Pavona cactus*, and *P. venosa*.

The area on the northern end of Gellinam previously provided suitable sea turtle nesting habitat. Since at least 1998, however, the sand has been replaced by a large amount of baseball-sized cobble, making the area unsuitable for successful sea turtle nesting. However, it is feasible that sea turtles could haul out on existing shorelines of Gellinam for resting purposes. (U.S. Department of the Army Space and Missile Defense Command, 2006)

Marine

Marine species of concern (SOC) are found on all sides of Gellinam (e.g., macro-invertebrates, hard corals and reef fishes). A number of conspicuous non-SOC organisms were also recorded in 2002 and 2004 (hard corals, mollusks). Marine plants genera observed included green algae and coralline algae. (U.S. Department of the Army Space and Missile Defense Command, 2006)

A juvenile green sea turtle was observed off the southern coast of Gellinam in 2004 (U.S. Department of Army Space and Missile Defense Command, 2006).

Environmentally Sensitive Habitat

Gellinam has marine (lagoon-facing reef slope and reef flat, interisland reef flat, lagoon floor, ocean-facing reef slope and reef flat, quarry pits and intertidal zone) and terrestrial habitats (*Pisonia* forest, seabird colonies, and shorebird sites). (U.S. Army Space and Missile Defense Command, 2006)

3.3.1.6 Illeginni—Biological Resources

Illeginni is located on the west-central side of the atoll and has 31 acres of land area with several buildings (some abandoned), towers, roads, a helipad, and a dredged harbor area. Illeginni also has terrestrial and marine habitats of significant biological importance, as defined in the UES. Figure 3-8 shows the categories of biological resources observed during recent surveys around Illeginni and the lagoon.

Vegetation

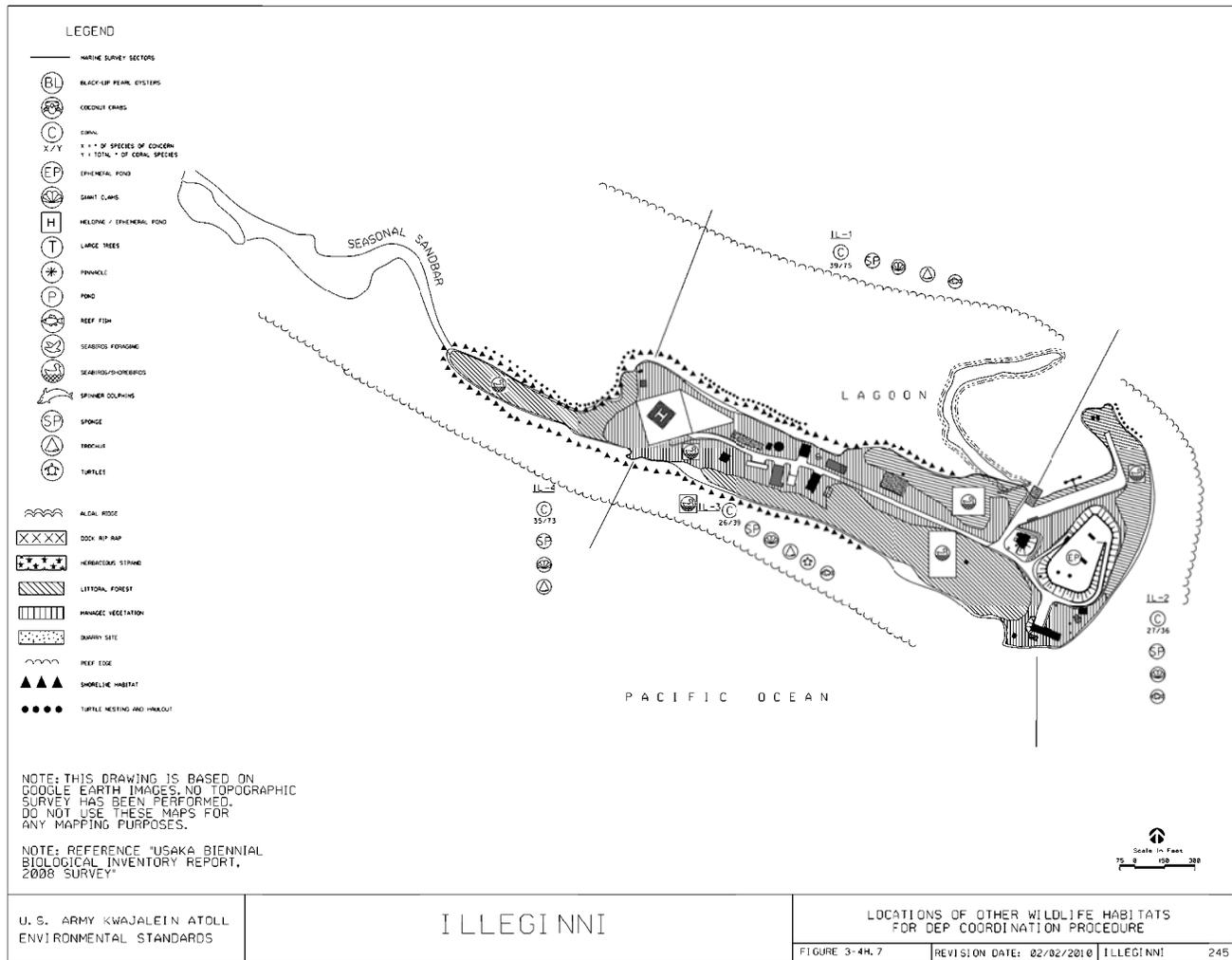
Illeginni is covered with mainly grassy lawns surrounding buildings and other facilities, and four relatively large patches of native vegetation (see Figure 3-8). The native vegetation consists of one patch of herbaceous strand and several patches of littoral (near shore) forest. The forest areas are composed primarily of *Pisonia*, *Intsia*, *Tournefortia*, and *Guettarda* trees. Some littoral shrubland can also be found mainly on the western end of Illeginni. (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)

Two adult squaretail coralgroupers (*Plectropomus areolatus*), two adult lyretail groupers (*Variola louti*), and an adult humphead wrasse (*Cheilinus undulatus*) were observed during the roving diver survey. (U.S. Department of the Army Space and Missile Defense Command, 2011)

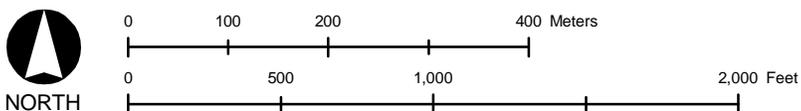
A number of protected migratory seabirds and shorebirds have been seen breeding, roosting, or foraging on Illeginni. Between 1998 and 2004, biological inventories conducted on Illeginni by the USFWS and NMFS have identified at least 14 bird species, including the black noddy, pacific golden plover, wandering tattler, and ruddy turnstone. Although these bird species are protected under the MBTA, none of them are listed as threatened or endangered. Surveys have shown shorebirds to use the managed vegetation throughout Illeginni's interior (Figure 3-8). Pooled water on the helipad attracts both wintering shorebirds and some seabirds (e.g., terns, plovers, and curlews). White terns have been observed in trees at the northwest corner and southwest quadrant of Illeginni. The shoreline embankment and exposed inner reef provides a roosting habitat for great crested terns and black-naped terns. Concentrations of federally protected migratory shorebirds and seabirds have also been seen in the littoral forest on the southeast side of Illeginni, which supports the second largest nesting colony of black noddies



Illeginni - Biological Resources

Kwajalein Atoll

Figure 3-8



recorded on the USAKA/RTS islands; nearly 150 nests were identified in 2000. There are also signs of black-naped tern nesting on the western tip of Illeginni (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 Illeginni 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 and Endangered Wildlife and Other Protected Species

The Kwajalein Atoll lagoon, reefs, and surrounding ocean waters are home to a number of threatened, endangered, and other protected species. The marine environment surrounding Illeginni supports a community of corals, fish, and invertebrates including the following protected species: coral (Candidate species: *Acropora globiceps*, *A. horrida*, *A. paniculata*, *A. vauhani*, *A. verweyi*, blue coral [*Heliopora coerulea*] and pore coral [*Montipora caliculata*]); mollusks, such as giant clams (including *Tridacna maxima* and *Hippopus hippopus*) and the top-shell snail (*Trochus niloticus*); and sponges (U.S. Department of the Army Space and Missile Defense Command, 2006). Figure 3-8 shows areas where various protected species can be found at Illeginni.

Based on prior surveys conducted around Illeginni, coral cover is moderate to high off the north and east sides, and lower off the west side. South of Illeginni, coral diversity and abundance is low. Marine life in general is abundant and diverse on the ocean side south of Illeginni. Towards the southwestern side, the water column was previously shown to be moderately turbid. Further west and south of the helipad, there is a marked degradation of the coral cover. During surveys conducted in 2000, coral mortality in this area was observed to an approximate depth of 82 feet. Live coral cover appeared to be low, and the benthic substrate was dominated by rubble. Severe physical impacts in this area have disrupted the coral community landward of the reef crest. In addition to the water column being turbid in this area, reef rubble and metal fragments from legacy iron piers and dump sites widely cover the benthic substrate (Robison et al., 2005; U.S. Air Force, 2004; U.S. Department of the Army Space and Missile Defense Command, 2002; 2006).

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

In 2000, a pod of approximately 12 endangered sperm whales was seen a few miles southeast of Illeginni. This pod of sperm whales has been seen consistently to the west of Illeginni, on the ocean side, several hundred yards offshore. Because calves have been seen with females, the group could represent a “nursery pod” of related females and their young, but this has not been verified. 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 p.m., biologists from the USFWS and NMFS observed a large adult whale or whales, approximately 2 to 3 miles due west of Illeginni in the BOA known as the Kwajalein Bight. At least one and possibly two large whales were observed to fully breach the surface, resulting in two large splashes. The sperm whale is described above in Section 3.3.1.1. (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/RTS. These include the hawksbill sea turtle and green sea turtle. As shown in Figure 3-8, suitable sea turtle haul-out/nesting habitat exists along the shoreline northwest and east of the helipad on the lagoon side of Illeginni. In 1996, sea turtle nesting pits were found on the northwestern tip of Illeginni. No pits were observed during the 1998, 2000, 2002, or 2004 biological inventories; however, the habitat still appeared suitable for successful nesting. On a few occasions, adult hawksbill and green sea turtles have been seen in the waters offshore. A hawksbill sea turtle was observed in the lagoon just north of Illeginni in 2002 and 2004, while an adult green sea turtle was seen on the seaward side in 1996. (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-shell snail (*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). *Trochus niloticus* and the coral species are described above. Based on prior surveys conducted around Illeginni, coral cover is moderate to high off the north and east sides, and lower off the west side. South of Illeginni, coral diversity and abundance is low. Figure 3-8 shows areas where various protected species can be found at Illeginni.

Marine life in general is abundant and diverse on the ocean side south of Illeginni. Towards the southwestern side, the water column was previously shown to be moderately turbid. Further west and south of the helipad, there is a marked degradation of the coral cover. During surveys conducted in 2000, coral mortality in this area was observed to an approximate depth of 82 feet. Live coral cover appeared to be low, and the benthic substrate was dominated by rubble. Severe physical impacts in this area have disrupted the coral community landward of the reef crest. In addition to the water column being turbid in this area, reef rubble and metal fragments from legacy iron piers and dump sites widely cover the benthic substrate (Robison et al., 2005; U.S. Air Force, 2004; U.S. Department of the Army Space and Missile Defense Command, 2002; 2006).

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 has marine and terrestrial habitats of significant biological importance, as defined in the UES. The terrestrial habitats of significant importance include the mixed broadleaf (littoral) forest, seabird colonies, and the shorebird sites around the island. The marine habitats considered biologically important are the lagoon-facing reef slope and reef flat, the inter-island reef flat, the lagoon floor, the ocean-facing reef slope and reef flat, the intertidal zone, and the reef pass. All of these habitats are considered important because of the presence or possible presence of protected species. (U.S. Department of the Army Space and Missile Defense Command, 2006)

Surveys have shown shorebirds to use the managed vegetation throughout Illeginni's interior. Pooled water on the helipad attracts both wintering shorebirds and some seabirds. Littoral forests to the west and east of the Illeginni helipad serve as habitat for a variety of federally protected migratory birds, including shorebirds and seabirds. White terns have been observed in trees at the northwest corner and southwest quadrant of Illeginni. The shoreline embankment and exposed inner reef provides a roosting habitat for great crested terns and black-naped terns. Seabirds have been seen concentrated in the southeast quadrant where the littoral forest supports the second-largest nesting colony of black noddies in the USAKA/RTS islands; nearly 150 nests were identified in 2000. There are also signs of black-naped tern nesting on the western tip of Illeginni. (U.S. Department of the Army Space and Missile Defense Command, 2006)

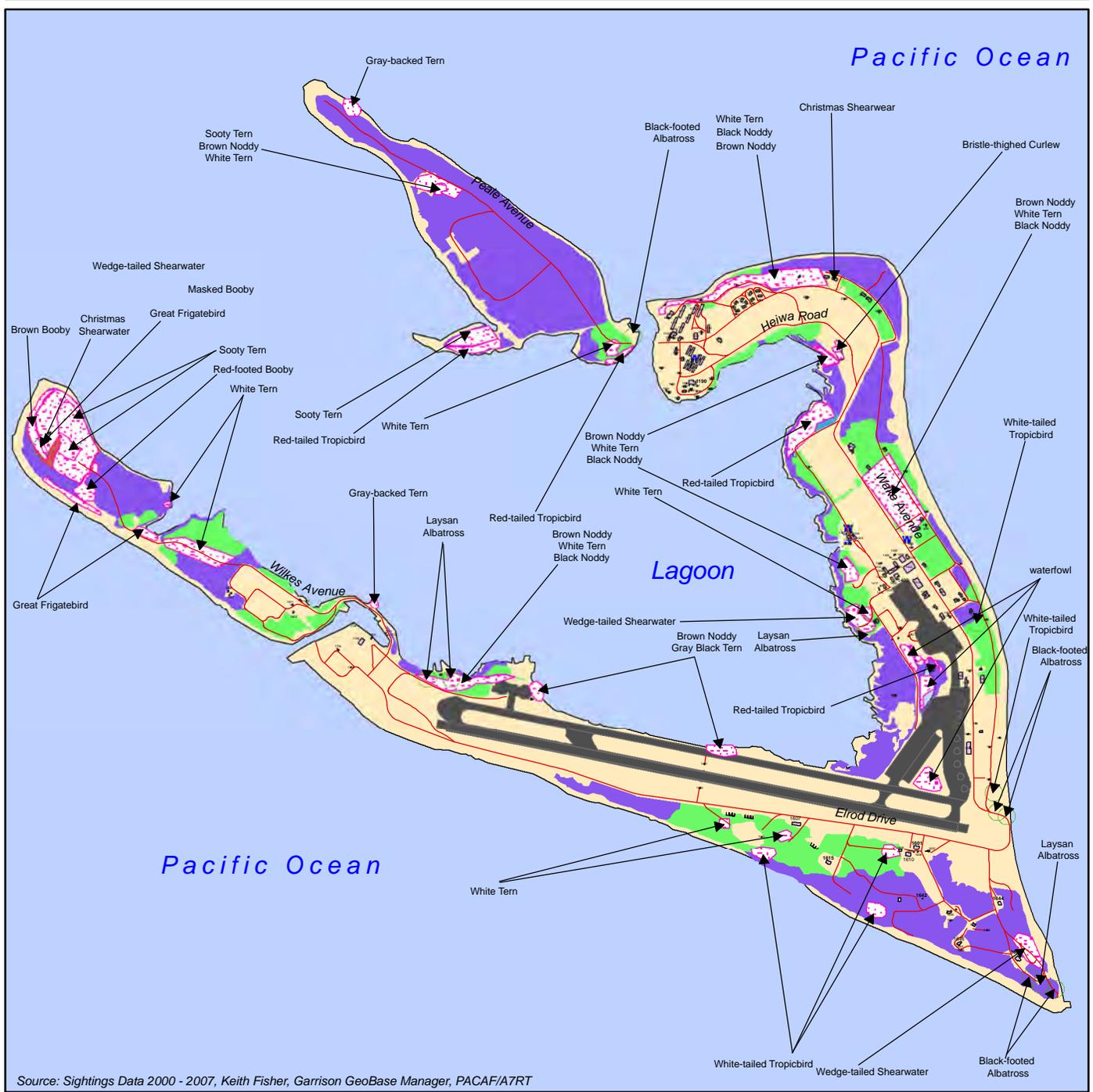
Suitable sea turtle haul-out/nesting habitat exists along the shoreline northwest and east of the helipad on the lagoon side of Illeginni. Sea turtle nest pits have not been observed near the western end of Illeginni since 1996. (U.S. Department of the Army Space and Missile Defense Command, 2006)

3.3.2 WAKE ISLAND—BIOLOGICAL RESOURCES

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 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 (botanical), wildlife, marine biological resources typically encountered at Wake, and threatened and endangered species encountered at Wake. Figure 3-9 shows vegetation and bird sightings and nesting areas on Wake.

Region of Influence

The region of influence is the area within the boundaries of the Wake Atoll (Wake, Wilkes, and Peale Islands).



EXPLANATION

- Road
- Other Sightings
- Sightings, Nestings or Courtship Activity

Vegetation

- | | | |
|---------|--------|----------|
| Forbs | Herbs | Trees |
| Grasses | Shrubs | Airfield |



0 1,000 2,000 4,000 Feet

Vegetation and Bird Sightings and Nesting Areas

Wake Atoll

Figure 3-9

Affected Environment

Wake Atoll is a biologically diverse group of islands. The islands sustain arthropods, small mammals, marine mammals, birds, and plants.

Vegetation

The 1998 compilations of terrestrial vegetation at Wake Atoll describe 204 species of terrestrial plants at the atoll, of which 20 are considered indigenous (i.e., a species which is native or probably native to the atoll), 55 are considered naturalized (i.e., a species which has been accidentally or deliberately introduced and has since become naturalized), and 129 are considered propagated (i.e., a species which is found only as a cultivated plant in a garden, a pot, or as a landscape plant). The distribution and composition of terrestrial plant communities at Wake Atoll vary among the three islands and reflect such primary community influences as elevation, climatic conditions, and the degree of human disturbance and intervention. Generally, the terrestrial plant communities on Wilkes and Peale have been relatively less disturbed by contemporary human activities and exhibit more indigenous and mature vegetation than the cultivated and operational areas of Wake. Each island is discussed in detailed in the following paragraphs.

Wake Island

The Peacock Point area was the subject of a 100 percent coverage botanical survey in preparation of the 1994 *Wake Island EA*. The site extends from the control tower eastward along Elrod Road to the ocean and from the tower south to the ocean. The vegetation of this area is a changing mosaic of scrub tree heliotrope, ironwood, and kou trees (*Cordia subcordata* L.) interspersed with dense stands of naupaka and cotton (*Abutilon albescens* Miq.). Eastward from Peacock Point Road the tree heliotrope is mostly scattered, shrubby individuals growing in coral rubble. West of Peacock Point Road, the tree heliotrope is interspersed with dense stands of naupaka and ironwood trees, which become dominant at the west end of the site and in the near vicinity of the control tower. Just seaward of the tower and to the east as far as Peacock Point Road, dense stands of kou trees, 20 to 26 feet in height, can be found.

Based on observation during August 2011, the area around Launch Pad #2 was clear of overgrowth and had low plant cover around the concrete pads. See Figure 3-8 for an overview of the Pad #2 area during August 2011. The abandoned Pad #3 (southwest of Launch Pad #2) was also observed in August 2011 to have an overgrowth of trees and bushes.

Wilkes Island

The western third of Wilkes has been set aside as a large seabird colony. The most conspicuous vegetation at the western end of the island is a scant fringe of heliotrope trees, 13 to 20 feet tall, and the broad mats formed by the nohu vines (*Tribulus cistoides* L.) which dominate the clipped, flattened landscape.

From the eastern edge of the bird sanctuary clearing to the Wilkes Island channel and continuing on the south side of the road to as far as the fuel storage tanks, the vegetation cover is composed of scattered heliotrope trees from 3 to 26 feet tall. The ground layer is mixed grasses, predominantly two species of bunch grass with intermittent patches of scurvy grass (*Lepidium bidentatum* Montino) and arena (*Boerhavia repens* L.).

On the south side of the dirt road, between the channel and the bird clearing, there is a long, deep anti-tank ditch that was dug during the WWII era. A dense colony of kou trees has grown up in this low area.

Along the lagoon shore of Wilkes the coastal vegetation is *Pemphis* with mats of sea purslane and a dense planting of ironwood trees near the point just north of the storage tanks. A scant scrub of tree heliotrope, naupaka, sour bush, cotton, and various weeds and grasses cover about 50 percent of the ground surface. The remainder is coral rubble and metal and wood scrap.

Peale Island

The dominant vegetation of Peale is tree heliotrope, approximately 7 to 26 feet tall. The ground cover is mixed bunch grass and open coral rubble. Along the shore near the burned out Peale Island Bridge, around to and including Flipper Point, and lining the inlets is a thriving *Pemphis* community with intermittent mats of red-stemmed sea purslane. Upland from and intermingled with the *Pemphis* is a burgeoning community of ironwood trees. A scattering of *Pisonia grandis* and kou trees is located about 492 feet from the burned out Peale Island Bridge on the ocean side of Peale Island Road, almost all that is left of what Fosberg referred to as a *Pisonia/Cordia* forest.

About halfway between the burned out Peale Island Bridge and the northwestern tip of Peale Island is a dirt road that leads to the old Pan American Seaplane Ramp. Just at the turn, there is a dense planting of *Opuntia littoralis* (Tour.) Mill., and a little further along the road is a reproducing stand of sisal. On either side of the dirt road are open areas where there are no heliotrope trees. In these open places, huge enclaves of the shrubby, wild cotton that is native to this atoll can be found.

Threatened and Endangered Plant Species

No plant species listed by the USFWS as threatened or endangered have been encountered at Wake Atoll.

Wildlife

The islands were home to the endemic Wake rail until it went extinct during World War II. Wake supports 12 species of resident nesting seabirds and 6 species of migratory shorebirds, all of which are populations of regional significance. Black-footed albatrosses and Laysan albatrosses recently recolonized Wake, one of few northern albatross colonies outside the Hawaiian archipelago. (U.S. Fish and Wildlife Service, 2010)

Approximately 32 species of birds have been encountered on Wake Atoll. These encounters include resident species, migrants, visitors, vagrants, accidentals, and exotics. Included among these 32 bird species are 15 species of seabirds, 9 species of shorebirds, 4 species of land birds, and 3 species of water birds. All seabirds present on the island, except for tropic birds, are conspicuous nesters that lay their eggs in the open, either on bare ground or exposed in shrubs or small trees. A population of albatrosses, either nascent or remnant, returns to Wake each year in November for the courtship and nesting season. Over the 1997-98 winter season, five individual black-footed albatross and three individual Laysan albatross over-wintered at Wake, nesting and displaying courtship behavior. Atoll residents reported observing several

Laysan albatross nests on Wake (Missile Defense Agency, 2007). A Terrestrial Resources Survey was conducted in June 1998.

Other than birds, the native terrestrial fauna at Wake Atoll is relatively limited and includes insects, several species of land crabs, and at least one species of snail. Geckos can be found on all three islands. There has been no recent account of snake species on Wake Atoll; however, the potential for such an introduction at the atoll has been recognized.

Exotic terrestrial mammalian species have been introduced, either deliberately or accidentally, to Wake. An eradication program for the large number of feral cats was exercised to reduce/eliminate the large population. A domestic cat was observed on Wake in the summer of 2011. Island residents claim that approximately four feral cats are currently present on Wake.

A large population of rats was observed on Wake during August 2011. Based on the 2011 observations, the Norway rat appears to be the majority of the rodent population. A future rat eradication program is being planned for Wake.

Marine Biological Resources

During the 1998 marine biological survey, a total of 122 species of reef fish, 41 species of corals, 39 species of other macroinvertebrates, and 19 species of macroalgae were recorded at Wake Atoll. The USFWS notes that more than 300 fish species and 100 coral species thrive on shallow coral reefs; and seabirds, giant clams, sea turtles, and spinner dolphins are found at Wake (U.S. Fish and Wildlife, 2011). The lagoon supports a large population of fish, and the surrounding reefs host a diverse assemblage of reef fish. Nearshore fish important for food and recreational purposes include groupers, porgy, and jacks. Black sharks were observed in the lagoon during the summer of 2011.

Marine mammals are protected under the Marine Mammal Protection Act (MMPA) of 1972 and may occur in the BOA surrounding Wake Atoll and between Wake and Kwajalein Atolls. Marine mammals that may be present include several species of cetaceans: blue whale, finback whale, humpback whale, Cuvier's beaked whale (*Ziphius cavirostris*), and sperm whale. Bottlenose dolphins and spinner dolphins may also be present around Wake Atoll.

Coral reefs off the coast of Wake are protected under EO 13089, Coral Reef Protection, which requires federal agencies to “identify their actions that may affect U.S. coral reef ecosystems; utilize their programs and authorities to protect and enhance the conditions of such ecosystems; and to the extent permitted by law, ensure that any actions they authorize, fund, or carry out will not degrade the conditions of such ecosystems.” Approximately 100 species of corals have been reported at Wake Atoll, a number somewhat lower than found at larger and less isolated neighboring atolls to the south. Fish populations are abundant, with at least 323 species recorded, including large populations of the Napoleon wrasse (*Cheilinus undulatus*), sharks of several species, and large schools of the bumphead parrotfish (*Bolbometopon muricatum*), all of which are globally depleted. Foraging populations of the threatened green turtle and resident populations of spinner dolphins are also found at Wake. (U.S. Fish and Wildlife Service, 2010)

Threatened and Endangered Species

Federally listed threatened and endangered species with potential to occur on Wake are listed in Table 3-3. This table shows data taken directly from USFWS data updated in August 2005, as well as earlier environmental documents that indicate that sea turtles may be found at Wake.

Birds

Federally protected terrestrial biota at Wake Atoll includes migratory seabirds, shorebirds, and occasional vagrant waterbirds. These birds are identified as “migratory” and are protected under the Migratory Bird Treaty Act (MBTA) of 1916 (16 U.S.C. 703-712). Birds known to occur at Wake Atoll that are protected under the MBTA include the black-footed albatross, Laysan albatross, brown booby, masked booby, red-footed booby, bristle-thighed curlew, great frigatebird, lesser golden-plover, black noddy, brown noddy, sharp-tailed sandpiper, Christmas shearwater, wedge-tailed shearwater, northern shoveler, wandering tattler, gray-tailed tattler, sooty tern, gray-backed tern, white tern, red-tailed tropicbird, white-tailed tropic bird, and the ruddy turnstone. There is no exclusively terrestrial biota, including plants and animals, federally listed as threatened or endangered under the Endangered Species Act, currently known or reported on Wake.

Table 3-3. Federally Listed Threatened and Endangered Species with Potential to Occur on Wake

Scientific Name	Common Name	Federal Status	Comments
Birds			
<i>Acrocephalus luscini</i>	Nightingale reed warbler, Gaga karisu	Endangered	Possibly extinct on Wake
<i>Collocalia bartschi</i>	Guam swiftlet, Yayaguak	Endangered	
<i>Corvus kubaryi</i>	Mariana crow, Aga	Endangered	Critical Habitat designated
<i>Gallinula chloropus guami</i>	Mariana moorhen, Pulattat	Endangered	
<i>Halcyon cinnamomina cinnamomina</i>	Micronesian kingfisher, Sihek	Endangered	Critical Habitat designated
Turtles			
<i>Chelonia mydas</i>	Green sea turtle	Threatened	
<i>Dermochelys coriacea</i>	Leatherback sea turtle	Endangered	
<i>Eretmochelys imbricata</i>	Hawksbill sea turtle	Endangered	
<i>Caretta caretta</i>	Loggerhead sea turtle	Endangered	

Sources: U.S. Fish and Wildlife Service, Pacific Islands, 2005; Adapted from U.S. Army Space and Missile Defense Command, 2002b

Turtles

The federally threatened green sea turtle was observed multiple times in the near shore ocean and lagoon waters at Wake Atoll during the 1998 terrestrial survey. Shoreline basking and nesting activity, the only terrestrially-based behaviors of this otherwise marine species, were neither observed during the investigation nor reported in the literature as having been observed at Wake. It is possible, however, that green turtles might haul out along the southern shoreline of the atoll since the slope of the shoreline is not steep and offers limited basking opportunities.

The federally endangered hawksbill sea turtle has been suspected to occur at Wake Atoll (*Transfer and Reuse of Wake Island Airfield*, Hickam AFB, HI as cited in U.S. Army Space and Missile Defense Command, 1999); however, no records or accounts of confirmed sightings could be found in the literature reviewed. No observations of hawksbill turtles were recorded at Wake Atoll during the 1998 marine survey, although a joint NMFS and USFWS Recovery Plan for U.S. Pacific populations of the green turtle noted that the unincorporated Pacific islands “all probably provide marine feeding grounds for green and perhaps hawksbill turtles” (National Marine Fisheries Service and U.S. Fish and Wildlife Service, 1998).

Giant Clam

The giant clam (*Tridacna maxima*) is commonly found in the nearshore waters surrounding Wake Atoll. This clam was observed during the summer of 2011 in the lagoon area and is currently afforded federal protection under the Convention for the International Trade of Endangered Species.

3.3.3 BROAD OCEAN AREA—BIOLOGICAL RESOURCES

For biological resources in deep ocean waters, the region of influence consists of the animal and plant life that lives in and just above the surface waters of the sea and its fringes, the salient physical and chemical properties of the ocean, biological diversity, and the characteristics of its different ecosystems or communities.

Region of Influence

The BOA region of influence includes those areas below the potential corridors and drop areas in the Pacific Ocean. The average depth of the BOA 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 Omelek 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, 2004a).

Threatened and Endangered Species

Species identified as threatened or endangered that exist in the BOA region of influence include the sei whale, blue whale, finback whale, humpback whale, sperm whale, loggerhead sea turtle, green sea turtle, leatherback sea turtle, hawksbill sea turtle, and olive ridley sea turtle.

Noise

Baseline or ambient noise levels on the ocean surface—not including localized noise attributed to shipping—is a function of local and regional wind speeds. Studies of ambient noise of the ocean have found that the sea surface is the predominant source of noise, and that the source is associated with the breaking of waves. Wave breaking is further correlated to wind speed, resulting in a relationship between noise level and wind speed. (Federal Aviation Administration, 2001)

Ambient noise in relation to underwater noise is also the existing background noise of the environment. Ambient noise strongly affects the distances to which animal and specific man-made sounds and other sounds of interest can be detected by marine mammals (Richardson et

al., 1995). Common sources of background noise for large bodies of water are tidal currents and waves; wind and rain over the water surface; water turbulence and infrasonic noise; biological sources (e.g., marine mammals); and human-made sounds (e.g., ships, boats, low-flying aircraft). The ambient noise levels from natural sources typically vary by as much as 20 dB or more (Richardson et al., 1995) according to numerous factors including wind and sea conditions, seasonal biological cycles, and other physical conditions. Noise levels from natural sources can be as loud as 120 dB (re: 1 micropascal [μPa] at 1 meter) in major storms. (U.S. Department of the Air Force, 1998)

Noise associated with human sources varies with the characteristics of the specific noise source. The primary human-made noise source within the region of influence is expected to be associated with ship and vessel traffic. This source may include transiting commercial tankers and container ships, commercial fishing boats, and military surface vessels and aircraft. Vessel noise is primarily associated with propeller and propulsion machinery. In general, noise levels increase with vessel size, speed, and load. Noise levels from large ships can reach levels of 180-190 dB (re 1 μPa at 1 meter), whereas smaller vessels range from approximately 100-160 dB (re 1 μPa at 1 meter) (U.S. Department of the Air Force, 1998). At distances greater than 1 meter, noise levels received diminish rapidly with increasing distance (Richardson et al., 1995).

Water Resources

Water quality in the BOA is excellent, with high water clarity, low concentrations of suspended matter, dissolved oxygen concentrations at or near saturation, and low concentrations of contaminants such as trace metals and hydrocarbons. A description of the BOA's physical and chemical properties, including salinity, density, temperature, pH, and dissolved gases, is given above.

3.4 CULTURAL RESOURCES

3.4.1 U.S. ARMY KWAJALEIN ATOLL/RONALD REAGAN BALLISTIC MISSILE DEFENSE TEST SITE (USAKA/RTS)

3.4.1.1 Meck—Cultural Resources

Region of Influence

The region of influence, or Area of Potential Effects (APE) as defined by cultural resources legislation, encompasses any and all areas where ground disturbance would take place. This specifically includes areas where leveling, vegetation removal, and subsurface boring/auguring may be required for the installation of lightning rods associated with the various radars and associated communications and SATCOM equipment.

Affected Environment

The surface of Meck has been heavily disturbed by extensive grading and construction for various missile launch programs and landfilling has increased Meck's size by about 14 acres. The entirety of Meck has been surveyed for cultural resources, and no prehistoric or historic archaeological resources sites have been recorded (U.S. Army Kwajalein Atoll Environmental Office, 2006). A survey was conducted for traditional cultural resources sites in 1997 (Carucci,

1997), and Meck was found to have links to indigenous and mythological practices. Two general areas associated with these practices were identified (a cavern area at the extreme north end and an area along the lagoon (northeast) shoreline; however, activities associated with the integrated flight testing proposed in this EA are not situated within these areas. Eight buildings have been determined to have important historical associations with the Cold War era at USAKA/RTS (U.S. Army Space and Strategic Defense Command Historical Office and Teledyne Brown Engineering, 1996), but none of the buildings will need to be modified to support the current program.

3.4.1.2 Roi-Namur—Cultural Resources

Region of Influence

The region of influence, or APE as defined by cultural resources legislation, encompasses any and all areas where ground disturbance would take place. On Roi-Namur, this includes areas where leveling, vegetation removal, and/or subsurface boring/augering may be required for the installation of lightning rods for the various radars and associated communications and SATCOM equipment, and for the stabilization of the land-launched target trailer.

Affected Environment

Prehistory

The Marshall Islands have a long prehistory and history, and some of the earliest cultural materials have been recovered from Roi-Namur. Radiocarbon dates from a disturbed burial on Roi-Namur indicate that people were present in the northern islands of Kwajalein Atoll as early as AD 100.

To date, no intact prehistoric or traditional period archaeological sites have been identified on the Roi portion of Roi-Namur, and only two isolated prehistoric artifacts have been recovered; as a result, little direct data is available regarding the island's earliest occupants. The presence of the artifacts does, however, indicate that a prehistoric component is, or was, present on the island (Mead, 2010).

The traditional period of occupation for Roi-Namur (1815-1885) is poorly understood, and the information available is confined to oral traditions. During this period Roi was unconnected to Namur to its east. However, there appears to have been a strong connection between the two, and oral tradition indicate that they shared a single church. The residential areas of Roi were along the lagoon shoreline, with aroid pits located in the central portions of the island. Oral tradition also maintains that the central part of Roi was the site of two "sacred depressions." The western shore (oceanside) of Roi is traditionally identified as the home of the people of Bikini Atoll, and the waters between Roi and Namur were a highly desirable fishing site (Carucci, 1997; Harry, 2009).

History

Oral traditions indicate that the pattern of residential settlement along the lagoon shoreline continued into the early 20th century, with the southern shore being the location of a church, burial ground, and possibly a trading post. Older Marshallese report the Japanese began forcibly removing populations from selected islands on the Atoll at some point between 1937 and 1939. No documentary resources have been found which conclusively prove there was a

Japanese base on Roi-Namur prior to 1940, and some historians maintain that the islands were not fortified until after 1939 when the Japanese Navy conducted a survey of the area to identify locations for base construction (Peattie, 1988). Once constructed, the Japanese base on Roi and Namur served as an airfield providing coverage for Kwajalein, which did not have a substantial airfield of its own. The Japanese construction on Roi included airfield facilities within a ring of shoreline defenses (Mead, 2010).

American military forces landed on Roi and Namur on 1 February 1944. In the days leading up to and during the landing, the landscape of the island was significantly transformed by naval and aerial bombing. The Japanese defense lasted only a few days, and the Americans declared the northern islands of Kwajalein Atoll secure on 2 February 1944. Following the battle, reconstruction efforts of the Americans concentrated on bringing the airfield to a functioning condition as rapidly as possible. Initial clean-up included demolition of some concrete facilities, but many of the Japanese buildings were reused. Battle debris was pushed off the shoreline and into convenient depressions in the ground by bulldozers. Most of the early post-battle structures built were temporary and for many months after the battle American construction was confined to Quonset huts, wood structures, and tent platforms (Mead, 2010).

Once the airfield was operational, the Americans launched a massive land expansion effort including filling in the open water between the islands of Roi and Namur and extending the southern (lagoon) shoreline of the islands. By mid-1945 the water between the former islands of Roi and Namur was filled in and the two were connected, forming the modern island of Roi-Namur. The base constructed by the Americans was, like its Japanese predecessor, an airbase, used for smaller bombers. Shortly after the war (1947), the airfield was mothballed by the U.S. Navy and American military presence was withdrawn (Mead, 2010).

Local Marshallese recall reoccupying the island after the Americans left, but oral informants have not been able to provide recollections of any specific occupation of Roi-Namur, and aerial photographs from the 1950s indicate that the island was largely overgrown. In 1960/61, Roi-Namur was reactivated as part of Project PRESS. Much of the construction of support facilities in the early 1960s took place along the lagoon shore of Roi and included temporary barracks buildings and personnel support facilities. Since the 1964, Roi-Namur has been continuously occupied as a U.S. Army base (Mead, 2010).

Previous Archaeology

Controlled archaeological surveys, excavations, and monitoring projects on Roi-Namur have identified significant surface and subsurface cultural resources. Among these are World War II Japanese and American features and artifacts (e.g., bomb craters, ammunition, bottle glass) and human burials (Panamerican Consultants, Inc., 1994; Kuttruff, 1996; Mead, 2005; and U.S. Army Kwajalein Atoll Environmental Office, 2006). Many of these have been uncovered from depths greater than 3 feet, including one burial that was unexpectedly uncovered during the installation of light poles near the softball field.

Archaeological Potential within the APE

Integrated flight test activities on Roi-Namur would take place within areas that have varying degrees of archaeological sensitivity (U.S. Army Kwajalein Atoll Environmental Office, 2006; Aljure, 2012). The types of cultural remains that could be encountered include human burials,

World War II impact craters, lens wells, above ground World War II features, and subterranean or semi-subterranean facilities and structures.

3.4.1.3 Omelek—Cultural Resources

Region of Influence

The region of influence, or APE, as defined by cultural resources legislation, encompasses any and all areas where ground disturbance would take place. On Omelek, this includes areas where leveling, vegetation removal, and/or subsurface boring may be required for the installation of grounding rods for the various radars and associated communications and SATCOM equipment.

Affected Environment

Much of Omelek has been heavily disturbed by construction and operational activities; however, there are three small areas containing remnants of mixed broadleaf forest that contain nonspecific archaeological remains and features (e.g., coral slabs, subsurface charcoal, and burned coral). These remains may represent a traditional Marshallese cemetery or living surface but may also be a naturally occurring phenomenon similar to that seen on adjacent beaches. Given the inconclusive nature of the site, it has been recommended not eligible for inclusion in the RMI National Register of Historic Places (Craib, et al., 1989; USAKA Environmental Office, 2006; Carucci, 1997).

There are no historic buildings or structures on Omelek (U.S. Army Space and Strategic Defense Command Historical Office and Teledyne Brown Engineering, 1996), and locations proposed for the various IFT program activities are outside the remnant forest/archaeological area.

3.4.1.4 Kwajalein—Cultural Resources

Region of Influence

The region of influence, or APE, encompasses any and all areas where ground disturbance would take place. This specifically includes areas where leveling, vegetation removal, and/or subsurface boring may be required for the installation of lightning rods for the various radars and associated communications and SATCOM equipment and for the stabilization of land-launched target trailers.

Affected Environment

Prehistory

Most Marshallese regard Kwajalein as the cultural hub of Kwajalein Atoll. It is a residence island associated with *Irooj* clans which govern the atoll. Initial settlement of Kwajalein Atoll was probably on the lagoon strand of Kwajalein. If the ethnographic data recovered from Kwajalein residents can be assumed to be an extension of the prehistoric past, the earliest occupation was probably on the western end of the island. Extrapolating from archaeological studies in other parts of the Marshall Islands, the earliest sites are likely to be found near the center, specifically in the area of the present day landing strip and taxi way (Rosendahl, 1977, 1987; Riley, 1987; Athens, 1984; Beardsley, 1994; Weisler, 2001a, 2001b).

The pattern of settlement on residence islands was defined during some of the earliest systematic archaeological investigations and appears that on Kwajalein that settlement pattern remained relatively consistent into the mid-20th century. Residence was based on family compounds on the lagoon strand or slightly back from it. These compounds contained sleeping and cooking houses and other small resource processing shelters surrounding a cobble gravel platform. Other features associated with these compounds would include small garden patches and wells. The central portion of the island would be dedicated to coconut trees and aroid (taro) pits. Other features of the landscape were described as follows:

Further out to the ocean side was the open field for arrowroot, and along the ocean side shore were the pandanus trees...The pandanus trees also acted as windbreak for the other trees and crops. The...‘wild pandanus’ and others were placed on the outer most part of the ocean side wāto in order to help keep the soil from eroding during high tide.... (Willy Mwekto, in Carucci, 1997: 2008).

Oral traditions and limited historic documentation indicate that in the later 19th century, settlement on Kwajalein was strung along the lagoon shore from one end of the island to the other. By the 1930s, Kwajalein had a number of churches, meeting houses, two schools, and at least two trading posts. At some point after 1914, the Japanese colonial government established offices on the island, located in the area between Ocean and Lagoon Roads in the approximate line of 9th Street (Carucci, 1997).

History

Construction of the Japanese Base on Kwajalein began in earnest in 1940. Designed as the regional administrative center for the Japanese of the Eastern Mandates, Kwajalein was built on a slightly different pattern from that seen on other Japanese occupied islands (e.g., Wotje, Maloelap and Roi-Namur, which were constructed as airbases). The island contained a larger number of administrative buildings, had only a minor airstrip, very large shipping dock, and a number of warehouses (Meade, 2008).

The American amphibious assault on Kwajalein began with heavy naval and aerial bombing to weaken the Japanese defenses. On D-day, January 31, 1944, the first landings were on the small islands to the west. The Americans landed on the western end of Kwajalein on the second day of the assault and over the course of the next several days fought their way along the length of the island. The fighting was characterized by repeated encounters with localized pockets of resistance, with the heaviest fighting along the lagoon shore. Once the battle lines reached the area west of the current tank farm, fighting changed to a structure-by-structure offensive as the Americans encountered Japanese entrenched in the more densely constructed administrative and warehouse districts (Meade, 2008).

Almost immediately after the battle, the Americans began rebuilding the base. Construction included an airfield, housing, warehouses, airfield support facilities, headquarters and administrative buildings, and infrastructure. Virtually all of this construction was temporary; mostly rapidly constructed buildings of wood and metal (Quonset huts) erected over slabs on-grade. One of the more profound transformation was the first in a series of expansions of the island's footprint, when the area south of Echo Pier was filled, widening this part of the island.

In 1946 the U.S. established the Pacific Proving Ground, and Kwajalein became the primary support base for nuclear testing in the Marshall Islands. Between 1951 and 1958 the temporary WWII base facilities were replaced by more permanent construction, and infrastructure was upgraded. As the civilian population increased, both military and civilian personnel began to bring their families with them to Kwajalein, creating a need for family housing and other non-military support facilities. The need for additional land led to the filling-in of an area immediate north of Echo Pier (Meade, 2008).

After the Nuclear Testing program at the Pacific Proving Ground ended in 1958, the base contracted in size and population. Before the base could be closed, it was reactivated in 1959 for the first in a series of programs which would provide new life for the base as a research and development facility for the American missile program. The missile testing programs required support facilities including sensors and tracking systems and the increased population of the island required additional housing and support facilities. Between 1959 and 1964, the requirement for land to construct these facilities would lead to additional filling efforts on the lagoon side of the island which would nearly double its width; land creation on the north and south ends of the island to increase the length by over 25 percent. After 1976, active programs related to missile programs died back and once again the base entered a period of decreased activity. (Meade, 2008).

In 1983 the Strategic Defense Initiative brought new impetus and base construction once again resumed. In the late 1980s and early 1990s environmental concerns began to play a role in base planning, by the mid-1990s the base would have a program in place to consider the cultural effects of construction on the island (Meade, 2008).

Previous Archaeology

Until the late 1980s, cultural resources associated with the prehistoric/traditional occupation of Kwajalein were considered a casualty of the 1944 battle and subsequent construction. Several studies since 1988 have identified prehistoric features, even on this most transformed of atolls. These features include *um*, agricultural deposits (aroid pits), a possible coral cobble well, and multiple inhumation burials (Streck, 1987; Shun and Athens, 1990; Craib et al., 1989; Beardsley, 1994). The archaeological data from prehistoric/ traditional sites coincides well with ethnographic and oral historical resources, which is remarkable in light of the fact that most, if not all, of the mnemonic devices imbedded within the Marshallese cultural landscape have been altered or removed (Meade, 2008).

Generally, prehistoric cultural resources on Kwajalein are not completely intact sites with well preserved stratigraphy. The pattern instead is for recovery of features originally created by intensive excavation below grade (e.g., aroid pits, inhumation burials, and wells) which have been truncated by subsequent activities. There are a few examples of features which have been sealed beneath later fill deposits preserving them from subsequent construction. This suggests that while prehistoric remains are present in limited areas, they are often significantly altered by more recent, extensive landscape transformation (Meade, 2008).

Useful information has also been obtained by locating, identifying, and excavating various features. Several aspects of the prehistoric archaeological record can be directly connected to Marshallese oral traditions documenting the location of agricultural areas, resource extraction locations, burial practices, and traditional cemetery locations (Meade, 2008).

The vast majority of cultural resources research on Kwajalein has been concerned with the historic period. Historic archaeological resources, specifically those relating to either the Japanese military presence on the island or Operation FLINTLOCK, have been identified on virtually every portion of the original 1944 footprint of Kwajalein. These resources have included tank traps, pillboxes, trash dumps, human remains, bomb craters, trenches, battle era ground surfaces, and the remains of a variety of, as yet, unexplained structures. (Meade, 2008).

Archaeological Potential within the APE

Integrated flight test activities on Roi-Namur would take place within areas that have varying degrees of archaeological sensitivity (U.S. Army Kwajalein Atoll Environmental Office, 2006; Aljure, 2012). The types of cultural remains that could be encountered have been described above.

3.4.1.5 Gellinam—Cultural Resources

Region of Influence

The region of influence, or APE, encompasses any and all areas where ground disturbance would take place. On Gellinam, this includes areas where leveling, vegetation removal, and/or subsurface boring/augering may be required for the installation of lightning rods for the various radars and associated communications and SATCOM equipment.

Affected Environment

The entirety of Gellinam has been surveyed for cultural resources. No known prehistoric, historic, or traditional cultural resources sites have been recorded, and none of the buildings or structures on Gellinam have been determined to be of historical significance.

3.4.1.6 Illeginni—Cultural Resources

Region of Influence

The region of influence, or APE, encompasses any and all areas where ground disturbance would take place. This specifically includes areas where leveling, vegetation removal, and/or subsurface boring/augering is required for the installation of lightning rods for the various radars and associated communications and SATCOM equipment and for the stabilization of land-launched target trailers.

Affected Environment

Illeginni has been surveyed for cultural resources and no known prehistoric, historic, or traditional archaeological resources sites have been recorded. Eight buildings have been determined to have important historical associations with the Cold War era at USAKA/RTS (Army Space and Strategic Defense Command Historical Office and Teledyne Brown Engineering, 1996), but none of the buildings will need to be modified to support the current program.

3.4.2 WAKE ISLAND—CULTURAL RESOURCES

Region of Influence

The region of influence is the area within the boundaries of the Wake Atoll (Wake, Wilkes, and Peale Islands) where ground disturbance might occur. This includes areas where lightning rods for the AN/TPY-2 radar and associated communications and SATCOM equipment would be emplaced.

Affected Environment

Prehistory

The remoteness of Wake Island and its lack of water (other than rainfall) discouraged permanent settlement; therefore, there is no archaeological evidence for prehistoric occupation of the islands by Polynesian peoples and little potential for prehistoric resources to be present (U.S. Army Space and Strategic Defense Command, 1994b; Jackson 1996).

Traditional resources may include prehistoric sites and artifacts, historic areas of occupation and events, historic and contemporary sacred areas, materials used to make implements, hunting and gathering areas, and other biological and geological resources of importance to contemporary cultures. There is no evidence of these types of sites or resources on Wake Island; however, Marshallese traditions, reveal that the islands may have been visited by voyagers for the collection of the orange *kio* flower (used in a warrior initiation ceremony) and to obtain wing bones of large seabirds for use in tattooing chiefs (Heine and Anderson, 1971; Burgett and Rosendahl, 1990; Jackson, 1996).

History

Early sightings of Wake Island by European and American expeditions (Spanish explorer Alvaro de Mendana in 1568; British Captain William Wake in 1796; American Lieutenant Charles Wilkes in 1841) all found the islands to be uninhabited. In 1898, the islands were claimed for the United States and have been used as a military facility and military and commercial aircraft transiting location periodically since that time (Jackson 1996).

In 1985, all areas of Wake encompassing Japanese structures and fortifications were officially designated a National Historic Landmark (NHL) because of the atoll's significance in the history of World War II in the Pacific. The atoll was concurrently placed on the U.S. National Register of Historic Places (Thompson, 1984; Jackson, 1996). Other areas—e.g., all post-World War II developments—while situated within the boundary of the NHL, do not contribute to the significance of the island, including those areas proposed for integrated flight test activities.

In 1996, the U.S. Air Force prepared a Historic Preservation Plan (HPP) for the Wake Island NHL, which outlines preservation and management alternatives for the property. The Air Force, the National Park Service, and the U.S. Advisory Council on Historic Preservation concurred with the findings in the HPP, which state that adverse effects on identified historic properties will not result from anticipated land uses because they will be conducted within previously developed post-World War II areas and specific historic features will be avoided (Jackson, 1996).

3.4.3 BROAD OCEAN AREA—CULTURAL RESOURCES

There are no known marine cultural resources (e.g., shipwrecks) within areas of the BOA beneath the proposed IFT paths. Average ocean depths within these areas are approximately 12,900 feet and any unidentified resources at that depth would have a very low probability of being affected by impacts from missile components or debris during planned activities or abnormal flight termination.

3.5 GEOLOGY AND SOILS

Geology and soils include those aspects of the natural environment related to the earth, which may be affected by the Proposed Action. This resource is described in terms of existing information on the land forms, geology, and associated soil development as it may be subject to erosion, flooding, mass wasting, mineral resource consumption, contamination, and alternative land uses resulting from proposed construction and launch activities.

3.5.1 U.S. ARMY KWAJALEIN ATOLL/RONALD REAGAN BALLISTIC MISSILE DEFENSE TEST SITE (USAKA/RTS)

3.5.1.1 Meck, Roi-Namur, Omelek, Kwajalein, Gellinam, and Illeginni—Geology and Soils

Geology and soils include those aspects of the natural environment related to the earth, which may be affected by the Proposed Action. These features include physiography, geologic units and their structure, the presence/availability of mineral resources, soil condition and capabilities, and the potential for natural hazards.

Region of Influence

The region of influence is anticipated to be the proposed locations on Meck, Roi-Namur, Omelek, Kwajalein, Gellinam, and Illeginni that may be subject to soil areas within the LHA that have the potential to be subject to contamination from launch exhaust emissions and/or potential contamination from unburned fuel in the event of a terminated launch.

Affected Environment

Paleontological Resources

Paleontological resources consist of the physical remains of extinct life forms or species that may have living relatives. These physical remains include fossilized remains of plants and animals, casts or molds of the same, or trace fossils such as impressions, burrows, and tracks. Geological studies indicate that the reefs and atolls of the Marshall Islands formed 70 to 80 million years ago; however, the natural processes from which atolls are built (U.S. Army Space and Strategic Defense Command, 1993) preclude the occurrence of paleontological remains.

Geology

The islands and reefs that collectively outline and form the Kwajalein Atoll are typical of other mid-Pacific Ocean atolls in that each was created as a result of prehistoric volcanic islands surfacing above the sea then gradually subsiding below the sea due to deflation of the

underlying magma chamber. As the volcanoes subsided below the average sea level, the surrounding ring-shaped coral reefs remained, forming a centralized lagoon. (U.S. Army Space and Strategic Defense Command, 1995)

As a result of similar atoll building processes, Meck and other land bodies within the mid-Pacific Ocean region have similar geological foundations primarily composed of layers of reef rock. Reef rock is made up entirely of the remains of the previous generations of marine organisms (reef corals, algae, mollusks, echinoderms) that secrete external skeletons of calcium and magnesium carbonate. (U.S. Army Kwajalein Atoll, Marshall Islands, 2004; U.S. Army Space and Strategic Defense Command, 1995)

Soils

USAKA's soils are poor and considered to be low in fertility and almost exclusively composed of calcium carbonate from the accumulation of reef debris and oceanic sediments. Consequently, soils are extremely deficient in major soil constituents such as nitrogen, potash, and phosphorous. Major physical factors which characterize USAKA's soil include coarse soil particles, minimal amounts of organic matter, and alkaline soil pH. In addition, water-holding capacity of the soil is poor due to the generally coarse grained-sands. (U.S. Army Kwajalein Atoll, Marshall Islands, 2004; U.S. Army Space and Missile Defense Command, 2002)

3.5.2 WAKE ISLAND—GEOLOGY AND SOILS

Region of Influence

The region of influence is anticipated to be the proposed locations on Wake that may be subject to soil areas within the LHA that have the potential to be subject to contamination from launch exhaust emissions and/or potential contamination from unburned fuel in the event of a terminated launch.

Affected Environment

Wake is typical of mid-Pacific Ocean atolls formed when a volcano rises above the ocean surface and then subsides back below the surface due to deflation of the underlying magma chamber. When the volcanic island subsidence rate is relatively slow, coral reefs form around the island and continue to grow at a rate equal to that of the subsidence, forming a ring-shaped reef with a shallow central lagoon. The reef rock is formed entirely from the remains of marine organisms (reef corals, coralline algae, mollusks, echinoderms, foraminiferans, and green sand-producing algae) that secrete external skeletons of calcium and magnesium carbonates. As these organisms grow and die, their remains are either cemented in place to form hard reef rock or erode and wash down slopes to accumulate as sediment deposits, particularly in the lagoon or on deep terraces downslope on the ocean side of reefs. The reefs are growing actively as a result of vigorous development and populations of corals, coralline algae, and large mollusks. Only the upper thin veneer of the reef structure is alive and growing, accreting over the remains of prior generations of reef organisms. Although coral reefs are unique because they build and advance wave-resistant structures in the face of persistent and severe wave and storm attack, the organisms that form the reefs are vulnerable to sedimentation, burial, and changes in circulation caused by human development activities.

Major reef-building organisms are marine fauna that cannot survive prolonged periods of exposure out of the water. The land masses at Wake have formed by one or both of two processes: accumulation of reef debris deposited on the lagoon side of the reef by large waves and the lowering of sea levels during periods of global cooling. The island's building process by large storm-generated waves is evidenced on the south side of Wake by the burial of pill boxes constructed during WWII under sand, gravel, and cobble-sized pieces of reef debris.

As a result of these building processes, atoll island soils are predominantly coarse-grained and almost exclusively composed of calcium carbonate. Therefore, they are of low fertility, and lack many of the nutrients required to support many plant species.

3.5.3 BROAD OCEAN AREA—GEOLOGY AND SOILS

Geology and soils are not applicable to the BOA.

3.6 HAZARDOUS MATERIAL AND WASTE

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 DOT, 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 U.S. Environmental Protection Agency (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.

3.6.1 U.S. ARMY KWAJALEIN ATOLL/RONALD REAGAN BALLISTIC MISSILE DEFENSE TEST SITE (USAKA/RTS)

3.6.1.1 Meck, Roi-Namur, Omelek, Gellinam and Illeginni—Hazardous Material and Waste

In general, hazardous substances (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.

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

Regulations governing hazardous material and hazardous waste management at USAKA/RTS are specified in UES Section 3-6. The UES classify all materials as general-use material, hazardous material and petroleum products, and prohibited materials.

Region of Influence

The region of influence for potential impacts related to hazardous materials and wastes would be all areas of the atoll where hazardous materials are stored, handled and disposed (Meck, Gellinam, and Omelek).

Affected Environment

Hazardous Materials Management

Hazardous materials at USAKA/RTS are used in a variety of operations, including facility infrastructure support, supply, transportation, power generation, medical, radar, and test. Hazardous materials include various cleaning solvents (chlorinated and non-chlorinated), paints, cleaning fluids, compressed gases, refrigerants, pesticides, motor fuels and other petroleum products, and other materials. These substances are shipped to USAKA/RTS by ship or by air. Upon arrival at USAKA/RTS, hazardous materials to be used are distributed, as needed, to various satellite supply facilities, from which they are distributed to the individual users. Distribution is coordinated through the base supply system; however, the issue of such materials requires prior authorization by the USAKA/RTS Environmental Office to prevent unapproved uses of hazardous materials.

An activity-specific Hazardous Materials Procedure must be submitted to the Commander, USAKA/RTS for approval within 15 days of receipt of any hazardous material or before use, whichever comes first. Hazardous materials to be used by organizations on the test range and its facilities are under the direct control of the user organization, which is responsible for ensuring that these materials are stored and used in accordance with UES requirements. The use of all hazardous materials is subject to ongoing inspection by USAKA/RTS environmental compliance and safety offices to ensure the safe use of all materials. The majority of these materials are consumed in operational processes.

Hazardous Waste Management

Hazardous waste treatment or disposal is not allowed at USAKA/RTS under the UES. Hazardous waste, whether generated by USAKA/RTS activities or range users, is collected at individual work sites in waste containers. These containers are labeled in accordance with the waste which they contain and are dated the day that the first waste is collected in the container. Containers are kept at the point of generation accumulation site until full or until a specified time limit is reached. Once full, 55-gallon containers are collected from the generation point within 72 hours and are prepared for transport to the USAKA/RTS Hazardous Waste 90-Day Storage Facility (Building 1521) located on Kwajalein. Each of the point of generation accumulation sites is designed to handle hazardous waste and provide the ability to contain any accidental spills of material, including spills of full containers, until appropriate cleanup can be completed. (U.S. Army Space and Missile Defense Command, 2006, 2011)

Hazardous waste may be accumulated and stored for up to 90 days, with possible extensions up to 120 days, before the waste must be shipped off USAKA/RTS. At the 90-Day Storage Facility any sampling of waste is performed (for waste from uncharacterized waste streams),

and waste is prepared for final off-island shipment for disposal. Hazardous wastes are shipped off-island for disposal in the continental United States (U.S. Army Space and Missile Defense Command, 2006, 2011). The barge departs Kwajalein approximately every 2 weeks.

In accordance with the UES, USAKA/RTS has prepared the Kwajalein Environmental Emergency Plan (KEEP) for responding to releases of oil, hazardous materials, pollutants, and contaminants to the environment. The KEEP is a contingency plan similar to a spill prevention, control, and countermeasure plan, but it incorporates response provisions of a National Contingency Plan. The hazardous materials management plan is incorporated into the KEEP. (U.S. Army Space and Missile Defense Command, 2011)

Pollution prevention, recycling, and waste minimization activities are performed in accordance with the UES and established contractor procedures in place at USAKA/RTS. The Installation Restoration Program is not applicable to USAKA/RTS, since it is located in a foreign country. Remedial action is performed as needed, in accordance with the UES. (U.S. Army Space and Missile Defense Command, 2011)

3.6.1.2 Kwajalein—Hazardous Material and Waste

The shipping, receipt, and handling of launch equipment and fuel associated with missile launching and supporting activities are normal operations for Kwajalein. No solid waste that contains specific concentrations of chemical constituents, toxicity, ignitability, corrosivity, or reactivity characteristics would be generated on Kwajalein as a result of the Proposed Action or its activities.

3.6.2 WAKE ISLAND—HAZARDOUS MATERIAL AND WASTE

Region of Influence

The region of influence is the area within the boundaries of the Wake Atoll (Wake, Wilkes, and Peale Islands).

Affected Environment

Hazardous Materials Management

Operations using hazardous materials at Wake are limited to aircraft flight and maintenance activities, base operations and infrastructure support activities, and infrequent missile launches. Jet fuel is the hazardous material used in the greatest quantity at Wake. Storage of up to 10 million gallons of jet fuel can be accommodated in fuel storage areas.

Jet fuel is transported to Wake via cargo ship and is transferred to the on-island storage system. It is distributed through two fuel systems to both aircraft refueling areas and to the power plant. No waste jet fuel is produced under normal conditions. The balance is consumed by aircraft flight operations and power production. In the event of a jet fuel spill, existing spill control contingency plans would be implemented to minimize the area of potential contamination and to expedite cleanup efforts.

In addition to jet fuel, small quantities of lubricants and motor fuel (gasoline) are stored in bulk for base operations and infrastructure support. These materials are delivered to Wake via ship

and are transferred to storage facilities. Distribution of these materials is accomplished for individual users as needed. Most of these materials are consumed in ongoing activities, and any spills are addressed under existing spill control prevention control and countermeasure plans.

Small quantities of other hazardous materials, including some solvents, paints, cleaning fluids, pesticides, chlorine and other materials, are also used for infrastructure support and aircraft maintenance activities. These materials arrive via ship or cargo aircraft. Remaining quantities of these materials, which are not consumed in operations, are collected as hazardous waste.

Small quantities of explosive materials, contained within ordnance and other equipment, are stored and handled at Wake.

Hazardous Waste Management

The USEPA identified Wake Island Airfield as a “large quantity generator” of hazardous waste in 1994. However, the installation could qualify for “small quantity generator” status based on actual amounts of hazardous wastes generated since 1994. (Missile Defense Agency, 2007)

There are several satellite accumulation points located around the installation where waste is temporarily stored. All hazardous waste is moved from the satellite accumulation sites to a main hazardous waste accumulation site to await transportation off-site via barge. All liquid wastes are stored on spill pallets. Types of wastes generated include small quantities of used solvents, paints, cleaning fluids, asbestos-containing materials (generated during building maintenance activities) and pesticides. Waste may be placed in DOT-E-9618-approved polyethylene overpack containers for added security until shipment for treatment or disposal. Hazardous waste shipments are normally consigned to the Wake supply barge for shipment to Hawaii. (Missile Defense Agency, 2007)

3.6.3 BROAD OCEAN AREA—HAZARDOUS MATERIAL AND WASTE

BOAs are typically considered to be relatively pristine with regard to hazardous materials and hazardous wastes. Hazardous materials are present on the ocean, however, as cargoes and as fuel, lubricants, and cleaning and maintenance materials for marine vessels and aircraft. Infrequently, large hazardous materials leaks and spills—especially of petroleum products—have fouled the marine environment and adversely affected marine life. No quantitative information is available on the overall types and quantities of hazardous materials present on the sea ranges at a given time, nor on their distribution among the various categories of vessels.

Region of Influence

The hazardous materials and wastes region of influence for the BOA includes the Navy’s sea ranges and immediately adjacent waters.

Affected Environment

Hazardous Materials and Hazardous Constituents

Missiles

The single largest hazardous constituent of missiles is solid propellant, but numerous hazardous constituents are used in igniters, explosive bolts, batteries, and warheads. Most of the missiles fired carry inert warheads that contain no hazardous constituents. Exterior surfaces may be coated, however, with anti-corrosion compounds containing chromium or cadmium.

Aerial Targets

Aerial targets are used for testing and training purposes. Most aerial targets contain jet fuels, oils, hydraulic fluid, batteries, and explosive cartridges as part of their operating systems. Fuel is shut off by an electronic signal, the engine stops, and the target begins to descend. A parachute is activated and the target descends to the ocean surface where range personnel retrieve it. Some targets are actually hit by missiles, however, and those targets fall into the Range unrecovered.

Hazardous Wastes

Environmental compliance policies and procedures applicable to shipboard operations afloat are defined in Office of the Chief of Naval Operations Instruction 5090.1C (2007). This document has a compliance orientation to ensure safe and efficient control, use, transport, and disposal of hazardous waste. Munitions containing or comprising hazardous materials expended during training exercises that are irretrievable from the ocean are not considered a hazardous waste in accordance with the Military Munitions Rule. Navy ships may not discharge overboard untreated used or excess hazardous materials generated onboard the ship within 200 nm of shore. Hazardous wastes generated afloat are stored in approved containers. The waste is offloaded for proper disposal within 5 working days of arrival at a Navy port.

3.7 HEALTH AND SAFETY

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.

3.7.1 U.S. ARMY KWAJALEIN ATOLL/RONALD REAGAN BALLISTIC MISSILE DEFENSE TEST SITE (USAKA/RTS)

3.7.1.1 Meck, Roi-Namur, Omelek, Kwajalein, Gellinam, and Illeginni—Health and Safety

Region of Influence

The region of influence for potential impacts to worker health and safety at USAKA/RTS includes the areas where the use of radar is proposed, where missile components would be stored and handled, and where launch and post-launch activities would occur. The worker population of concern for the Proposed Action includes all of USAKA/RTS, but would predominantly consist of the personnel directly involved with the Proposed Action and its activities.

Affected Environment

Regional Safety

The Kwajalein Hospital is the primary health care facility for USAKA/RTS. The approximate 16-bed hospital provides emergency treatment, surgical, obstetric, general medical and diagnostic services for the community and range personnel. There is also a separate dental clinic on Kwajalein. One medical technician staffs a dispensary located on Roi-Namur. The hospital, dispensary, and first aid station are contractor operated and staffed. Video consultations with Tripler Army Medical Center in Honolulu, Hawaii provide access to medical specialists for those patients requiring supplemental evaluation. Medical specialists such as optometrists schedule periodic visits to Kwajalein.

Range Safety

Missions on USAKA/RTS are conducted with the approval of the USAKA/RTS Commander. A specific procedure is established to ensure that such approval is granted only when the safety of all proposed tests has been adequately addressed.

Range safety is accomplished by compliance with USAKA/RTS regulations and the use of established procedures and safety precautions to prevent injury to people and minimize damage to property. Range safety applies to preparation, testing, and execution of programs on USAKA/RTS. Other range safety objectives are the successful completion of mission objectives.

All program operations must receive the approval of the Safety Office. This is accomplished by the user through presentation of the proposed program to the Safety Office. All safety analyses, Standard Operating Procedures, 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 safety requirements, as specified in the Safety Manual and supporting regulations, are followed. (U.S. Army Space and Strategic Defense Command, 1995)

Ground Safety

Ground safety is the protection of range personnel and the public from injury when conducting potentially hazardous operations and handling hazardous materials. Several of the islands are

affected by building construction, the storage and assembly of explosives and rocket propellants, and the operation of heavy equipment. Gellinam, Kwajalein, Meck, and Omelek are, or in the past have been, sites for assembling and launching missiles.

Explosives are used at USAKA/RTS for missile flight programs and for destruction of unexploded ordnance, fireworks, small arms rounds, and flares. Small amounts of explosives are used in missile launches for stage separation and flight termination systems, which destroy in-flight missiles that show abnormal flight characteristics. Explosives are stored on Kwajalein, Roi-Namur, and Meck.

Launch facilities consist of structures used for the assembly and launch of missiles that contain experimental payloads. The primary structures are missile and payload assembly buildings, launch control buildings, and launch pads. The site plans of launch facilities are reviewed and approved by the DoD Explosives Safety Board before construction begins. These structures are currently spaced according to ESQD criteria defined in Army Regulation 385-64, *U.S. Army Explosives Safety Program*, and other regulations. Launches on smaller islands may be done remotely, when building separation is insufficient to protect personnel. The number of personnel working at launch facilities is limited during missile assembly and other potentially hazardous operations.

The ground safety plans for programs at USAKA/RTS contain emergency procedures for response to potential accident scenarios. For example, the emergency procedures for a missile launch program include the response to misfire and hangfire conditions, an explosion or fire on the launch pad, and the impact of an errant missile flight. Fire protection is provided by fire suppression systems in most operations buildings, and by continuously staffed fire stations, on Kwajalein, Roi-Namur, and Meck islands. No fire station is located on Gellinam or Omelek (U.S. Army Kwajalein Atoll, Marshall Islands, 2004).

Flight Safety

Flight safety provides protection to USAKA/RTS personnel, inhabitants of the Marshall Islands, and ships and aircraft operating in areas potentially affected by these missions. Specific procedures are required for the preparation and execution of missions involving aircraft, missile launches, and reentry payloads. These procedures include regulations, directives, and flight safety plans for individual missions. The area affected by aircraft and missile operations varies according to the type of mission.

Flight safety activities include the preparation of a flight safety plan that includes evaluating risks to inhabitants and property near the flight, calculating trajectory and debris areas, and specifying range clearance and notification procedures.

Notification is made to inhabitants near the flight path, and international air and sea traffic in the caution area designated for specific missions. NOTMARs and NOTAMs are transmitted to appropriate authorities to clear caution areas of this traffic and to inform the public of impending missions. The warning messages contain information describing the time and area affected and safe alternate routes. RMI is informed in advance of launches and reentry payload missions.

In missions that involve the potential for reentry debris near inhabited islands, precautions are taken to protect personnel. In Mid-Atoll hazard areas, where an island has a 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 or sheltering non-mission-essential personnel. Sheltering is required for reentry vehicle missions impacting the Mid-Atoll Corridor in Kwajalein Atoll. The Mid-Atoll Corridor is declared a caution area when it contains a point of impact.

Instrumentation is used for range safety by tracking incoming reentry vehicles and terminating missile flights in order to prevent an impact on inhabited islands. The Kwajalein Range Safety System links the USAKA/RTS radar system to a range safety center on Kwajalein. A missile and payload can be tracked during the entire flight by the range safety center. Missiles launched from USAKA/RTS are equipped with flight termination systems that allow destruction of the missile if the flight deviates significantly from planned criteria or otherwise poses a threat to the public. For example, a flight would be terminated if the missile path intersects a protection circle, an artificial boundary around inhabited atolls and islands in the Marshall Islands.

3.7.2 WAKE ISLAND—HEALTH AND SAFETY

Region of Influence

The region of influence is the area within the boundaries of the Wake Atoll (Wake, Wilkes, and Peale Islands).

Affected Environment

Functioning as an Air Force installation, all operational activities at Wake Island Launch Center are subject to Air Force health and safety regulations. These governing regulations include AFMAN 91-201, Explosive Safety Standards. The primary existing hazards at Wake are associated with aircraft refueling and base infrastructure support. Typical hazards include the handling and use of hazardous materials, exposure to noise from aircraft operations, and physical safety associated with the use of heavy equipment and support operations. These hazards are managed and controlled through implementation of safety programs, procedures, and the use of safety equipment. (U.S. Army Space and Missile Defense Command, 1999)

Range Safety

The missile range extending from Wake toward USAKA/RTS is under the jurisdiction of RTS. USAKA/RTS controls all range operations, and all procedures are conducted in accordance with the USAKA Range Safety Manual (U.S. Army Space and Strategic Defense Command, 1993; Missile Defense Agency, 2004) and USAKA/RTS policies and procedures. In the event of a catastrophic event (e.g., natural disaster, hazardous materials spill, aircraft or missile mishap), Operations Plan 355-1, Wake Island Disaster Preparedness Plan, would be implemented.

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 prior to launches. This allows security forces to monitor traffic that passes through the Ground Hazard Areas. 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.

Ordnance Management and Safety

Ordnance safety includes procedures to prevent premature, unintentional, or unauthorized detonation of ordnance.

Wake still contains a substantial amount of buried ordnance from WWII. In the event that unexploded ordnance is accidentally discovered during operations on the island, work ceases, and explosive ordnance demolition crews from Army units stationed in Hawaii or USAKA/RTS dispose of the munitions.

Ordnance is delivered to Wake by aircraft to the on-base airfield or by barge, and then over land by truck transport. The barges carrying explosives are met by trained ordnance personnel and special vehicles for transit to and delivery its point of storage or use. All ordnance is transported in accordance with U.S. Department of Transportation regulations.

Wake has defined ESQD arcs. The arcs are generated by launch pads, ordnance storage area, ordnance handling pad, and the Missile Assembly/Test Buildings.

Broad Ocean Area Clearance

Range Safety officials manage operational safety for projectiles, targets, missiles, and other hazardous activities on Wake. Prior to a hazardous operation proceeding, the range is determined to be cleared using inputs from sensors, visual surveillance of the range, and radar data.

Transportation Safety

Wake transports ordnance by truck from the marine harbor to designated area. All ordnance is transported in accordance with U.S. Department of Transportation regulations.

3.7.3 BROAD OCEAN AREA—HEALTH AND SAFETY

Region of Influence

The BOA region of influence consists of all areas beneath the proposed flight track where there is the potential for impact of missile components during planned activities or abnormal flight termination and the BOA where the missile's first stage and missile debris would impact.

Affected Environment

The affected health and safety environment for the BOA is described below in terms of its principal attributes, namely range control procedures and verification of BOA clearance procedures.

Range Control is charged with surveillance, clearance, and real-time range safety. The Range Control Officer using USAKA/RTS assets is solely responsible for determining range status and setting “RED” (no firing) and “GREEN” (range is clear and support units are ready to begin the event) range firing conditions. USAKA/RTS uses RCC 321-02, *Common Risk Criteria for National Test Ranges*. RCC 321-02 sets requirements for minimally-acceptable risk criteria to occupational and non-occupational personnel, test facilities, and nonmilitary assets during range operations. Under RCC 321-02, individuals of the general public shall not be exposed to a probability of fatality greater than 1 in 10 million for any single mission and 1 in 1 million on an annual basis.

Flight Safety provides protection to USAKA/RTS personnel, inhabitants of RMI, and ships and aircraft operating in areas potentially affected by mission activities. Specific procedures, including regulations, directives, and flight safety plans, are required for the preparation and execution of missions involving aircraft, missile launches, and reentry payloads. USAKA/RTS controls all flight corridor operations as part of USAKA/RTS. All operations are thus conducted in accordance with safety procedures, which are consistent with those implemented for USAKA/RTS. There is no special use airspace over USAKA/RTS.

3.8 INFRASTRUCTURE

3.8.1 U.S. ARMY KWAJALEIN ATOLL/RONALD REAGAN BALLISTIC MISSILE DEFENSE TEST SITE (USAKA/RTS)

3.8.1.1 Meck—Infrastructure

Region of Influence

The region of influence for infrastructure includes the on-island utility system or structures, as well as any modes of transportation.

Affected Environment

Transportation (Air, Ground, and Marine)

Meck has about 1 mile of paved road, a concrete pier that accepts both personnel and cargo, and a runway that no longer accepts fixed-wing aircraft but is capable of accepting helicopter transportation. Meck is also serviced by regularly scheduled ferryboat and UH-1 helicopter runs. There is also an existing concrete landing ramp and a barge pier, which ensure access to the island by maritime craft or tactical sealift assets. This site is approved to support launch and generator operations. (U.S. Army Space and Missile Defense Command, 2002)

Utilities

Water

A new water treatment plant was put into operation during September 2001. The Meck water treatment plant is only operational during the normal 8 hours/day, 4 days/week work schedule. This plant is a package plant and maintains a capacity of 144,000 gallons per day. (U.S. Army Space and Missile Defense Command, 2002) The water produced at Meck meets the requirements of the UES.

Raw fresh water is gathered from a rainwater catchment area located on the former runway and from the roof of the Meck Control Building. The drinking water supply is sometimes supplemented, during times of low rainfall, with treated water barged from the Kwajalein Water Treatment Plant. Both rainwater and the barged water are sent from the catchment areas to raw water storage. Raw water storage consists of one 500,000-gallon tank and two 250,000-gallon tanks. (U.S. Army Kwajalein Atoll/Ronald Reagan Ballistic Missile Defense Test Site, 2005a)

Wastewater

Wastewater on Meck is collected and pumped to a septic system. Residual sludge is collected from the septic tank as needed and periodically sent to Kwajalein for composting. (U.S. Army Space and Missile Defense Command, 2002)

Solid Waste

The small amount of solid waste generated on Meck is collected and taken to the landfill/incinerator facility for processing. A debris pile occupies 0.2 acre on the southern tip of the island, adjacent to the shoreline. It is located approximately 150 feet from an inactive runway and approximately 700 feet from the helipad. In 2005, the Meck solid waste disposal operations managed less than 200 tons of solid waste a year. One thousand pounds per day of solid waste is composed primarily of office and light food service wastes. (U.S. Army Kwajalein Atoll/Ronald Reagan Ballistic Missile Defense Test Site, 2005) Source separation is practiced to facilitate processing. Combustibles are incinerated at the facility, and the inert materials are removed for disposal at an adjacent landfill. Metals are shipped to Honolulu, and glass, tires, and plant matter are sent to Kwajalein for recycling. (U.S. Army Space and Missile Defense Command, 2002)

Electricity

Power on Meck is provided by diesel generators. The power plant maintains five diesel generators with a total output of 2,750 kW. Standby diesel generators are maintained at numerous locations in case of a power shortage. (U.S. Army Kwajalein Atoll, 2006)

3.8.1.2 Roi-Namur—Infrastructure

Region of Influence

The region of influence for infrastructure includes the on-island utility system or structures, as well as any modes of transportation on Roi-Namur.

Affected Environment

Transportation

Air Transportation

Dyess Army Airfield on Roi-Namur serves fixed-wing aircraft and helicopters; paved landing pads accommodate helicopters serving Eniwetak.

Ground Transportation

There are approximately 8 miles of paved roads and 1 mile of unpaved road on Roi-Namur. Vehicles are located on the island. Personnel arriving for work from Kwajalein by air either walk, bike, or take one of the shuttle buses.

Marine Transportation

Roi-Namur has piers for loading and unloading personnel and materials. Periodic dredging is required to keep the approach channels and harbors deep enough for the boats.

Utilities

Water

Roi-Namur has a full range of utilities to support operations as well as their residential communities. There are two rainwater catchments and a system lens well with a total pumping capacity of 65,000 gallons per day available. Daily demand averaged 35,000 gallons per day during the period of January 1989 through December 1991. Raw water is stored in three tanks before treatment; treated water is stored in a single elevated tank linked to the distribution system.

Wastewater

The sewage system for Roi-Namur consists of an ocean outfall and septic tank/leach fields. The existing sewer outfall is located on the northwest side of Roi-Namur and extends approximately 915 feet from the shoreline in a northwesterly direction into the Pacific Ocean. The ocean outfall discharges about 43,000 gallons per day of raw wastewater.

Solid Waste

Food wastes that are collected on Roi-Namur are placed in trenches on its northeast portion. Other wet garbage and septage from the portable toilets are disposed of in trenches along the northeast side of Roi-Namur in an area of heavy vegetation. Refuse and other solid waste are taken to a scrap dump on Roi-Namur, where they are separated. Paper and wood wastes are burned daily in an open burn pile, while other segregated wastes are transported to Kwajalein for recycling or disposal.

3.8.1.3 Omelek—Infrastructure

Region of Influence

The region of influence for infrastructure includes the on-island utility system or structures, as well as any modes of transportation on Omelek.

Affected Environment

Transportation (Air, Ground, and Marine)

Omelek does not have any paved roads, and it does not house any motor vehicles. Roads on Omelek are predominately unformed tracks (U.S. Army Space and Missile Defense Command, 2004a). The Omelek harbor is periodically dredged and is therefore capable of accepting marine transport. There is a pier and marine ramp available at the harbor. (U.S. Army Kwajalein Atoll, Marshall Islands, 2004) The Omelek pier is built into the embayment that is formed by a natural projection of the island and a constructed breakwater. This dock is used by personnel and receives limited cargo delivery. The power boats ferry personnel and material to and from

Omelek. Omelek has a 10,000-square foot helipad, and is serviced by UH-1H helicopters. (U.S. Army Kwajalein Atoll, Marshall Islands, 2004; U.S. Army Space and Missile Defense Command, 2004a)

Utilities

Water

Omelek does not have an active, developed potable water system (U.S. Army Space and Strategic Defense Command, 1995). When needed, bottled or potable water for drinking, food preparation, hand-washing, and bathing is shipped from Kwajalein and stored on the island.

Wastewater

The existing site restrooms on Omelek were refurbished and are in use as intended. Wastewater is diverted to the existing site septic/leaches field system. Salt water from the island lens well pump provides flushing water.

Solid Waste

The minimal quantities of solid waste generated on Omelek are collected and transported to Kwajalein for disposal (U.S. Army Space and Strategic Defense Command, 1993). Additionally, construction solid waste is generated frequently as new facilities are built and as existing facilities are upgraded or demolished. Solid waste is managed in accordance with the UES (UES Sections 3-6.5.5 through 3-6.5.7) (U.S. Army Space and Missile Defense Command, 2004a).

Electricity

A network of communication lines and underground electrical lines were operational on Omelek and used by SpaceX Corporation. Power lines were routed from this facility to facilities around the island, primarily via existing underground conduits. The generator building is a small facility on the south end of the island that distributes island power.

3.8.1.4 Kwajalein—Infrastructure

Region of Influence

The region of influence for infrastructure includes the on-island utility system or structures, as well as any modes of transportation on Kwajalein.

Affected Environment

Transportation

Air Transportation

Local air service between islands is operated out of USAKA. Fixed wing services between Kwajalein and Roi Namur operate daily except Sunday. Helicopters are based on Kwajalein and serve the other USAKA/RTS islands. Long distance air service is provided from Kwajalein by Airline of the Marshall Islands, United Airlines, and Air Mobility Command. In addition, some Kwajalein test activities involve technical flights by modified commercial or military aircraft.

Ground Transportation

There are approximately 13 miles of paved roads and 6.5 miles of unpaved roads on Kwajalein. Bicycles are the principal means of transportation and travel on the same path used by pedestrians as well as on roads used by motor vehicles. The low level of motor traffic precludes the need for separate bike paths.

A fleet of shuttle buses and vans transports personnel to work and community service areas from residential areas. The buses serve routes on a regular daytime schedule, and the vans offer transportation by special arrangement, day or evening.

Marine Transportation

Marine transport facilities are concentrated at Kwajalein, which serves as a base for most of the fleet and hosts oceangoing ships and barges delivering cargo and fuel to USAKA/RTS.

Utilities

Water

Under normal conditions, Kwajalein's portable water system can provide an adequate supply of freshwater. Demand over the period January 1, 1989 through December 31, 1991 is more than met by available daily supply of 430,000 gallons from rainwater catchments and groundwater.

One of the fourteen 1-million gallon reinforced concrete tanks used to store raw water collected from the catchments and lens wells has been converted to store treated water from the package water treatment plant. Raw water is pumped from storage to treatment in the package water treatment plant. The treated water receives pH adjustment and chlorination before being stored in the covered concrete tank. A desalination facility with a capacity of 150,000 gallons per day makes use of waste heat from the power plant.

Wastewater

The wastewater system on Kwajalein consists of a force main and gravity collection system, nine pump stations, a secondary wastewater treatment plant, and an outfall extending into the lagoon. The wastewater treatment plant is approximately 31 years old.

Solid Waste

Twenty to thirty tons of waste per day are generated on Kwajalein. Wet wastes are collected and taken to the composting areas. Food wastes are placed in the west end of the composting area, and soil, palm fronds, and other yard wastes are placed in a layer over the food wastes. When the compost mulch is formed, it is used as a solid for landscaping purposes and in the nursery on Kwajalein.

Electricity

Kwajalein has three power plants (Power Plants 1A, 1B, and 2). Power Plant A became operational in 1991. Power Plant 1A produced the majority of Kwajalein's electrical requirements. Plant 1A has a capacity of 12,000 kW and plant 2 has a capacity of 4,290 kW.

3.8.1.5 Gellinam and Illeginni—Infrastructure

Region of Influence

The region of influence for infrastructure includes the on-island utility system or structures, as well as any modes of transportation on Gellinam or Illeginni.

Affected Environment

Transportation

Gellinam and Illeginni are unpopulated—there are no roads, and permanent vehicles are not stored on these locations.

Utilities

Gellinam and Illeginni do not have developed water systems. Personnel working on Gellinam and Illeginni bring their water supplies with them. Gellinam and Illeginni may have portable toilets on pit latrines. Any solid waste generated is transported to Kwajalein for disposal.

3.8.2 WAKE ISLAND—INFRASTRUCTURE

Region of Influence

The region of influence for infrastructure includes the on-island utility system or structures, as well as any modes of transportation on Wake.

Affected Environment

Transportation

Air Transportation

Wake Island's runway is approximately 9,850 feet long and 150 feet wide, and is central to the missile launch support missions. In addition, the airfield supports trans-Pacific military operations and western Pacific military contingency operations, in-flight emergency airfield service, and emergency sealift capability. All aircraft operations and servicing activities are directed from base operation, which is manned 24 hours per day. Aircraft ramps are available for processing passengers and cargo, and for refueling up to 36 aircraft types, including DC-8, C-5, C-130, and C-141 aircraft. Although there is only one flight scheduled every other week to transport passengers and cargo to Wake, approximately 800 aircraft per year use the Wake Island Airfield. Based on an August 2011 observation, the overall condition of the runway is good, with subsidence, raveling, and minor cracking over the entire length, and the parking apron is in good condition. Based on the August 2011 observation it is believed that the airfield has been refurbished within the last 10 years (between 2001 and 2011).

Ground Transportation

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

A combination of paved and coral roads serves the marina area. Paved access to Wilkes Island ends at the petroleum, oil, and lubricants tank farm, where a road constructed of crushed coral provides access to the western point of Wilkes Island. A portion of the road, near the unfinished WWII submarine channel, is flooded nearly every year by high seas. The launch sites are accessed from the main paved road on Wake Island by paved and coral roads. Generally, the road network is suitable for low-speed, light-duty use only.

Wake Island's paved roadway network has been adequately maintained to move materials, services, and personnel from the airfield on the southern end to the personnel support area on the northern end. Modes of transportation include walking, bicycles, light utility carts, standard automobiles, vans, trucks, and larger trucks and equipment.

Marine Transportation

Wake is supplied by sea-going barges and ships. The BOS contractor maintains three small landing barges used to transfer material from ships to the dockyard. The barges are required because the harbor is too small for sea-going vessels to enter. Off and on-load fueling facilities built in the mid-1970s by the Navy have never been operated due to a reported electrical fault. The older off-load hydrants for gasoline and JP-5 fuels are operational and are currently used.

Utilities

Water

Potable water is supplied by a reverse osmosis (RO) system. The catchment basins are not used for the RO system; however, a well is used to obtain water for the RO process.

Fire protection is provided by fire suppression systems in most operations buildings and by a continuously staffed fire station. Wake has a medical clinic staffed by a medical technician and one full-time physician. Security is provided as an alternate duty by BOS contractor personnel.

Wastewater

Along with lagoon water, brackish wells provide water for the sanitary sewer system. A series of wet-well lift stations is used to collect and move sewage to a treatment plant where solids are collected and disposed, and wastewater is discharged to the ocean off Peacock Point at the far southeast end of Wake. Although their full design capacity is not known, the sewer system and treatment plant served the 1960s' peak base population.

Solid Waste

Solid waste generated on Wake is disposed in the landfill/burning pit located on Peacock Point, or it is burned in the incinerator. No trash sorting is performed, with aluminum cans and glass burned with waste paper, foliage, leaves, and cardboard packing materials. The incinerator, an Advanced Combustion Systems Model CA-150 with a design capacity of 150 pounds per hour, actually burns approximately 60 pounds per hour and is operated 2 to 4 hours per day, disposing of about 240 pounds per day of primarily wet garbage from mess operations. Residue from the incinerator goes into the landfill.

Electricity

The current Power Plant is a new system brought online on 17 May 2008. This facility is located in the north quadrant of the island. This facility has the capability of producing 1,755 kilowatts (kW) (1.755 megawatts [MW]) of power. The Power Plant consists of three 585-kW capacity engines that also have the capability of producing 650 kW of power if connected to a 1,000-watt switch. The Installation is anticipating adding a fourth engine in the next 12 months, which will increase the capacity output by an additional 585 kW. There are three MEP-12 (Mobile Electric Power) backup engines with a capacity of 750 kW each. Five MEP-10 generators are also anticipated to be added to the inventory. A maximum peak load of 1,432 kW was recorded on 19 October 2010, at which time there were approximately 300 individuals (contractors and active duty) on island. An Installation Electrical Study was completed on 28 December 2010.

3.8.3 BROAD OCEAN AREA—INFRASTRUCTURE

Infrastructure is not applicable to the BOA.

3.9 LAND USE

3.9.1 U.S. ARMY KWAJALEIN ATOLL/RONALD REAGAN BALLISTIC MISSILE DEFENSE TEST SITE (USAKA/RTS)

3.9.1.1 Meck, Roi-Namur, Omelek, Kwajalein, Gellinam, and Illeginni—Land Use

This section describes current land-based uses.

Region of Influence

The region of influence for land use includes Meck, Roi-Namur, Omelek, Kwajalein, Gellinam, and Illeginni.

Affected Environment

USAKA/RTS is the site of major test facilities. It supports test and evaluation programs of major Army and DoD missile systems. The programs that USAKA/RTS supports include Army missile defense, MDA demonstration and validation, Air Force Intercontinental Ballistic Missile development and operational testing, U.S. Space Surveillance Network, and orbital debris.

3.9.2 WAKE ISLAND—LAND USE

Region of Influence

The region of influence for land use includes areas used for radar locations.

Affected Environment

Wake is the main island and contains the majority of the operations and facilities associated with the military. Housing and community facilities are located toward the north end of the island. The central portion of the island contains support facilities (e.g., water storage and reverse osmosis system, power plant). The airfield and missile launch facilities are situated on the southern part of the island.

3.9.3 BROAD OCEAN AREA—LAND USE

The typical definition of land use (e.g., regulated by management plans, polices, ordnance, and encroachment of one land use on another) does not apply to the BOA.

3.10 NOISE

3.10.1 U.S. ARMY KWAJALEIN ATOLL/RONALD REAGAN BALLISTIC MISSILE DEFENSE TEST SITE (USAKA/RTS)

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.

3.10.1.1 Meck—Noise

Under 29 CFR 1910.95, *Occupational Noise Exposure*, employers are required to monitor employees whose exposure to hazardous noise could equal or exceed an 8-hour time weighted average of 85 dBA.

Region of Influence

The region of influence for noise analysis is the area within the maximum sound level = 85-dB (decibel) contours generated by prior proof-of-principle launches and activities. As a conservative method, the region of influence for Meck is a circular area with a 7.5-mile radius, centered on the proposed launch site.

Affected Environment

The primary sources of man-made noises on Meck include helicopter operations and infrequent launching of meteorological rockets and satellites. Since Meck has been developed as a launch support facility and has no inhabitants occupied in unrelated activities, aside from personnel no noise-sensitive receptors have been identified.

3.10.1.2 Roi-Namur—Noise

Region of Influence

The region of influence for noise analysis is the area within the maximum sound level = 85-dB contours generated by man-made activities. As a conservative method, the region of influence for Roi-Namur is a circular area with a 7.5-mile radius, centered on the proposed launch site.

Affected Environment

Primary noise sources on Roi-Namur are aircraft, power plant, air conditioning units, and (potentially) missile launches.

3.10.1.3 Omelek—Noise

Under 29 CFR 1910.95, *Occupational Noise Exposure*, employers are required to monitor employees whose exposure to hazardous noise could equal or exceed an 8-hour time weighted average of 85 dBA.

Region of Influence

The region of influence for noise analysis is the area within the maximum sound level = 85-dB contours generated by proof-of-principle launches and activities. As a conservative method, the region of influence for Omelek is a circular area with a 7.5-mile radius, centered on the proposed launch site.

Affected Environment

The primary sources of man-made noises on Omelek include helicopter operations and infrequent launching of meteorological rockets and satellites. Since Omelek has been developed as a launch support facility and has no inhabitants occupied in unrelated activities, aside from personnel no noise-sensitive receptors have been identified. The nearest inhabited island to Omelek is Gugeegue, which is approximately 13 miles away and considered to be outside of the region of influence.

3.10.1.4 Kwajalein—Noise

Region of Influence

The region of influence for noise analysis is the area within the maximum sound level = 85-dB contours generated by proof-of-principle launches and activities. As a conservative method, the region of influence for Kwajalein is a circular area with a 7.5-mile radius, centered on the proposed launch site.

Affected Environment

Primary sources of noise on Kwajalein include aircraft, power plants, marine sandblasting and service, air conditioning units, and small diesel engine generators.

3.10.1.5 Gellinam—Noise

Under 29 CFR 1910.95, *Occupational Noise Exposure*, employers are required to monitor employees whose exposure to hazardous noise could equal or exceed an 8-hour time weighted average of 85 dBA.

Region of Influence

The region of influence for noise analysis is the area within the maximum sound level = 85-dB contours generated by prior proof-of-principle launches and activities. As a conservative method, the region of influence for Gellinam is a circular area with a 7.5-mile radius, centered on the proposed launch site.

Affected Environment

The primary sources of man-made noises on Gellinam include helicopter operations and infrequent launching of targets and interceptors. Since Gellinam has been developed as a launch support facility and has no inhabitants occupied in unrelated activities, aside from personnel no noise-sensitive receptors have been identified.

3.10.1.6 Illeginni—Noise

Region of Influence

The region of influence for noise analysis is the area within the maximum sound level = 85-dB contours generated by proof-of-principle launches and activities. As a conservative method, the region of influence for Omelek is a circular area with a 7.5-mile radius, centered on the proposed launch site.

Affected Environment

The primary man-made noise sources on Illeginni are the occasional reentry vehicle impacts and the machinery necessary to clean up the impact areas.

3.10.2 WAKE ISLAND—NOISE

Region of Influence

The region of influence is primarily those areas closest to the activities of the Proposed Action.

Affected Environment

Natural background sound levels on Wake are relatively high because of wind and surf. Background levels can mask the approach of trucks on base roads, and personnel are not always aware of aircraft landings. No measurements of ambient sound levels are known to be available.

Anthropogenic sources of noise at Wake are from airfield operations and base maintenance activities. The majority of non-military aircraft are unscheduled. The majority of military aircraft are C-141s and C-130s. During flight operations, the noisiest aircraft that typically operates at Wake, an Air Force C-5, is estimated to generate A-weighted sound pressure levels of approximately 84 dB at the base dispensary, 69 dB at base family housing, 74 dB at the base dormitories, 69 dB at the midpoint of Peale, and 95 dB at the midpoint of Wilkes. Hearing protection is required for personnel engaged in aircraft apron operations. Estimates of aircraft noise were developed using DoD Noise Exposure Model Version 6.1.

Missile launches are another noise source on Wake. Maximum A-weighted sound pressure level contours during flight vehicle launches for the TCMP vary from approximately 115 dB near Launch Pad #2, to less than 95 dB on the western ends of Peale and Wilkes. The 95-dB contour covers almost all of the Wake Island Launch Center (U.S. Army Space and Strategic Defense Command, 1994a). Launch vehicles generate impulse-type noise for a brief period during the launch and only a few launches occur per year. Personnel engaged in missile launch operations are inside reinforced concrete shelters and do not require hearing protection. Other island personnel are evacuated beyond the LHA, where they do not require hearing protection.

With the exception of diesel generators, other environmental noise sources do not exist on the island.

3.10.3 BROAD OCEAN AREA—NOISE

Wildlife receptors and their acoustic characteristic and sensitivities are described in Biological Resources.

Region of Influence

Noise sources in the region are transitory and widely dispersed. The region of influence for noise includes all areas where air operations or live weapons firings take place.

Affected Environment

Airborne noise sources include civilian and military aircraft (both types of which fly at altitudes ranging from hundreds of feet to tens of thousands of feet above the surface), bombs, gunfire, missiles, rockets, and small arms. Noise levels may be significant in the vicinity of these activities, but the noise intensity decreases rapidly with increasing distance from the source, especially for impulsive noise from the discrete noise events characteristic of military training. Additionally, these activities take place miles from land within the BOA, where few or no human receptors are exposed to the noise. BOA noise events are widely dispersed, temporally and geographically, with little or no overlap or additive effects.

3.11 SOCIOECONOMICS

3.11.1 U.S. ARMY KWAJALEIN ATOLL/RONALD REAGAN BALLISTIC MISSILE DEFENSE TEST SITE (USAKA/RTS) MECK, ROI-NAMUR, OMELEK, KWAJALEIN, GELLINAM AND ILLEGINNI—SOCIOECONOMICS

Region of Influence

The region of influence is defined primarily as the 11 USAKA/RTS defense sites as defined in Compact of Free Associated and its subsidiary agreement the Military Use and Operating Rights at Article III and Annex A, and secondarily as Ebeye and Ennubirr, where most of the Marshallese who work for USAKA/RTS reside.

Affected Environment

Meck, Omelek, Gellinam, and Illeginni are unpopulated. Kwajalein and Roi-Namur both contain residents and some socioeconomic attributes.

3.11.2 WAKE—SOCIOECONOMICS

Region of Influence

The region of influence for Wake is limited to the island itself. Since the island is an isolated military installation, actions taken have little effect on outside employment, population immigration, or local area expenditures.

Affected Environment

The military or contractor personnel who work at Wake, including Thai nationals brought the island, live in billets previous constructed on the island. These billets are military controlled. There are no schools, private homes, motels/hotels, or private retail business on the island. The economy on the island is dominated by the military installation. Government and contractor employment is the only contributor to the island economy.

3.11.3 BROAD OCEAN AREA—SOCIOECONOMICS

Region of Influence

The region of influence for the BOA would be all areas outside of 12 nautical miles from the land of a USAKA/RTS island.

Affected Environment

Socioeconomic attributes of the BOA would include commercial fishing and commercial shipping routes.

3.12 VISUAL AESTHETICS

3.12.1 U.S. ARMY KWAJALEIN ATOLL/RONALD REAGAN BALLISTIC MISSILE DEFENSE TEST SITE (USAKA/RTS)

3.12.1.1 Meck, Roi-Namur, Omelek, Kwajalein, Gellinam and Illeginni— Visual Aesthetics

Region of Influence

The region of influence includes the USAKA/RTS islands associated with the Proposed Action.

Affected Environment

The USAKA/RTS islands have a long history of human occupation and modification. A significant portion of the natural landscape of most of the USAKA/RTS islands has been altered or replaced by struts. On Meck, Roi-Namur, Kwajalein, and Illeginni man-made structures and features dominate. Resident views of the landscape are found on Kwajalein and Roi-Namur.

3.12.2 WAKE ISLAND—VISUAL AESTHETICS

Region of Influence

The region of influence includes the potential locations (radar site and land launched target rail/missile) on Wake that would support the Proposed Action.

Affected Environment

Since the Atoll is an isolated military installation, actions taken there have little effect to the views of government and contracted employees.

3.12.3 BROAD OCEAN AREA—VISUAL AESTHETICS

Region of Influence and the

The region of influence and the affected environment would include the area outside of 12 nm from land.

Affected Environment

The affected environment would include views from islands and ships in the region of influence.

3.13 WATER RESOURCES

3.13.1 U.S. ARMY KWAJALEIN ATOLL/RONALD REAGAN BALLISTIC MISSILE DEFENSE TEST SITE (USAKA/RTS)

3.13.1.1 Meck, Omelek, Gellinam and Illeginni—Water Resources

Water resources refer to surface water, groundwater, water quality, and flood hazard areas. The amount of fresh groundwater that may be available on Meck for potable water consumption has not been investigated. Potable water requirements are provided by a rainwater catchment area adjacent to the airfield runway. In the unlikely event of an accidental release of hazardous material at the storage area, emergency response personnel would comply with the KEEP.

3.13.1.2 Roi-Namur—Water Resources

Region of Influence

The region of influence for water resources includes groundwater and Pacific Ocean water resources on and offshore of Roi-Namur that may have the potential to be impacted by the Proposed Action.

Affected Environment

Roi-Namur's tropical marine climate is characterized by a high annual rainfall, approximately 100 inches per year. Groundwater provides a significant source of potable water on Roi-Namur, supplementing rainwater from catchments. No flood hazard areas and surface water areas have been identified within the region of influence. The coastal waters surrounding the affected islands have been classified under the UES as either A or B. No shoreline waters are classified as AA—water that shall remain in as nearly the natural pristine state as possible, with an absolute minimum of pollution from any source.

3.13.1.3 Kwajalein—Water Resources

Region of Influence

The region of influence includes the lagoon area on the western side of Kwajalein.

Affected Environment

Potable water sources on Kwajalein are supplied by both groundwater wells and captured rainwater in catchment areas located adjacent to the airfield's runway. Water capture during

periods of drought can be less than one-third of the daily demand. Groundwater occurs on Kwajalein as a lens of fresh to brackish water floating on deeper marine waters in the subsurface rock layers. Seasonal infiltration of rainwater recharges the aquifer. The fresh groundwater storage capacity has been estimated at about 279 million gallons, with fluctuations of greater than 20 percent in response to recharge or pumping. Raw water is stored in twelve 1-million gallon aboveground storage tanks. (U.S. Army Space and Missile Defense Command, 1995b) No flood hazard or surface water areas have been identified in the region of influence. However, generally coral atolls lack surface water bodies or defined drainage channels due to extreme high porosity and permeability of the soils and surface sediments. With the exception of man-made impervious surfaces, abundant amounts of rainwater rapidly infiltrate directly into the ground. The coastal waters surrounding the Kwajalein have been classified under the UES as either A or B. No shoreline waters are classified as AA.

3.13.2 WAKE ISLAND—WATER RESOURCES

Region of Influence

The region of influence for potable water resources includes the entire Wake Atoll where potable water would be obtained to supply program requirements.

Affected Environment

The average annual precipitation on Wake is 35 inches. Due to the relatively small area of the island and the high permeability of the soil, all precipitation rapidly runs from the land into the ocean and lagoon or filters into the soil. Other than the water collected in the catchment basins, there is virtually no fresh surface water on the island.

The island does contain some fresh groundwater. Rainwater that filters into the soil is less dense than the underlying saline or brackish groundwater and generally remains segregated. However, this resource is limited by the subdued topography and limited areal extent of the island. The amount of fresh groundwater that may be available for potable water consumption has not been investigated. Several deep wells are used to provide brackish groundwater to the desalination plant.

3.13.3 BROAD OCEAN AREA—WATER RESOURCES

Region of Influence

The BOA region of influence includes those areas below the potential flight corridors areas in the central North Pacific Ocean. The average depth of the BOA 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 are generally 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).

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4.0 Environmental Consequences

4.0 ENVIRONMENTAL CONSEQUENCES

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

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

4.1 AIR QUALITY

4.1.1 UNITED STATES ARMY KWAJALEIN ATOLL/REAGAN TEST SITE (USAKA/RTS)

4.1.1.1 Meck—Air Quality (AN/TPY-2 (TM), THAAD Launcher, AN/MPQ-65)

THAAD Interceptor System (Radar and Launcher)

The evaluation of potential air quality impacts from the Proposed Action includes the effects of air pollutant emissions from the operations of the AN/TPY-2 (TM) and missile/interceptor launch.

Radar

Potential issues related to the effect of the radar use on air quality would be from the operation of the four generators associated with the two PPU's. The PPU's, used to power the AN/TPY-2 (TM) system, are in a self-contained trailer in a noise-dampening shroud that contains two diesel engine-powered generators. As analyzed in the USAKA Final Supplemental EIS (U.S. Army Space and Strategic Defense Command, 1993a), modeling analysis determined that the maximum concentrations of pollutants were not expected to degrade air quality standards.

Launcher

Flight test activities on Meck have previously been analyzed in the USAKA Final Supplemental EIS (U.S. Army Space and Strategic Defense Command, 1993a) and the Theater Missile Defense ETR EIS (U.S. Army Space and Strategic Defense Command, 1994a), including the launching of interceptors (THAAD, Patriot). Modeling analysis determined that the maximum concentrations of pollutants were not expected to degrade air quality standards by more than the sum of 25 percent, compliant with the goal of maintaining the current ambient air quality at USAKA/RTS. Table 4-1 shows the amount of main constituents emitted from the THAAD Interceptor.

Table 4-1. Interceptor Emission Constituents

Constituent	Amounts	
	Kilograms	Pounds
Aluminum Oxide (Al ₂ O ₃)	<159	<350.0
Carbon Monoxide (CO)	<113	<250.0
Hydrogen Chloride (HCl)	<90.7	<200.0
Nitrogen (N ₂)	<45.3	<100.0
Water (H ₂ O)	<22.6	<50.00
Hydrogen (H ₂)	<22.6	<50.00
Carbon Dioxide (CO ₂)	<6.80	<15.00
Chlorine (Cl*)	<2.26	<5.00
Calcium Chloride (CaCl* (1))	<2.26	<5.01
Sodium Chloride (NaCl)	<2.26	<5.00
Aluminum Chloride (AlCl* (2))	<0.45	<1.00

Source: U.S. Army Space and Missile Defense Command, 2002a

Note: * = radicals, (#) = valence

AN/MPQ-65

Air quality on Meck could be impacted by the AN/MPQ-65. The radar requires the use of generators. As discussed in Section 4.1.1.1, the generator emissions associated with the operation of the radar (EPP and EPU) have been analyzed in previous NEPA documents. No substantial impact to air quality from generator use is expected. Refer to Section 4.1.1.1 for a more detailed discussion.

Global Warming

Greenhouse gas emissions are of concern as they contribute to global warming by trapping re-radiated energy in the atmosphere. The main GHG in the Earth's atmosphere are water vapor, CO₂, CH₄, N₂O, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and other fluorinated gases including nitrogen trifluoride and hydrofluorinated ethers. The 2010 draft NEPA guidance on consideration of the effects of climate change and greenhouse gas emission deems projected direct annual CO₂ equivalent GHG emissions from a proposed action of 25,000 metric tons or more as an indicator that a quantitative or qualitative assessment may be meaningful to decision makers and the public. However, the 25,000 metric tons figure is not a firm standard, and currently there are no standards to determine the significance of the cumulative impacts from these emissions. Based on the emission constituents listed on Tables 4-1 and 4-4, it is not anticipated that the emission activities associated with the execution of the Proposed Action would reach 25,000 metric tons or more.

Ozone Depletion

Burning diesel fuel is of concern because it can lead to emission of ozone-depleting substances such as hydrochloric acid, aluminum oxide, and nitrogen. Under the Clean Air Act, USEPA has set protective health-based standards for ozone in the air we breathe. USEPA, state, and cities have instituted a variety of multi-faceted programs to reduce ozone-depleting substances. USAKA ambient air quality standards are designed to ensure continued achievement of health-based standards for decreasing ozone-depleting substances in air. Due to the chemical reaction of propellants and diesel fuel burning, the Proposed Action would have an impact on ozone depletion; however, due to the implementation of the USAKA Ambient Air Quality

standards and air pollutant thresholds for major stationary sources, it is anticipated that there is no potential for significant impacts for ozone depletion associated with the execution of the Proposed Action.

Cumulative Impacts

The THAAD Pacific Flight Tests EA (U.S. Army Space and Missile Defense Command, 2002a) analyzed up to 50 THAAD missile launches over a period of 4 years, typically ranging from 1 to 14 per year from Meck. The USAKA Supplemental EIS (U.S. Army Space and Strategic Defense Command, 1993a) evaluated the impacts from multiple launches of missiles per year for several years, a maximum of 28 strategic missiles launched in a single year from Meck. These documents concluded that no substantial cumulative impacts to air quality were expected from the continued use of USAKA/RTS for missile launch programs. Launches as part of the MDA IFTs would not exceed these numbers. Most of the emissions sources on USAKA/RTS are not continuous in nature. The strong tradewinds prevent any localized emissions, including those from missile launches from accumulating. No significant cumulative impacts to air quality have been identified as a result of prior launch-related activities from USAKA/RTS. The activities of the Proposed Action would be performed at varying times and should have negligible cumulative impacts on the air quality of Meck.

Additionally, USAKA/RTS is governed by a Document of Environmental Protection (DEP) outlining requirements and limitation for air emission sources. Meck currently has two major stationary sources of air pollution (incinerator and gensets) for which the DEP outlines limitations on operations. MDA will operate within the parameters of the current Air DEP, with any modification of the current Air DEP and the USAKA/RTS ambient air quality standards listed in Chapter 3 of this EA.

4.1.1.2 Roi-Namur—Air Quality

The air quality on Roi-Namur could be impacted by the execution of the Proposed Action (e.g., AN/TPY-2 Radar, C2BMC, and MQM-107E target). The MEP 810 diesel generators would be used for the operation of the radar and would operate 10 hours per day for 60 days. A reserve generator would be deployed for use with the C2BMC to substitute in the absence of other power. Two operational and one reserve diesel generators would be used for the MQM-107E target. The generators supporting the MQM-107E target would operate 12 hours per day. A gasoline generator would also be used to support the MQM-107E target. Table 4-2 lists all generators that are scheduled to be deployed to Roi-Namur. The operation of these generators must not exceed the UES standards for air quality as listed on Table 3-1 of this EA. Based on the size, quantity and daily hours of operation for the generators, the DEP for activity associated with air emission should be modified to document the additional air emissions resulting from the Proposed Action. Any requirements and limitations stated in the DEP as a result of this modification shall require review by the appropriate agencies.

Table 4-2. Generators Scheduled to be Deployed to Roi-Namur

Type of Generator/ Fuel	Power Output/of Units	Equipment Supported	Daily Hours of Operation (Avg.)	Hourly Fuel Consumption
MEP 810/Diesel	840 kW/ 5 on line, 2 reserve	AN/TPY-2	10 hours per day for 60 days	60 gallons/hour
N/A	60 kW/ 3 on line 1 reserve (only need if other power not available)	C2BMC	N/A	N/A
Diesel	60 kW/3 each with 2 operational and 1 reserve	MQM-107E Target	12 hours/day	≈4.5 gallons/hour
Gasoline	2.8 kVA	MQM-107E Target	N/A	N/A

Global Warming

Greenhouse gas emissions are of concern as they contribute to global warming by trapping re-radiated energy in the atmosphere. The main GHG in the Earth's atmosphere are water vapor, CO₂, CH₄, N₂O, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and other fluorinated gases including nitrogen trifluoride and hydrofluorinated ethers. The 2010 draft NEPA guidance on consideration of the effects of climate change and greenhouse gas emission deems projected direct annual CO₂ equivalent GHG emissions from a proposed action of 25,000 metric tons or more as an indicator that a quantitative or qualitative assessment may be meaningful to decision makers and the public. However, the 25,000 metric tons figure is not a firm standard, and currently there are no standards to determine the significance of the cumulative impacts from these emissions. Based on the emission constituents listed in Tables 4-1 and 4-4, it is not anticipated that the emission activities associated with the execution of the Proposed Action would reach 25,000 metric tons or more.

Ozone Depletion

Burning diesel fuel is of concern because it can lead to emission of ozone-depleting substances such as hydrochloric acid, aluminum oxide, and nitrogen. Under the Clean Air Act, USEPA has set protective health-based standards for ozone in the air we breathe. USEPA, state, and cities have instituted a variety of multi-faceted programs to reduce ozone-depleting substances. USAKA ambient air quality standards are designed to ensure continued achievement of health-based standards for decreasing ozone-depleting substances in air. Due to the chemical reaction of propellants and diesel fuel burning, the Proposed Action would have an impact on ozone depletion; however, due to the implementation of the USAKA Ambient Air Quality standards and air pollutant thresholds for major stationary sources, it is anticipated that there is no potential for significant impacts for ozone depletion associated with the execution of the Proposed Action.

Cumulative Impacts

The operation of the AN/TPY-2 has been previously analyzed in the USAKA Temporary Extended Test Range EA. This analysis determined that even with the increase in power demand and the location on Roi-Namur, there would be no significant impact to the air quality of Roi-Namur. Air pollutants do not accumulate at any locations under consideration because winds effectively disperse them between launches. The use of the AN/TPY-2 must be in accordance to the UES standard; therefore, no cumulative impacts are expected.

4.1.1.3 Omelek—Air Quality

Air quality on Omelek could be impacted by the PAC-3 LS pollutant constituents and its associated generator (MEP 814A/Diesel/15 kW). As discussed in Section 4.1.1.5 the generator emissions associated with the operation of the LS and the potential impacts of the pollutant constituents have been analyzed in previous NEPA documents. No substantial impacts to air quality from the use of the generators or the pollutant constituents are expected on Omelek. Refer to Section 4.1.1.5 for a more detailed discussion.

4.1.1.4 Kwajalein—Air Quality

Activities from the Proposed Action are normal activities at Kwajalein and are not expected to impact air quality; therefore, this resource was not analyzed for Kwajalein.

4.1.1.5 Gellinam—Air Quality

Patriot (PAC-3) Interceptor System

The evaluation of potential air quality impacts from the Proposed Action includes the effects of air pollutant emissions from the operations of the PAC-3 System AN/MPQ-65 and missile/interceptor, which includes the generators for the LS, EPP, and the HEMTT EPU mounting truck as well as the launch operation lift-off of the missile/interceptor.

AN/MPQ-65

Potential issues related to the effect of the radar on air quality would be from the operation of the generators. Table 4-3 lists the types of generators associated with the radar. The generator emissions for each of radar components (EPP and EPU) have been analyzed in previous NEPA documents. The 1991 and 1997 analysis of the PAC-3 noted that it is anticipated that the generators for the EPP and EPU would be run intermittently for a few hours per test; and due to the trade winds that exist at USAKA/RTS, no substantial impact to air quality from generators use is expected. (U.S. Army Space and Strategic Defense Command, 1997)

Table 4-3. Types of Diesel Generators Used by the PAC-3 System

PAC-3 Component	Generator Support	Generator Type
Radar	Electric Power Plant (EPP)	Two 150-kW Generators
	Electrical Power Unit (EPU)	One 30-kW Generator
Missile	Launch Station (LS)	One 15-kW Generator

Sources: U.S. Army Space and Strategic Defense Command, 1997.

PAC-3 Launch Stations

Potential issues related to the effect of the use of the PAC-3 LS would be from the operation of the generator (see Table 4-1) and the actual lift-off of the missile. The potential impacts from the generator operations for the LS were analyzed in previous NEPA documents in conjunction with the generators supporting the AN/MPQ-65 (as discussed above). Launch operations constitute the largest source of uncontrolled emissions into the atmosphere. See Table 4-4 for a list of the constituents produced by the lift-off of an interceptor missile. Air quality modeling determined that due to the short burn time for the motor (5 seconds) and the small amount of

exhaust products, average pollutant concentrations would be well below the standards for the USEPA 8-hour threshold limit value for launch operations constituents. (U.S. Army Space and Strategic Defense Command, 1997) No substantial impacts to air quality from the launch of the Patriot interceptor missile are anticipated. Air pollutant constituents do not accumulate due to the trade winds at USAKA/RTS. The impacts on USAKA/RTS (including Gellinam and Omelek) from the use of the PAC-3 LS would not be significant.

Table 4-4. PAC-3 Interceptor Emission Constituents

Constituent	Amount	
	Pounds	Kilograms
Aluminum Oxide (Al ₂ O ₃)	89.7	40.7
Carbon Dioxide (CO ₂)	57.6	26.1
Carbon Monoxide (CO)	5.9	2.7
Hydrogen (H ₂)	5.9	2.7
Hydrogen Chloride (HCL)	51.8	23.5
Water (H ₂ O)	16.8	7.6
Nitrogen (N ₂)	21.9	9.9

Sources: U.S. Army Space and Strategic Defense Command, 1997

Global Warming

Greenhouse gas emissions are of concern as they contribute to global warming by trapping re-radiated energy in the atmosphere. The main GHG in the Earth's atmosphere are water vapor, CO₂, CH₄, N₂O, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and other fluorinated gases including nitrogen trifluoride and hydrofluorinated ethers. The 2010 draft NEPA guidance on consideration of the effects of climate change and greenhouse gas emission deems projected direct annual CO₂ equivalent GHG emissions from a proposed action of 25,000 metric tons or more as an indicator that a quantitative or qualitative assessment may be meaningful to decision makers and the public. However, the 25,000 metric tons figure is not a firm standard, and currently there are no standards to determine the significance of the cumulative impacts from these emissions. Based on the emission constituents listed in Tables 4-1 and 4-4, it is not anticipated that the emission activities associated with the execution of the Proposed Action would reach 25,000 metric tons or more.

Ozone Depletion

Burning diesel fuel is of concern because it can lead to emission of ozone-depleting substances such as hydrochloric acid, aluminum oxide, and nitrogen. Under the Clean Air Act, EPA has set protective health-based standards for ozone in the air we breathe. USEPA, state, and cities have instituted a variety of multi-faceted programs to reduce ozone-depleting substances. USAKA ambient air quality standards are designed to ensure continued achievement of health-based standards for decreasing ozone-depleting substances in air. Due to the chemical reaction of propellants and diesel fuel burning the Proposed Action would have an impact on ozone depletion; however, due to the implementation of the USAKA Ambient Air Quality standards and air pollutant thresholds for major stationary sources, it is anticipated that there is no potential for significant impacts for ozone depletion associated with the execution of the Proposed Action.

Cumulative Impacts

The operation of the Patriot Interceptor System has been previously analyzed in the EA for Patriot Missile System (1995) and the PAC-3 Life-cycle EA. No substantial impacts to air quality from the launch of the Patriot interceptor missile are anticipated. Air pollutant constituents do not accumulate due to the trade winds at USAKA/RTS. The impacts on Gellinam and Omelek from the use of the PAC-3 LS would not be significant.

4.1.1.6 Illeginni—Air Quality

Activities from land launches and the HF Radar are normal activities at Illeginni and are not expected to impact air quality; therefore, this resource was not analyzed for Illeginni.

4.1.2 WAKE ISLAND—AIR QUALITY

Although the Proposed Action would allow various pollutants to be released into the atmosphere, the levels are not expected to violate any federal ambient air quality standards (AAQS) that may apply to Wake. Activities from the Proposed Action are normal activities at Wake and are not expected to impact air quality. No ambient air quality monitoring data is known to be available for Wake; however, it is believed that there are no air pollution problems at Wake due to the strong trade winds quickly dispersing any local emissions. Additionally, there are no other islands within several hundred miles of Wake Atoll that could be affected by pollutants generated on Wake. Based on this information, air quality on Wake would not be affected.

4.1.3 BROAD OCEAN AREA—AIR QUALITY

Flights (interceptors or targets) occur within a large open area of the ocean. Missile intercepts in this area would result in only temporary, minor, and localized emissions. There is no indication of emissions from the Proposed Action affecting the air quality in the BOA area.

Cumulative Impacts

No cumulative impacts are anticipated that could significantly affect air quality in the global upper atmosphere of the BOA.

4.2 AIRSPACE

4.2.1 UNITED STATES ARMY KWAJALEIN ATOLL/REAGAN TEST SITE (USAKA/RTS)

A general description of the potential for impacts to airspace is provided in Section 4.2.1.1, since Meck is the first location discussed. Impacts at other USAKA/RTS locations would be similar.

4.2.1.1 Meck—Airspace

Site Preparation Activities

Although site preparation activities could involve flights in and out of Bucholz Army Airfield on Kwajalein, the IFT activities would not restrict access to, nor affect the use of, existing airfields and airports in the region of influence. Operations at the airfield would continue unhindered. Similarly, the existing airfield or airport arrival and departure traffic flows would not be affected. 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 Test Activities

The RTS is located under international airspace and, therefore, has no formal airspace restrictions governing it. NOTAMs would be issued to advise avoidance of the Patriot tracking radar areas during IFT activities. Before launching a THAAD missile from Meck, NOTAMs would be sent to notify commercial and private aircraft in advance of launch activities by RTS as part of their routine operations. NOTAMs would also advise avoidance of the tracking radar areas during the proposed IFT activities, particularly in the vicinity of Kwajalein or Roi-Namur when the AN/TPY-2 (TM) is transmitting.

Safety regulations dictate that launch operations would be suspended when it is known or suspected that any unauthorized aircraft have entered any part of the surface danger zone until the unauthorized entrant has been removed or a thorough check of the suspected area has been performed.

Meck is approximately 20 miles north of Bucholz Army Airfield. Thus, its interceptor missile launch sites, LHAs, and the water impact and debris containment areas for intercepts, both inside the Mid-atoll Corridor and the BOA east of Kwajalein Atoll, would be well north of Bucholz Army Airfield and its standard instrument approach and departure procedures.

Post Flight Test Activities

Flights required as part of the post flight test activities would not restrict access to, nor affect the use of, existing airfields in the region of influence. Operations at the airfields would continue unhindered. 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 under the Proposed Action, and no impact.

Cumulative Impacts

Missile launches are short-term, discrete events and are actively managed by USAKA/RTS range safety. The Proposed Action is not scheduled to occur at the same time as other regional programs. The THAAD Pacific Flight Tests EA (U.S. Army Space and Missile Defense Command, 2002a) analyzed up to 50 THAAD missile launches over a period of 4 years, typically ranging from 1 to 14 per year from Meck. The USAKA Supplemental EIS (U.S. Army Space and Strategic Defense Command, 1993a) evaluated the impacts from multiple launches of missiles per year for several years, a maximum of 28 strategic missiles launched in a single year from Meck. These numbers of launches were not anticipated to result in cumulative

impacts to regional airspace. THAAD flight tests as part of the MDA IFTs would not exceed these numbers. 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.

4.2.1.2 Roi-Namur, Kwajalein, and Illeginni—Airspace

Site Preparation Activities

Roi-Namur would mainly be used for the placement and use of the AN/TPY-2 (FBM) radar and communications equipment and the HF Radar. Radar operation is a common use of the island that has a minimal impact to airspace. The island could also potentially be used to launch remotely-piloted target aircraft. Kwajalein would mainly be used for staging and storage of equipment necessary for MDA's IFT launch program, which is a common use of the island. Kwajalein and Illeginni could also potentially be used as a location for the HF Radar and to launch remotely-piloted target aircraft.

Although site preparation activities could involve flights in and out of Bucholz Army Airfield on Kwajalein, the IFT activities would not restrict access to, nor affect the use of, existing airfields and airports in the region of influence.

Flight Test Activities

Up to four MQM-107E targets may be used to support each integrated flight test. The RTS is located under international airspace and, therefore, has no formal airspace restrictions governing it. NOTAMs would be issued to advise avoidance of the HF Radar areas during IFT activities. Before launching an MQM-107E missile from Roi-Namur, Kwajalein, or Illeginni, NOTAMs would be sent to notify commercial and private aircraft in advance of launch activities by RTS as part of their routine operations.

Post Flight Activities

As discussed in Section 4.2.1.1, flights required as part of the post flight test activities would not restrict access to, nor affect the use of, existing airfields in the region of influence.

Cumulative Impacts

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. Impacts to regional airspace would be similar to those discussed above in Section 4.2.1.1.

4.2.1.3 Omelek—Airspace

Site Preparation Activities

Although site preparation activities (i.e., equipment delivery) could involve flights in and out of Bucholz Army Airfield on Kwajalein, they would not restrict access to, nor affect the use of, existing airfields and airports in the region of influence. Operation at the airfield would continue

unobstructed. Similarly, the existing airfield or airport arrival and departure traffic flows would not be affected. No modification to or new requirements for special use airspace would be required. No changes to existing air routes or additional restricted access to regional airfields and airports are anticipated. 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 effect.

Flight Test Activities

Omelek is located under international airspace and, therefore, has no formal airspace restrictions governing it. Commercial and private aircraft would be notified in advance of MDA launch activities by USAKA/RTS as part of their routine operations through NOTAMs by the FAA.

To satisfy airspace safety requirements in accordance with existing regulations as described in Section 4.2.1.1, NOTAMs would be issued to advise avoidance of the tracking radar areas during proposed IFT activities, particularly in the vicinity of Kwajalein or Roi-Namur when their radars are transmitting.

Omelek is approximately 22 miles north of Bucholz AAF; thus its Patriot launch BOA impact and debris containment areas for intercepts would be well north of Bucholz Army Airfield on Kwajalein. MDA would coordinate launches with the USAKA/RTS Commander, which would include scheduling to avoid the potential for airspace conflicts. NOTAMs would be sent to notify commercial and private aircraft in advance of launch activities by RTS as part of their routine operations. No new special use airspace would be required.

Omelek is approximately 22 miles north of Bucholz Army Airfield; thus, its Patriot launch BOA impact and debris containment areas for intercepts would be well north of Bucholz Army Airfield on Kwajalein. MDA would coordinate launches with the USAKA/RTS Commander, which would include scheduling to avoid the potential for airspace conflicts.

Post-Flight Activities

Flights required as part of the post flight activities would not restrict access to, nor affect the use of, existing airfields in the region of influence. Operations at the 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.

Cumulative Impacts

Cumulative impacts that could occur as a result of the Proposed Action are discussed in Section 4.2.1.1.

4.2.1.4 Gellinam—Airspace

As discussed in the 1997 PAC-3 Life-cycle EA (U.S. Army Space and Strategic Defense Command, 1997), the USAKA/RTS is located under international airspace, and therefore has no formal airspace restrictions governing it. Before launches from USAKA/RTS, NOTAMs would

be sent in accordance with applicable directives. The responsible Commander would obtain approval from the Administrator, FAA, through appropriate channels. Operation of the missile acquisition radars could potentially interfere with airborne weather radar systems and other electrical devices. The NOTAMs would advise avoidance of the tracking radar areas during PAC-3 flight testing. The use of the required scheduling and coordination process for international airspace, adherence to applicable DoD and MDA regulations concerning issuance of NOTAMs, and selection of missile firing areas and trajectories obviate the potential for substantial, additive cumulative impacts.

Site Preparation Activities

Although site preparation activities could involve flights in and out of Bucholz Army Airfield on Kwajalein, the Proposed Action would not restrict access to, nor affect the use of, existing airfields and airports in the region of influence. Operations at the airfield would continue unhindered. Similarly, the existing airfield or airport arrival and departure traffic flows would not be affected. 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 under the Alternative Action, and no impact.

Flight Test Activities

USAKA/RTS is located under international airspace and, therefore, has no formal airspace restrictions governing it. The missile launches represent precisely the kinds 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. Before launching a PAC-3 missile from Gellinam, NOTAMs would be sent to notify commercial and private aircraft in advance of launch activities from Gellinam. Commercial and private aircraft would be notified in advance of launch activities by USAKA/RTS as part of their routine operations through NOTAMs by the FAA.

Also, safety regulations dictate that launch operations would be suspended when it is known or suspected that any unauthorized aircraft have entered any part of the surface danger zone until the unauthorized entrant has been removed or a thorough check of the suspected area has been performed. NOTAMs would be issued to advise avoidance of the tracking radar areas during the test. Gellinam is approximately 27.5 miles north of Bucholz Army Airfield. Thus, its interceptor missile launch sites, LHAs, and the water impact and debris containment areas for intercepts, both inside the Mid-atoll Corridor and the BOA east of Kwajalein Atoll, would be well north of Bucholz Army Airfield and its standard instrument approach and departure procedures.

Post Flight Activities

Flights required as part of the post flight test activities would not restrict access to, nor affect the use of, existing airfields in the region of influence. Operations at the airfields would continue unhindered. 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 under the Alternative Action, and no impact.

Cumulative Impacts

All missile launches, missile intercepts, and debris impacts would take place in international airspace. The USAKA Supplemental EIS (U.S. Army Space and Strategic Defense Command, 1993b) evaluated the impacts from multiple launches of missiles per year for several years, up to a maximum of 28. MDA IFT flight tests when combined with other regional activities are not expected to exceed this number. There is no airspace segregation method such as a warning or restricted area to ensure that the area would be cleared of nonparticipating aircraft. However, missile launches are short-term, discrete events. The use of the required scheduling and coordination process for international airspace, and adherence to applicable DoD directives and Army regulations concerning issuance of NOTAMs and selection of missile firing areas and trajectories, obviates the potential for significant incremental, additive, cumulative impacts.

4.2.2 WAKE ISLAND—AIRSPACE

Prior permission is required to land on Wake Island, and the airspace is controlled by the FAA Air Traffic Control Center at Oakland, so aircraft without the knowledge and permission of an aircraft control authority are not permitted to fly within controlled airspace. Since the number of aircraft (one jet route) flying over or near to the island is small and only a small number of IFTs are anticipated, no major impacts are expected to airspace use. Aircraft within the region of radar operating on Wake would be subject to a NOTAM to advise avoidance of the radar during testing. The Proposed Action would not impact airspace management or air traffic control. No cumulative impacts are expected.

4.2.3 BROAD OCEAN AREA—AIRSPACE

Typically, a missile would be at very high altitude passing through FL 600 (approximately 60,000 feet) in just a matter of minutes after launch, and thus well above the airspace subject to the rules and regulations of the ICAO Convention. However, the designation and activation of booster drop areas in the launch corridor could have airspace use impacts.

The airspace outside territorial limits lies in international airspace and, consequently, is not part of the National Airspace System. Because the area is in international airspace, the procedures of ICAO, outlined in ICAO Document 444, *Rules of the Air and Air Traffic Services*, are followed. The FAA acts as the U.S. agent for aeronautical information to the ICAO, and air traffic in the over-water region of influence is managed by the Honolulu Control Facility and Oakland ARTCC.

After launch, typically the target missiles would be above FL 600 within minutes of the rocket motor firing. As such, all other local flight activities would occur at sufficient distance and altitude so that the target missile and interceptor missiles would be little noticed. However, activation of the proposed stationary Altitude Reservation procedures, where the FAA provides separation between non-participating aircraft and the missile flight test activities in the Temporary Operating Area, would impact the controlled airspace available for use by non-participating aircraft for the duration of the Altitude Reservation—usually for a matter of a few hours, with backup days reserved for the same hours. Because the airspace above the impact areas is not heavily used by commercial aircraft, and is far removed from the en route airways and jet routes crossing the North Pacific, the impacts to controlled/uncontrolled airspace would be minimal.

For sea-launch target launches, it may be necessary to establish a 2-nautical-mile radius temporary Warning Area, extending from the surface up to 60,000 feet mean sea level above the mobile launch platform. Such a restricted area would marginally reduce the amount of navigable airspace in the BOA, but because the airspace is not heavily used by commercial aircraft, and is far removed from the en route airways and jet routes crossing the North Pacific, the impacts to controlled and uncontrolled airspace would be minimal. Missile intercepts and intercept debris would generally occur outside special use airspace areas.

Cumulative Impacts

All missile launches, missile intercepts, and debris impacts would take place in international airspace. There is no airspace segregation method such as a warning or restricted area to ensure that the area would be cleared of nonparticipating aircraft. However, missile launches are short-term, discrete events. The use of the required scheduling and coordination process for international airspace, and adherence to applicable DoD directives and Army regulations concerning issuance of NOTAMs and selection of missile firing areas and trajectories, obviates the potential for significant incremental, additive, cumulative impacts.

4.3 BIOLOGICAL RESOURCES

4.3.1 UNITED STATES ARMY KWAJALEIN ATOLL/REAGAN TEST SITE (USAKA/RTS)

Potential impacts of construction, building modification, and missile launches on terrestrial and marine biological resources within the RTS ROI have been addressed in detail in the USAKA EIS, USAKA Supplemental EIS, Theater Missile Defense Extended Test Range EIS, and the USAKA Temporary Extended Test Range EA.

Impacts are considered substantial if they have the potential to jeopardize the existence of federally listed threatened or endangered species, degradation of biologically important unique habitats, substantial long-term loss of vegetation, or reduction in capacity of a habitat to support wildlife. Impacts that could result from site preparation activities include vegetation disturbance and removal and disturbance to wildlife from the accompanying noise and presence of personnel. Impacts could also result from launch-related activities such as noise, air emissions, debris impacts, and the use of radar equipment. Based on the prior analyses done and the effects of past target and interceptor launch activities, the potential impacts of activities related to IFT activities on biological resources are expected to be minimal, as discussed below.

Immediately prior to their shipment to USAKA/RTS, prefabricated buildings and all other materials would be inspected by a certified pest control inspector and, if necessary, treated for the removal of pests (e.g., rats, mice, and ants) and other non-native organisms to prevent their potential spread and introduction to other USAKA/RTS islands.

Prior to their arrival on any of the USAKA islands under consideration, personnel would be briefed on the need to respect and protect sensitive island resources, including remaining native vegetation, and to avoid harassment of sensitive species. Personnel would be instructed to stay on existing roads and paths where possible.

4.3.1.1 Meck—Biological Resources

Site Preparation Activities

Vegetation

Meck has been extensively altered by human activity, and little native vegetation remains to serve as wildlife habitat. Several small areas suitable for seabird nesting and roosting are present on the island; however, proposed construction would be performed on the inactive runway. Fiber-optic cables would be laid on the ground or along existing road rights of way. If fiber-optic cables require additional protection from vehicle and foot traffic, they would be placed in cable raceways. No trenching of fiber optic or other cables is anticipated. These activities should result in no or negligible impacts to the island's vegetation.

If MDA chooses to locate the AN/MPQ-65 and ICC equipment on Meck, temporary living facilities would be sited on previously disturbed land to provide billeting space, and portable sanitary facilities would be provided for personnel during the test period. The existing dining facility would be used to provide all meals during the test period. There would be no or negligible impacts to the island's vegetation from these actions.

Wildlife

As mentioned above, little native vegetation remains on Meck to serve as wildlife habitat. Site preparation noise and the presence of personnel could impact wildlife within the area. Construction ground disturbance and equipment noise-related impacts could include loss of habitat, displacement of wildlife, and short-term disruption of daily/seasonal behavior. At 50 feet from construction equipment, noise levels typically range from 70 to 98 dBA. The combination of increased noise levels and human activity would likely displace some birds that forage, feed, or nest within and adjacent to the construction site. Foraging water birds would be subjected to increased energy demands if flushed by the construction noise, but this should be a short-term, minimal impact. Disturbance to wildlife from noise and the temporary increase in personnel would be brief and is not expected to have a lasting impact nor a measurable negative effect on migratory bird populations.

UES Protected Species

No threatened or endangered vegetation has been identified in the project areas. Personnel would be instructed to avoid areas designated as avian nesting or roosting habitat and to avoid all contact with any nest that may be encountered. Sea turtles or turtle nests would also be avoided. No impacts to marine mammals are expected as a result of proposed site preparation activities.

Flight Test Activities

Vegetation

Any vegetation near the selected launch site 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. Minimal impacts to vegetation would occur as a result of launch activities on Meck, since the THAAD launcher would be located on a previously disturbed area on the northwest section of Meck. The potential for spills during refueling of the PPU or leaks from the closed CEU system

would be offset by in-place, impermeable ground cover, and/or spill-containment berms. There should be no impacts to area vegetation.

Wildlife

According to the 2002 THAAD Pacific Test Flights EA (U.S. Army Space and Missile Defense Command, 2002), results of monitoring conducted following a Strategic Target System launch at PMRF indicated little effect upon wildlife due to the low-level, short-term hydrogen chloride emissions. The program included marine surveys of representative birds and mammals for both prelaunch and post launch conditions. Studies on representative birds and mammals reviewed in the Final EIS for the Strategic Target System (U.S. Army Strategic Defense Command, 1992) also indicated that low-level, short-term exposure to hydrogen chloride would not adversely affect threatened or endangered species or other wildlife. Birds flying through an exhaust plume may be exposed to concentrations of hydrogen chloride that could irritate eye and respiratory membranes (Federal Aviation Administration, 1996). However, birds are unlikely to come in contact with the exhaust plume, because of their flight away from the initial launch noise. Deposition of aluminum oxide from missile exhaust onto skin, fur, or feathers of animals will not cause injury because it is inert and not absorbed into the skin. The U.S. Environmental Protection Agency has determined that non-fibrous aluminum oxide found in solid rocket motor exhaust is nontoxic (U.S. Air Force, Air Combat Command, 1997). The prevailing trade winds on Meck carry ground level concentrations of emissions away from the area (U.S. Army Space and Strategic Defense Command, 1993b). Aluminum oxide and hydrogen chloride do not bioaccumulate; therefore, no indirect effects to the food chain are anticipated.

The THAAD launcher would be located on pavement, and the resulting blast area would not be near the black-naped tern nesting colony. 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) Informal observation at several launch facilities indicates the increased presence of personnel immediately before a launch tends 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. Therefore, no direct physical auditory changes are anticipated. The brief noise peaks that would be produced by the launches are comparable to levels produced by close-range thunder (120 dB to 140 dB peak). Wildlife is known to exhibit a startle effect when exposed to short-term noise impacts, such as the launch of a missile. Birds usually show signs of disturbance, such as the fluttering of wings, when the noise occurs, but quickly return to normal behavior after the event. (U.S. Army Space and Missile Defense Command, 2002a)

An early flight termination or mishap could result in debris impact along the flight corridor, which may temporarily impact fishing activities in the immediate area. Due to the small amount of propellant involved and the small number of launches, the project is not anticipated to adversely affect marine resources. The potential ingestion of toxins by fish species, which may be used for food sources, would be remote because of the diluting effect of the ocean water and the relatively small area that would be affected. The primary flight test activity that may affect wildlife within the flight test corridor is the actual intercept of the target missile. Debris impact areas for both the interceptor and target vehicles would be located in the BOA.

Any intercept debris greater than 11 foot-pounds of energy from mishaps landing in the Kwajalein Lagoon at depths of up to approximately 164 feet of water would be recovered. The

debris is not expected to contain hazardous materials. The great volume of water in the Kwajalein Lagoon would dilute any contaminant that could leach out of the intercept debris to acceptable levels.

Operation of the AN/TPY-2 (TM) and AN/MPQ-65s would be conducted in accordance with USAKA/RTS regulations. In terms of the potential for EMR impacts to wildlife, the power densities emitted from the THAAD or Patriot radars are unlikely to cause any biological effects in animals or birds. The radar is not expected to radiate lower than 5 degrees, which would preclude EMR impacts to terrestrial species on the ground from operation of the THAAD radar during flight tests. The potential for main-beam (airborne) exposure thermal effects to birds exists. Unfortunately, while much information exists on the effects of microwaves on laboratory animals (mostly rats, mice, and similar species), relatively few studies have been conducted on birds. Likewise, while there is specific information on calculating whole-body-averaged specific absorption rates at different frequencies for various polarizations for many mammalian species over a wide range, there is little or no specific information for birds. Mitigating these concerns is the fact that radar beams are relatively narrow. (Missile Defense Agency, 2005; U.S. Army Space and Missile Defense Command, 2002a)

To remain in the beam for any period requires that the bird flies directly along the beam axis, or that a hovering bird such as a raptor does so for a significant time. There is presently insufficient information to make a quantitative estimate of the joint probability of such an occurrence (beam stationary/bird flying directly on-axis or hovering for several minutes), but it is estimated to be insubstantial. The extent of exposure of migrating birds and resident populations to radar beams depends both on the behavior of the birds and the motion and output of the radar. For moving radar beams, as during surveillance testing and operations, the maximum duration of an EMR pulse is in one direction, and thus the maximum likely exposure duration for a given bird encountering a beam, would be on the order of milliseconds. Thus, although the potential for adverse effects on birds exists, the probability that it would occur with any frequency is judged to be low. (Missile Defense Agency, 2005; U.S. Army Space and Missile Defense Command, 2002a)

Analysis indicates that only the X-band mobile radars such as the THAAD radar may present a small risk in spring and fall to some migrating birds during periods of inclement weather, when birds migrate at lower altitudes than usual, as well as to resident bird populations. Therefore, there is likely to be no or a very small risk to migrating birds from flying over areas where mobile X-band radars are operating. The analysis further shows that, under both tracking and surveillance modes that there is very low probability of an impact on migrating birds and on resident bird populations. (Missile Defense Agency, 2005)

UES-Protected Species

RF radiation does not penetrate the surface of water to any great degree. The power density level just below the surface of the ocean would not exceed the permissible exposure level for uncontrolled environments. (U.S. Department of the Navy, 2002a) No adverse impacts would occur to whales, other marine mammals, or sea turtles at least 0.5 inch below the surface. It is also highly unlikely that an individual would be on or substantially above the surface of the water for a significant amount of time within the main beam or side lobe areas during the particular time that the AN/TPY-2 (TM) or AN/MPQ-65 would be operating. No impacts to marine mammals would be expected as a result of proposed radar operation. For these reasons, no effects are anticipated on marine mammals, or on sea turtles. Therefore, no further action

regarding whales is required pursuant to the Endangered Species Act and the Marine Mammal Protection Act.

An early flight termination or mishap could result in debris impact along the flight corridor, which may adversely impact coral species in the immediate area. However, this is not a planned event, and applicable agencies would be contacted by USAKA/RTS if coral is harmed to discuss any necessary follow-up actions. Due to the small amount of propellant involved and the small number of launches, the project is not anticipated to adversely affect marine resources. The primary flight test activity that may affect wildlife within the flight test corridor is the actual intercept of the target missile. Nominal debris impact areas for both the interceptor and target vehicles would be located over the Mid-atoll Corridor of the Kwajalein Lagoon or the BOA.

UES-protected marine species such as larger whales are generally widely scattered, and the probability of debris striking one of these protected species is considered remote. Debris impact and booster drops in the BOA are thus not expected to adversely affect marine mammal species protected by the Marine Mammal Protection Act of 1972. The probability is rather low that migratory whales or sea turtles would be within the area to be impacted by falling debris and boosters.

Post Flight Activities

Post flight activities would include the removal of all mobile equipment/assets brought to the installation and collection of any trash or litter deposited on land during the flight test events. Personnel would not enter the water to recover trash or litter, and water recovery would not be required. These activities would result in impacts similar to, but less than, those caused by site preparation. Specific restoration actions, if necessary, would be determined on a case-by-case basis.

Cumulative Impacts

The THAAD Pacific Flight Tests EA (U.S. Army Space and Missile Defense Command, 2002a) analyzed up to 50 THAAD missile launches over a period of 4 years, typically ranging from 1 to 14 per year from Meck. The USAKA Supplemental EIS (U.S. Army Space and Strategic Defense Command, 1993a) evaluated the impacts from multiple launches of missiles per year for several years, a maximum of 28 strategic missiles launched in a single year from Meck. These documents concluded that no substantial cumulative impacts to biological resources were expected from the continued use of USAKA/RTS for missile launch programs. THAAD flight tests as part of the MDA IFTs would not exceed these numbers. No significant cumulative impacts to biological resources have been identified as a result of prior launch-related activities from RTS. These combined activities would be performed at varying times and locations on RTS and should have negligible cumulative impacts on biological resources.

4.3.1.2 Roi-Namur, Kwajalein, and Illeginni—Biological Resources

Site Preparation Activities

Vegetation

Portable fuel bladders would be located near the MEP 810s and would have secondary containment. All cabling and fuel lines would be laid directly on the ground or in protective cable trays. Although only a small portion (the southeastern tip) of Roi-Namur has been left relatively

undisturbed since World War II, maximum effort would be made to locate the AN/TPY-2 (FBM) radar and communications equipment or the HF Radar so as to avoid areas of herbaceous strand and littoral forest vegetation. The potential AN/TPY-2 radar location is located on the Speedball Site, a previously disturbed area on Roi-Namur. Potential sites for the HF radar transmitter and receiver are shown in Figures 2-10 and 2-11. Although Illeginni is not currently being considered, HF radar transmitter and receiver sites could be located near the helipad. Since Roi-Namur, Kwajalein, and Illeginni have been previously established as radar locations, site preparation activities would be minimal and other than impacts from the increased presence of personnel, no long-term impacts to vegetation are anticipated.

Non-native grasses and weeds dominate the open areas on the islands and are maintained by mowing. The MQM-107E target would be launched from a trailer that is staked to the ground, which would require augering four holes about 4 feet deep and about 6-8 inches in diameter in a previously disturbed area or one approved by the USAKA Environmental Office. No UES-protected vegetation is located within the areas proposed for use.

Wildlife

Roi-Namur would mainly be used for the placement and use of the AN/TPY-2 (FBM) radar and communications equipment and the HF Radar. The island could also potentially be used to launch remotely-piloted target aircraft. Kwajalein would mainly be used for staging and storage of equipment necessary for MDA's IFT launch program, which is a common use of the island that has a minimal impact to wildlife. Kwajalein or Illeginni could also potentially be used as a location for the HF Radar and to launch remotely-piloted target aircraft. The potential site for the trailer launch of an MQM-107E from any of the three islands would be a previously disturbed location or an area approved by the USAKA Environmental Office. The HF Radar would not be located on the beach.

Site preparation activities would be minimal and other than impacts from the increased presence of personnel, no long-term impacts to wildlife are anticipated.

Flight Test Activities

Vegetation

Non-native grasses and weeds dominate the open areas on Roi-Namur and Kwajalein and are maintained by mowing, which minimizes the potential for impacts caused by exhaust products. No UES-protected vegetation is located within the areas proposed for use.

Wildlife

Radar operation is a common use of the island that has a minimal impact to wildlife as described in Section 4.3.1.1. The depth to which radar EMR can penetrate biological materials generally decreases with increasing frequency. If no intercept occurs, the target would fly to a pre-planned area, deploy a parachute, and descend to the Kwajalein lagoon where it would be recovered. Flight planners would tailor the flight profile so that all fuel would be expended before the target descends to the lagoon.

Up to four MQM-107E targets may be used to support each integrated flight test. Impacts to wildlife from noise, exhaust products, and debris would be minimal and similar to those described in Section 4.3.1.1.

Post Flight Activities

Vegetation

Unused and recovered targets would be disassembled, flushed with fresh water if needed, and cleaned. The target components would be repacked in their shipping containers and returned to the United States in the reverse process of their shipment to USAKA/RTS. No UES-protected vegetation is located within the areas proposed for use.

Wildlife

Post flight activities would include the removal of all mobile equipment/assets brought to the installation and collection of any trash or litter deposited on land during the flight test events. Personnel would not enter the water to recover trash or litter, and water recovery would not be required. These activities would result in impacts similar to, but less than, those caused by site preparation. Specific restoration actions, if necessary, would be determined on a case-by-case basis.

Cumulative Impacts

The THAAD Pacific Flight Tests EA (U.S. Army Space and Missile Defense Command, 2002a) analyzed up to 50 THAAD missile launches over a period of 4 years, typically ranging from 1 to 14 per year from Meck. The USAKA Supplemental EIS (U.S. Army Space and Strategic Defense Command, 1993a) evaluated the impacts from multiple launches of missiles per year for several years, a maximum of 28 strategic missiles launched in a single year from Meck. These documents concluded that no substantial cumulative impacts to biological resources were expected from the continued use of USAKA/RTS for missile launch programs. MQM-107E launches as part of the MDA IFTs would not exceed these numbers. No significant cumulative impacts to biological resources have been identified as a result of prior launch-related activities from RTS. These combined activities would be performed at varying times and locations on RTS and should have negligible cumulative impacts on biological resources.

4.3.1.3 Omelek—Biological Resources

Site Preparation Activities

Vegetation

In order to accomplish the Proposed Action, additional trees and other vegetation may need to be removed from the island. The Patriot LS-1 would be sited adjacent to the southwest corner of the helipad approximately 30 feet from a protective habitat area (i.e., Littoral Forest) (U.S. Army Space and Missile Defense Command/Army Forces Strategic Command, 2011). In coordination with the USFWS and NMFS, significant vegetation removal has already occurred in this area to allow for the clearing of the helicopter clearing zone. As a mitigation measure, a substantial re-planting effort of indigenous coastal plants would be implemented on the eastern shoreline of Omelek at a 2:1 ratio of re-plants to removal of trees/shrubs. These areas could be re-planted to help stabilize the coastline. Any replanting would be conducted in coordination with USAKA/RTS, USFWS, and NMFS. The blast area from LS-1 would not adversely affect any remaining vegetation in the southwest point of the island. Areas of grass and forb (broad-leaved herb other than grass) vegetation are currently maintained at a low level by mowing or other mechanical control and are, as such, already significantly disturbed.

Prior to their arrival on Omelek, personnel would be briefed on the need to respect and protect sensitive island resources, including the remaining native forest, and to avoid harassment of sensitive species. Personnel would be instructed to stay on existing roads and paths where possible. Onsite supervisors would ensure that personnel comply with the briefing objectives.

Wildlife

Personnel would be instructed to avoid areas designated as avian nesting or roosting habitat by USAKA/RTS in coordination with the Pacific Islands Fish and Wildlife Service office and to avoid all contact with any nest that may be encountered. Emergency lighting would be shielded and pointed down to minimize the potential for impacts to migratory birds and sea turtles.

Immediately prior to their shipment to Omelek, all materials would be inspected by a certified pest control inspector and, if necessary, treated for the removal of pests and other non-native organisms to prevent their potential spread and introduction to other USAKA/RTS islands.

The Patriot LS-2 would be located approximately 312 feet north east of LS-1. The blast zone associated with LS-2 would not adversely affect the nearest wildlife habitat since it would be approximately 150 feet from LS-2. As discussed in Section 4.3.1.1, 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, due partly to the fact that wildlife can be very sensitive to sounds in some situations and very insensitive to the same sounds in other situations (Larkin, 1996).

The increased presence of personnel could temporarily affect wildlife within the area. Additional ground disturbance and equipment noise-related impacts could include loss of habitat, displacement of wildlife, and short-term disruption of daily/seasonal behavior. The combination of increased noise levels and human activity would likely displace some birds that forage, feed, or roost within the areas with the highest noise levels. Although site preparation activities could cause flushing (birds suddenly flying up), this is a common reaction to sudden natural sounds that only slightly increases the energy expenditure of individual birds, and while some might potentially leave the immediate area permanently, others may likely become accustomed to the increased noise and human presence. Actions would be taken to minimize disturbance to sensitive resources, such as posting signs designating sensitive areas on the northern part of Omelek, and providing personnel with information on the need to protect and avoid harassment of sensitive species.

UES-Protected Species

Per USFWS guidance, the former turtle nesting area will be marked and personnel instructed to avoid the area. Personnel would be further instructed to avoid all contact with sea turtles or turtle nests that might occur within the area. If turtle nests are discovered, then MDA personnel would contact USAKA Environmental, who would consult with the appropriate UES agencies (i.e., USFWS and NMFS) prior to the launch. No site preparation activities would take place offshore, and thus marine mammals would not be affected. Whales and small cetaceans in the vicinity are not anticipated to be affected by proposed site preparation activities, which would be minimal and on land. USFWS would be consulted regarding placement of equipment to avoid impacts to protected species.

Flight Test Activities

Wildlife

As discussed in Section 4.3.1.1, disturbance to wildlife from the launches would be brief and is not expected to have a lasting impact nor a measurable negative effect on migratory bird populations. Studies indicate that birds may flush during sharp, loud noises but return to normal behavior within a short time. Wildlife that remains in the area would quickly resume feeding and other normal behavior patterns after a launch is completed. Birds driven from preferred feeding areas by disturbances from aircraft or explosions usually return soon after the disturbance stops, as long as the disturbance is not severe or repeated (Federal Aviation Administration, 1996). No evidence has indicated that serious injuries to wildlife have resulted from prior launches in the region, and no long-term adverse effects are anticipated. The brief noise peaks that would be produced by the Patriot launches are comparable to levels produced by close-range thunder (120 dB to 140 dB peak). The launches are not anticipated to result in direct effects to nesting, resting, or roosting birds other than the temporary disturbance during the launch itself.

Post Flight Activities

Post flight activities would include the removal of all mobile equipment/assets brought to the installation and collection of any trash or litter deposited on land during the flight test events. Personnel would not enter the water to recover trash or litter, and water recovery would not be required. These activities would result in impacts similar to, but less than, those caused by site preparation. Specific restoration actions, if necessary, would be determined on a case-by-case basis.

Cumulative Impacts

The THAAD Pacific Flight Tests EA (U.S. Army Space and Missile Defense Command, 2002a) analyzed up to 50 THAAD missile launches over a period of 4 years, typically ranging from 1 to 14 per year from Meck. The USAKA Supplemental EIS (U.S. Army Space and Strategic Defense Command, 1993a) evaluated the impacts from multiple launches of missiles per year for several years, a maximum of 28 strategic missiles launched in a single year from Meck. These documents concluded that no substantial cumulative impacts to biological resources were expected from the continued use of USAKA/RTS for missile launch programs. Patriot launches as part of the MDA IFTs would not exceed these numbers. No significant cumulative impacts to biological resources have been identified as a result of prior launch-related activities from RTS. These combined activities would be performed at varying times and locations on RTS and should have negligible cumulative impacts on biological resources.

4.3.1.4 Gellinam—Biological Resources

Site Preparation Activities

Vegetation

PAC-3 launch and radar sites would be located in previously disturbed locations to minimize the potential for impacts to vegetation. On Gellinam, the AN/MPQ-65 and ICC equipment would be moved to a location approximately 410 feet south–southeast of the helipad for emplacement and subsequent operations. One PAC-3 LS would be located on a trail north of the helipad in an area overgrown with vegetation. Vegetation may be removed by mowing, hand cutting, or other mechanical control equipment. If Gellinam is selected as a launch site, additional agency

coordination will be performed. The second PAC-3 LS would be located in a cleared area near the helipad. The Patriot soldiers would be transported from Meck to Gellinam daily on existing marine transportation. Fiber-optic cables would be laid on the ground or along existing road rights-of-way. If fiber-optic cables require additional protection from vehicle and foot traffic, they would be placed in cable raceways. No trenching of fiber optic or other cables is anticipated. No sensitive habitat or protected species would be adversely affected. Inadvertent or deliberate introduction of alien plant or animal species would be prevented by inspections of arriving aircraft and ships by cargo-handling personnel.

Wildlife

Personnel would be instructed to avoid areas described as avian nesting or roosting habitat and to avoid all contact with any nests that may be encountered. Sea turtles or turtle nests would also be avoided. The USAKA Environmental Office would be contacted if any sea turtles are harmed.

Flight Test Activities

Vegetation

Removal/mowing of vegetation around the PAC-3 launch and radar sites on Gellinam would minimize the potential for impacts to vegetation from fire and deposition of exhaust products. All activities would be performed in accordance with the UES and the KEEP.

Wildlife

According to the 2002 THAAD Pacific Test Flights EA (U.S. Army Space and Missile Defense Command, 2002), results of monitoring conducted following a Strategic Target System launch at PMRF indicated little effect on wildlife due to the low-level, short-term hydrogen chloride emissions (U.S. Army Space and Strategic Defense Command, 1993a). The program included marine surveys of representative birds and mammals for both prelaunch and post launch conditions. Studies on representative birds and mammals reviewed in the Final EIS for the Strategic Target System (U.S. Army Strategic Defense Command, 1992) also indicated that low-level, short-term exposure to hydrogen chloride would not adversely affect wildlife. The prevailing trade winds carry ground level concentrations of emissions away from the area (U.S. Army Space and Strategic Defense Command, 1993b). The PAC-3 missile also has hydrogen chloride and aluminum oxide as emissions products. Aluminum oxide and hydrogen chloride do not bioaccumulate; therefore, no indirect effects to the food chain are anticipated.

An early flight termination or mishap could result in debris impact along the flight corridor, which may temporarily impact fishing activities in the immediate area. Due to the small amount of propellant involved and the small number of launches, the project is not anticipated to adversely affect marine resources. The potential ingestion of toxins by fish species, which may be used for food sources, would be remote because of the diluting effect of the ocean water and the relatively small area that would be affected. The primary flight test activity that may affect wildlife within the flight test corridor is the actual intercept of the target missile. Debris impact areas for both the interceptor and target vehicles would be located over the Mid-atoll Corridor of the Kwajalein Lagoon or the BOA.

Any intercept debris greater than 11 foot-pounds of energy from mishaps landing in the Kwajalein Lagoon at depths of up to approximately 164 feet of water would be recovered. The

debris is not expected to contain hazardous materials. Were hazardous materials to leach out of the intercept debris, the great volume of water in the Kwajalein Lagoon would dilute the contaminant to acceptable levels.

Although fire from a launch mishap or early flight termination could impact vegetation and wildlife near the launch site, the proposed launch sites are located in areas with very little ground cover.

Operation of the AN/MPQ-65 would be conducted in accordance with USAKA/RTS safety guidelines. Several factors reduce the potential for electromagnetic radiation exposure for birds and other wildlife. The main radar beam would normally be located several degrees above horizontal, which limits the probability of energy absorption by wildlife on the ground. The radar beam is relatively small and would remain in motion, making it extremely unlikely that a bird would remain within the most intense area of the beam for any meaningful length of time. The radiation hazard area would be visually surveyed for birds and other wildlife prior to the activation of the radar.

Studies on representative birds and mammals reviewed in the USAKA Final Supplemental EIS (U.S. Army Space and Strategic Defense Command, 1993a) indicate that low level, short-term exposure to hydrogen chloride would not adversely affect wildlife. A startle effect is known to be exhibited by wildlife when exposed to short-term noise, like that caused by a missile launch. Recent studies, however, indicate that birds usually show signs of disturbance, such as fluttering of wings, when the noise occurs, but quickly return to normal behavior after the event.

Post Flight Activities

Post flight activities would include the removal of all mobile equipment/assets brought to the installation and collection of any trash or litter deposited on land during the flight test events. Personnel would not enter the water to recover trash or litter, and water recovery would not be required. These activities would result in impacts similar to, but less than, those caused by site preparation. Specific restoration actions, if necessary, would be determined on a case-by-case basis.

Cumulative Impacts

The THAAD Pacific Flight Tests EA (U.S. Army Space and Missile Defense Command, 2002a) analyzed up to 50 THAAD missile launches over a period of 4 years, typically ranging from 1 to 14 per year from Meck. The USAKA Supplemental EIS (U.S. Army Space and Strategic Defense Command, 1993a) evaluated the impacts from multiple launches of missiles per year for several years, a maximum of 28 strategic missiles launched in a single year from Meck. These documents concluded that no substantial cumulative impacts to biological resources were expected from the continued use of USAKA/RTS for missile launch programs. Patriot launches as part of the MDA IFTs would not exceed these numbers. No significant cumulative impacts to biological resources have been identified as a result of prior launch-related activities from RTS. These combined activities would be performed at varying times and locations on RTS and should have negligible cumulative impacts on biological resources.

4.3.2 WAKE ISLAND—BIOLOGICAL RESOURCES

Site Preparation Activities

Vegetation

The site(s) for the launch activities are previously cleared, improved locations. No substantial impacts to vegetation are anticipated. Any spill or release of hazardous material would likely be restricted to a small localized area near the source. Standard operating procedures and spill plans would reduce any potential impact to vegetation.

Wildlife

Disturbance to wildlife, including migratory birds, from construction noise and increased personnel would be short-term and is not expected to have a lasting impact nor a measurable negative effect, since migratory birds primarily nest at the end of Peale and Wilkes outside of the typical 70 to 98 dBA noise levels at 50 feet from construction equipment. Any spill or release would likely be restricted to a small localized area near the source. Standard operating procedures and spill plans would reduce any potential impact to wildlife in the vicinity of the spill.

Threatened and Endangered Species

No exclusively terrestrial threatened and endangered species are known or reported to exist on Wake. No impacts as a result of site preparation activities are expected to the federally threatened green turtle or the federally endangered hawksbill turtle. According to information provided in the Wake Island Launch Center EA, although the green turtle has been observed in the nearshore ocean and lagoon waters, neither sea turtle species has been observed basking or nesting on the island, the only land-based behaviors of these species.

Flight Test Activities

Vegetation

Nominal launch activities are not expected to result in impacts to vegetation. Observations of vegetation at other launch locations indicate that vegetation continues to thrive in the immediate areas surrounding launch pads. Based on these observations and resultant analyses, the potential effects to vegetation from the proposed target missile launches are also expected to be minimal.

Wildlife

Potential impacts could result from launch related activities such as launch noise and emissions. Impacts to wildlife on and in the vicinity of Wake are not expected to have a lasting impact nor a measurable negative effect on wildlife, including migratory birds. According to the Wake Island Launch Center EA, several previous studies have shown that intermittent noises (other than noises at or near the threshold of pain) have little if any apparent effect on most animals, including birds. Birds acclimate quickly to most non-constant noises in their environment and after an initial flushing return to their nest. Other wildlife also typically exhibits a momentary startle effect.

Procedures are in place that requires cargo handling personnel to inspect arriving aircraft/crafts for pest species of plants and animals. Program personnel would be briefed on methods of pest detection. Therefore, any short-term potential increase in sea and air traffic associated with the

ARAV-B launches is not expected to increase the transportation of non-native pest species to the atoll.

A launch mishap on the launch pad could impact wildlife species such as, migratory birds (red-tailed tropicbird, blackfooted albatross, and the Laysan albatross), which nest within the LHA. Implementation of launch safety procedures helps to minimize the potential for on-pad failure or explosion and thus the potential for impacts to the mentioned species.

Threatened and Endangered Species

The LHA extends into the ocean area several hundred feet where federally protected green sea turtles might be found. Of the internationally protected species, sea turtles and marine mammals would have the greatest risk, although remote, of incidental impact from falling missile debris in the booster drop area or in the event of an aborted flight. The likelihood that debris from a spent booster or terminated launch would strike a sea turtle or marine mammal is remote since the potential for a launch mishap is small and the marine species tend to be widely scattered.

Environmentally Sensitive Habitat

The Alternative Action is not expected to have a lasting impact nor a measurable negative effect on the bird nesting area on the western end of Wilkes and Peale. Nominal launch activities would not affect sea turtle nesting habitat. Nominal launches are not expected to have a negative effect on nearby reefs since debris would be located further out in the open ocean.

Post Flight Test Activities

ARAV-B program personnel would remove all mobile equipment/assets brought to Wake and collect any trash or litter deposited on land during the flight test events. Personnel would not enter the water to recover trash or litter, and water recovery would not be required at the conclusion of its testing activities on Wake. These activities would result in impacts similar to, but less than, those caused by site preparation. Specific restoration actions, if any, would be determined on a case-by-case basis.

Cumulative Impacts

Adherence to the standard procedures in place to minimize the introduction of invasive species would reduce the potential for cumulative impacts of these species to existing vegetation and wildlife on Wake. No substantial cumulative impacts have been identified as a result of previous launches from Wake Island Launch Center. The Alternative Action in combination with other regional activities should also result in negligible cumulative impacts to biological resources.

4.3.3 BROAD OCEAN AREA—BIOLOGICAL RESOURCES

Up to 10 parachutes would be used to deploy the MRBM target vehicle from the aircraft in preparation for actual launch. The parachutes may use a ring-slot design with multiple panel openings or a ribbon parachute made of a nylon/Kevlar composition. They would range from approximately 15 to 94 feet in diameter. Air launched MRBM targets are held to the extraction pallet with a blanket made of nylon or similar material that is released at a predetermined time after the target and its extraction pallet are pulled from the C-17 aircraft. The pallet and parachutes, which are weighted, then fall to the ocean surface and sink.

The intercepts would occur over the BOA area northeast of USAKA for interceptor launches from Omelek and Gellinam. Debris impacts and booster drops in the BOA are not expected to adversely affect marine mammal species protected under the Marine Mammal Protection Act and the Endangered Species Act. The probability is rather low that migratory whales and other marine species, such as the green or hawksbill sea turtle, would be within the area to be impacted by falling debris and boosters. Sensitive marine species are widely scattered, and the probability of a threatened or endangered species being struck by debris is considered remote. Should marine species be observed during prelaunch survey flights of the hazard area, flight tests would be delayed until these species vacate the area.

Cumulative Impacts

The Final Supplemental EIS for Proposed Actions at USAKA (U.S. Army Space and Strategic Defense Command, 1993a) has addressed the environmental impacts of ongoing and future programs at USAKA/RTS and concluded that impacts to biological resources would not be significant under the intermediate level of activity alternative, which meets or exceeds the increase represented by the Proposed Action, for activities included in this project. The 2002 THAAD Pacific Flight Tests EA analyzed up to 14 test flights per year. This EA also concluded that impacts to marine resources would not be significant.

No substantial impacts to the BOA and its wildlife have been identified from current and past missile test activities. Prior analysis has not identified a significant potential for cumulative impacts. Although MDA IFT activities would take place in the BOA, these would be discrete, short-term events and no adverse cumulative impacts are anticipated.

4.4 CULTURAL RESOURCES

4.4.1 UNITED STATES ARMY KWAJALEIN ATOLL/REAGAN TEST SITE (USAKA/RTS)

4.4.1.1 Meck—Cultural Resources

No adverse effects are anticipated. Although there are no known archaeological sites on Meck and its original surface is at considerable depth due to landfilling, the potential for subsurface materials to be unexpectedly encountered exists across USAKA/RTS. As a result, project personnel will be briefed during the routine construction briefing for Meck regarding the significance of cultural resources and the penalties associated with their disturbance or collection. Out of respect to Marshallese traditions, personnel will also be cautioned to avoid the two noted sacred areas. If, during the course of program activities, cultural materials, particularly human remains, are discovered, (e.g., during vegetation removal or leveling to accommodate the various radars or the emplacement of lightning rods), activities in the immediate vicinity of the find would be halted and the USASKA/RTS environmental office notified. Coordination/consultation required by the UES would be conducted by the USAKA/RTS environmental office as appropriate to the find.

4.4.1.2 Roi-Namur—Cultural Resources

Activities described in this EA that would take place on Roi-Namur have the potential to adversely affect archaeological and historical resources. These include subsurface and surface World War II Japanese and American features and artifacts, lens wells, and human remains. Subsurface archaeological resources of this type have already been recorded on Roi-Namur within the strata between the island surface and 3 feet (and below). Depending on the specific location, a dig permit and archaeological monitoring may, therefore, be required as described below.

The Proposed Action and all alternatives meet the definition of actions covered under the DEP-Protection of Cultural Resources (04-001) (Teledyne Solutions, Inc., 2004) for both on-going operations and mission activities; therefore, a new or separate DEP for this project is not required.

AN/TPY-2 Radar

Within the vicinity of the Speedball area, six grounding rods that will protect the AN/TPY-2 radar and associated communications and SATCOM components would be emplaced at depths approximately 8 feet below the ground surface. The grounding rods will be driven (hammered) into the ground, and no boring or augering is anticipated. In addition, six lightning rods (telephone poles with metal arrestors) would also be erected. Ground leveling, the installation of grounding rods and lightning rods and a personnel protection fence have been analyzed in previous environmental documents and found to have no significant impacts. In addition, a REC for these actions was finalized in 2012 to cover IFT site preparation activities at the Speedball site. It should be noted that there is one caveat to this clearance. The specification for the grounding rod is 1/2 inch in diameter and 9 feet long. The archaeologist's opinion was that a rod of that small diameter would not harm the context or integrity of artifacts or features that may or may not be present and that consultation would most likely not be necessary with the following caveat, that grounding rod(s) are not driven into a location(s) which might possibly contain remaining traces of the tank trap/seawall which defined the northwest edge of Speedball. This is recommended because it would be an activity which may affect a structure which is listed as eligible for the RMI National Register as per the HPP.

Staking the MQM 107-E Land-Launched Target Trailer

Staking the MQM 107-E land-launched target trailer would require boring/augering four holes, each 4 feet deep and 6 to 8 inches in diameter. Because archaeological remains have been previously encountered within the 3-foot layer (and below) at various locations across Roi-Namur, the holes have the potential to adversely affect subsurface archaeological remains and monitoring may be required. Because the exact location of the MQM 107-E trailer has not yet been finalized, the archaeological sensitivity cannot be confirmed; therefore, prior to the augering of the four holes, coordination with the USAKA Environmental Coordinator would be conducted. As a result, no adverse effects are expected.

HF Radars

Grounding rods would be required for both the transmitter and receiver sites associated with the HF Radar. Nine alternative sites (1 through 8 and 8a) are currently proposed on Roi-Namur and are shown on Figure 2-10; however, the figure locations are approximate, and the exact placement of the HF radar and rods has not yet been finalized. It is anticipated that the radars

will be sited within areas that have been surficially predisturbed; however, the emplacement of grounding rods (approximately 5 feet in length) would extend below the ground surface at depths sufficient to unexpectedly encounter and possibly affect archaeological remains if they are present. The archaeological sensitivity and any proposed monitoring requirements for each are:

Alternative Site 1. Moderate/High Sensitivity. Alternative 1 is within an area that has been determined moderate to high sensitivity for archaeological resources. The location is also sensitive for historic resources and is in close proximity to three known U.S. World War II structures and one suspected Japanese World War II structure. If this alternative site is selected, any removal of vegetation from the historic structures should be avoided so as not to adversely affect them, as they are protected by the vegetation.

The grounding rods for this type of radar are small diameter (1/2 inch) copper rods approximately 5 feet in length. The rods are typically hammered into the ground and require no boring or augering. While the emplacement of a 1/2 inch rod is not likely to adversely affect subsurface resources, that possibility cannot be entirely ruled out, similar to the circumstances noted above for the AN/TPY-2 radar. Archaeological remains have been previously encountered within the 3-foot layer (and below) at various locations across Roi-Namur, and the rods could affect archaeological remains depending on their placement. Because the exact locations for the HF radars and their rods have not yet been finalized, coordination with the USAKA Environmental Coordinator would be conducted prior to their installation to ensure that there are no adverse effects.

Alternative Site 2. Moderate/High Sensitivity. Alternative 2 is within an area that has been determined moderate to high sensitivity for archaeological resources. Although there are no known historic features within, or adjacent, to this location, the exact placement of the radar is not known; therefore, the same requirements outlined for archaeological resources under Alternative Site 1 would also apply to Alternative Site 2. As a result, no adverse effects are expected.

Alternative Site 3. Moderate/High Sensitivity. Alternative 3 is within an area that has been determined moderate to high sensitivity for archaeological resources. There are no known historic features within, or adjacent, to this location; however, there is a recorded Marshallese taro pit, which is a significant prehistoric feature. The same requirements outlined for archaeological resources under Alternative Site 1 would also apply to Alternative Site 3, and the prehistoric feature should be avoided. Prior to any ground disturbing activities, coordination with the USAKA Environmental Office should be conducted to determine the location of the taro pit. As a result, no adverse effects are expected.

Alternative Site 4. High Sensitivity. There are several historic archaeological features in the vicinity of Alternative Site 4. These include World War II tank traps, structures, and trenches. There is also one above ground historic structure west of the proposed location. The south side of this location was extensively filled in 1944 to extend the southern shoreline of Namur Island, and the filled part of the area would not be sensitive; however, the exact delineation between the original island and the fill area has not yet been determined. The same requirements outlined for archaeological resources under Alternative Site 1 would also apply to Alternative Site 4. Prior to any ground disturbing activities, coordination with the USAKA Environmental

Office should be conducted to determine the exact location of the grounding rods and their relationship to the known features. As a result, no adverse effects are expected.

Alternative Site 5. High Sensitivity. This location is within an area that has been determined to be highly sensitivity for archaeological resources, particularly adjacent to TRADEX Road. The same requirements outlined for archaeological resources under Alternative Site 1 would also apply to Alternative Site 5. As a result, no adverse effects are expected.

Alternative Site 6. Moderate/High Sensitivity. Alternative 6 is within an area that has been determined moderate to high sensitivity for archaeological resources, although there has been some disturbance within this area from previous projects. If this alternative location is selected, the same requirements outlined for archaeological resources under Alternative Site 1 would also apply. Given the known disturbance, the USAKA Environmental Coordinator would be consulted to determine the most appropriate location to avoid or minimize impacts. As a result, no adverse effects are expected.

Alternative Site 7. Moderate/Low Sensitivity. Although the Alternative 7 location is situated within an area that has been previously disturbed from the installation of modern utilities, it is characterized as moderate to low sensitivity for archaeological resources because of a possible Japanese lens well in the vicinity. Moderate to low sensitivity areas do not normally require archaeological monitoring; however, the area must be inspected prior to any ground disturbance. Coordination with the USAKA Environmental Coordinator for the inspection would be required to ensure that sensitive resources are not within the footprint of project activities. As a result, no adverse effects are expected.

Alternative Site 8. No Archaeological Sensitivity. Alternative location 8 is within an area created by landfilling after the 1944 American invasion. There are no known archaeological concerns within landfilled areas, and no monitoring is required if this alternative location is selected. As a result, no adverse effects are expected.

Alternative Site 8a. No to High Archaeological Sensitivity. Depending on the exact location within Alternative 8a the archaeological sensitivity may be either high or essentially no sensitivity. Much of this area of Roi-Namur was created by landfilling after the 1944 American invasion; however, the exact demarcation between the filled area and the original island is not well defined. If this alternative location is selected, the same requirements outlined for archaeological resources under Alternative Site 1 or 8 would apply. Coordination with the USAKA Environmental Coordinator once the proposed location is refined, will determine any requirements for monitoring. As a result, no adverse effects are expected.

Alternative Site 9. Alternative 9 is west of the Roi-Namur runway in an area of low archaeological sensitivity. Projects within low sensitivity areas do not normally require archaeological monitoring; however, the project supervisor is responsible for reporting any unexpectedly encountered archaeological or historical resources to the USAKA Environmental Coordinator. As a result, no adverse effects are expected.

Alternative Site 10. The southeastern most extent of Roi-Namur is a high sensitivity area for archaeological resources. Projects undertaken within high sensitivity areas usually require monitoring unless the ground disturbance takes place within existing utility lines. Although there

are no known historic features within, or adjacent, to this location; the exact placement of the transmitter is not known. If this alternative location is selected, coordination with the USAKA Environmental Coordinator would be undertaken to determine if monitoring is required and to ensure that sensitive resources are not inadvertently disturbed. As a result, no adverse effects are expected.

4.4.1.3 Omelek—Cultural Resources

No adverse effects are anticipated; however, given the archaeological potential across USAKA/RTS, there is always potential for subsurface materials to be unexpectedly encountered. As a result, project personnel will be briefed during the routine construction briefing for Omelek regarding the significance of cultural resources and the penalties associated with their disturbance or collection. If, during the course of program activities, cultural materials, particularly human remains, are discovered (e.g., emplacement of grounding rods associated with the PAC-3 system or any other type of ground disturbance), activities in the immediate vicinity of the find would be halted and the USAKA/RTS environmental office notified. Coordination/consultation required by the UES would be conducted by the USAKA/RTS environmental office as appropriate to the find.

4.4.1.4 Kwajalein—Cultural Resources

Activities described in this EA that would take place on Kwajalein have the potential to adversely affect archaeological and historical resources. These include subsurface and surface World War II Japanese and American features and artifacts and human remains. Subsurface archaeological resources of this type have already been recorded on Kwajalein; therefore, depending on the specific location, archaeological monitoring may be required as described below.

The Proposed Action and all alternatives meet the definition of actions covered under the DEP-Protection of Cultural Resources (04-001) (Teledyne Solutions, Inc., 2004) for both on-going operations and mission activities; therefore, a new or separate DEP for this project is not required.

HF Radars

Grounding rods would be required for both the transmitter and receiver sites associated with the HF Radar. A description of the grounding rods and their emplacement are described in Section 4.4.1.2. Seven alternative sites (1 through 7) are currently proposed on Kwajalein and are shown on Figure 2-11; however, the figure locations are approximate, as the exact placement of the HF radar and rods has not yet been finalized. It is anticipated that the radars will be sited within areas that have been surficially pre-disturbed; however, the emplacement of grounding rods (approximately 5 feet in length) would extend below the ground surface at depths sufficient to unexpectedly encounter and possibly affect archaeological remains if they are present. On Kwajalein, the location of historic cultural resources does not seem to be as constrained as in the case of prehistoric or traditional cultural resources. Nevertheless, there are some general statements that can be made. Historic cultural resources are, like the prehistoric/traditional ones, frequently truncated by post-war grading and construction. Historic cultural resources are more commonly found, and generally more intact, at the western end of the island. Historic cultural resources found north of 6th Street and south of the high school tend to be found at greater depths below existing grade than on other parts of the island.

The archaeological sensitivity and any proposed monitoring requirements for each alternative location on Kwajalein are:

Alternative Site 1. No Sensitivity. Alternative Site 1 is proposed for a location on Kwajalein that was created by landfilling after the 1944 World War II invasion of the island. No adverse effects are anticipated if this alternative site is selected, and no archaeological monitoring would be required.

Alternative Site 2. Low to Moderate Sensitivity. Recent monitoring of projects within Alternative Site 2 has revealed extensive intact subsurface stratigraphy. As a result, inspection of the site prior to project disturbance is required, and coordination with the USAKA Environmental Coordinator would be undertaken to ensure that sensitive resources are not inadvertently disturbed. As a result, no adverse effects are expected.

Alternative Site 3. Low Sensitivity. Projects within low sensitivity areas do not normally require archaeological monitoring; however, the project supervisor is responsible for reporting any unexpectedly encountered archaeological or historical resources to the USAKA Environmental Coordinator. As a result, no adverse effects are expected.

Alternative Site 4. Moderate Sensitivity. Alternative Site 4 is situated adjacent (to the west) to a mass grave site. The extent of the site is not well defined; therefore, if this alternative location is selected, inspection of the site prior to project disturbance would be required and coordination with the USAKA Environmental Coordinator would be undertaken to ensure that sensitive resources, particularly human remains, are not inadvertently disturbed. As a result, no adverse effects are expected.

Alternative Site 5. Moderate Sensitivity. Little is known about Alternative Site 5 other than intact, non-fill soils have been identified. Project sites within areas moderately sensitive for archaeological remains must at least be inspected prior to any ground disturbance. As a result, coordination with the USAKA Environmental Coordinator would be undertaken to ensure that sensitive resources, particularly human remains, are not inadvertently disturbed. As a result, no adverse effects are expected.

Alternative Site 6. High Sensitivity. Alternative 6 is situated within an area that has been shown to be highly sensitive for archaeological remains. Intact stratigraphy is present and there are identified prehistoric Marshallese sites at depths 2 feet or more below grade. If this alternative location is selected, monitoring for any ground disturbing activities may be required, and coordination with the USAKA Environmental Coordinator would be undertaken to ensure that sensitive resources are not inadvertently disturbed. As a result, no adverse effects are expected.

Alternative Site 7. High Sensitivity. Alternative 7 is situated within an area that has been shown to be highly sensitive for archaeological remains. Multiple World War II sites have been recorded within the location, and traditional, prehistoric Marshallese sites may be present as well. In addition, there is a historic structure that has been determined to be eligible for inclusion in the RMI National Register within this area. If this alternative location is selected, monitoring for any ground disturbing activities may be required and coordination with the

USAKA Environmental Coordinator would be undertaken to ensure that sensitive resources are not inadvertently disturbed. As a result, no adverse effects are expected.

4.4.1.5 Gellinam—Cultural Resources

No adverse effects are anticipated; however, the potential for subsurface materials to be unexpectedly encountered exists across USAKA/RTS. As a result, project personnel will be briefed during the routine construction briefing for Gellinam regarding the significance of cultural resources and the penalties associated with their disturbance or collection. If, during the course of program activities, cultural materials, particularly human remains, are discovered (e.g., during emplacement of grounding rods for the PAC-3 system or any other type of ground disturbance), activities in the immediate vicinity of the find would be halted and the USASKA/RTS environmental office notified. Coordination/consultation required by the UES would be conducted by the USAKA/RTS environmental office as appropriate to the find.

4.4.1.6 Illeginni—Cultural Resources

No adverse effects are anticipated. Although there are no known recorded archaeological sites, the potential for subsurface materials to be unexpectedly encountered exists across USAKA/RTS. As a result, project personnel will be briefed during the routine construction briefing for Illeginni regarding the significance of cultural resources and the penalties associated with their disturbance or collection. If, during the course of program activities, cultural materials, particularly human remains, are discovered (e.g., during the staking of the land-launched target trailer or any other type of ground disturbance), activities in the immediate vicinity of the find would be halted and the USASKA/RTS environmental office notified. Coordination/consultation required by the UES would be conducted by the USAKA/RTS environmental office as appropriate to the find.

4.4.2 WAKE ISLAND—CULTURAL RESOURCES

No adverse effects are anticipated. There are no known prehistoric or traditional resources sites identified on Wake Island (U.S. Army Space and Strategic Defense Command, 1994b; Jackson, 1996; Burgett and Rosendahl, 1990) and historic military resources will be protected in accordance with the Wake Island HPP (Jackson 1996), activities would take place within previously developed post-World War II areas and specific historic features would be avoided. Given the history of Wake, there is always potential for unexpected cultural remains to be encountered. Project personnel would be briefed during the routine construction briefing regarding the significance of these types of resources and the penalties associated with their disturbance or collection. If, during the course of program activities, prehistoric, historic, or traditional cultural materials, particularly human remains, are unexpectedly discovered (e.g., during vegetation removal, leveling for the AN/TPY-2 radar, emplacement of lightning protection poles or grounding rods), activities in the immediate vicinity of the find would be halted, and the Wake Atoll environmental coordinator would be notified.

4.4.3 BROAD OCEAN AREA—CULTURAL RESOURCES

No adverse effects are anticipated. There are no known marine cultural resources (e.g., shipwrecks) within the areas of the BOA beneath the proposed IFT paths. Average ocean depths within these areas are approximately 12,900 feet, and any unidentified resources at that

depth would have a very low probability of being affected by impacts from missile components or debris during planned activities or abnormal flight termination.

Cumulative Impacts

When reviewed against ongoing and reasonably foreseeable actions at USAKA/RTS, the proposed activities associated with this EA would have no appreciable cumulative effects on cultural resources.

4.5 GEOLOGY AND SOILS

4.5.1 UNITED STATES ARMY KWAJALEIN ATOLL/REAGAN TEST SITE (USAKA/RTS)

4.5.1.1 Meck—Geology and Soils

Site Preparation Activities

Prelaunch activities on the USAKA/RTS islands are not expected to result in any adverse geological or soil impacts. Depending on the construction period, soils at the proposed sites on Meck may be slightly subject to erosion from the wind. However, any soil disturbance would be of short duration and limited to the immediate vicinity of the radar and launch sites. Best Management Practices, such as regular watering of any excavated material, could further reduce the potential for soil erosion.

Flight Test Activities

THAAD interceptor launches from Meck will use solid fuel propellants. A qualified accident response team would be available near the launch locations to negate or minimize any adverse effects in an unlikely event such as a flight termination. Primary emission products from previous launches of a solid propellant missile include hydrogen chloride, aluminum oxide, carbon dioxide, carbon monoxide, nitrogen, and water. (U.S. Army Space and Strategic Defense Command, 1995b)

Deposition of aluminum oxide and hydrogen chloride are expected to be very minimal during nominal launches because they disperse rapidly in the air. The minimal amount of aluminum oxide and hydrogen chloride that could reach land would be in the form of dust that would not adversely affect the soil.

Emission products from launches would be rapidly buffered by the soil, which is composed mainly of calcium carbonate. The launcher will be located on the asphalt road and a steel blast plate will be used to reduce damage to the asphalt. If the solid fuel continues to burn, it may start on-pad fires. Controlling fires may require ground-disturbing activities in the LHA. Identifiable unburned fuel or residual burned fuel would be recovered during the debris recovery process. The impact of this activity is expected to be short-term. The recovered fuel and residue would be disposed of following standard USAKA/RTS hazardous waste management procedures (U.S. Army Space and Strategic Defense Command, 1995b).

Post Flight Test Activities

Adverse impacts to soils, other than slight compaction, are unlikely to occur as a result of the removal of all mobile THAAD equipment/assets brought to the range.

Cumulative Impacts

The USAKA Supplemental EIS (U.S. Army Space and Strategic Defense Command, 1993b) evaluated the impacts from multiple launches of missiles per year for several years, a maximum of 28 strategic missiles launched in a single year from Meck. MDA flight tests when combined with other regional activities are not expected to exceed this number. The launcher will be located on the asphalt road, and a steel blast plate will be used to reduce damage to the asphalt. This will minimize the potential for impacts to soil. No cumulative adverse effects to soils are anticipated from IFT activities.

4.5.1.2 Roi-Namur, Kwajalein, and Illeginni—Geology and Soils

Site Preparation Activities

Impacts to area soils could occur as a result of augering four holes about 4 feet deep and about 6-8 inches in diameter to stake down the launch trailer. This would occur in a previously disturbed area and result in minimal soil damage. Any spills would be remediated in accordance with the UES and KEEP.

Flight Test Activities

Launches of MQM-107E targets from a trailer would not result in impacts to geology and soils on Roi-Namur or Illeginni. Radar operation would also not result in geology and soils impacts.

Post Flight Test Activities

Adverse impacts to soils, other than slight compaction, are unlikely to occur as a result of the removal of all mobile equipment/assets brought to the range.

Cumulative Impacts

No cumulative adverse effects to soils are anticipated from program activities. Emission products from nominal launches would be rapidly buffered by the soil. Hazardous byproducts from any spill would be removed, and any residual accumulation of nitrogen compounds would be ultimately washed out to sea or taken up by plants.

4.5.1.3 Omelek and Gellinam—Geology and Soils

Site Preparation Activities

The movement of the Patriot Fire Unit and the placement of portable sensors on the proposed USAKA/RTS islands are not expected to result in any increase in soil erosion. The islands' soils consist of gravel, cobbles, and very coarse-grained particles which are not prone to erosion. Spill prevention measures would be followed to minimize the potential for soil contamination.

Flight Test Activities

No adverse changes to soil chemistry are predicted to occur as a result of hydrogen chloride, aluminum oxide, or other solid rocket motor emission products deposited on the soil. Deposition of these materials is expected to be minimal because they disperse in the air. Any hydrogen chloride falling on the land would be buffered by contact with the calcium carbonate reef material. The minimal amount of aluminum oxide that could reach land would be in the form of dust that would not adversely affect the soil.

Post Flight Test Activities

Adverse impacts to soils, other than slight compaction, are unlikely to occur as a result of the removal of all mobile equipment/assets brought to the range. Spill prevention measures would be followed to minimize the potential for soil contamination.

Cumulative Impacts

No cumulative adverse effects to soils are anticipated from program activities. Emission products from nominal launches would be rapidly buffered by the soil. Hazardous byproducts from any spill would be removed and any residual accumulation of nitrogen compounds would be ultimately washed out to sea or taken up by plants.

4.5.2 WAKE ISLAND—GEOLOGY AND SOILS

Site Preparation Activities

The movement of the ARAV-B and the placement of portable sensors on pre-existing launch sites on Wake are not expected to result in any increase in soil erosion. Spill prevention measures would be followed to minimize the potential for soil contamination.

Flight Test Activities

No adverse changes to soil chemistry are predicted to occur as a result of solid rocket motor emission products deposited on the soil. Deposition of these materials is expected to be minimal because they disperse in the air. Any emission products falling on the land would be buffered by contact with the calcium carbonate reef material.

Post Flight Test Activities

Adverse impacts to soils, other than slight compaction, are unlikely to occur as a result of the removal of all mobile equipment/assets brought to the range. Spill prevention measures would be followed to minimize the potential for soil contamination.

Cumulative Impacts

No cumulative adverse effects to soils are anticipated from program activities. Emission products from nominal launches would be rapidly buffered by the soil. Hazardous byproducts from any spill would be removed and any residual accumulation of nitrogen compounds would be ultimately washed out to sea or taken up by plants.

4.5.3 BROAD OCEAN AREA—GEOLOGY AND SOILS

Proposed IFT activities would not impact the ocean floor.

4.6 HAZARDOUS MATERIAL AND WASTE

4.6.1 UNITED STATES ARMY KWAJALEIN ATOLL/REAGAN TEST SITE (USAKA/RTS)

4.6.1.1 Meck—Hazardous Material and Waste

The Patriot activities on Meck would require use of diesel fuel and lubricants for the operation of the radar. Radar components would be brought to Kwajalein as the initial arrival point and transported to Meck. The THAAD activities on Meck would require the use of diesel fuel and lubricants for the operation of the radar generators, solid propellant for the missile/inceptor lift-off, and small quantities of motor oil and/coolant would be generated through normal operations. All fuel handling areas will include secondary containment.

Refer to Section 4.6.1.5 for the discussion and cumulative impacts of hazardous material and waste management. All 11 USAKA/RTS islands (including Meck) follow the same requirements as they relate to the management and storage of hazardous material and waste.

4.6.1.2 Roi-Namur—Hazardous Material and Waste

The operation of the radars on Roi-Namur would require use of diesel and gasoline fuel to operate the generators. Radar components would be shipped from either Hawaii or Wake to Roi-Namur. Additionally, C2BMC would be co-located with the radar. There are no generators specific to the C2BMC. The C2BMC would receive power from the same MEP 810A generators supporting the radar; therefore the operation of the C2BMC would not further impact the hazardous material and waste management for Roi-Namur.

Refer to Section 4.6.1.5 for analysis and cumulative impact discuss of hazardous material and waste management. All 11 USAKA/RTS islands (including Roi-Namur) follow the same requirements as they relate to the management and storage of hazardous material and waste.

4.6.1.3 Omelek—Hazardous Material and Waste

The Patriot activities on Omelek would require use of diesel fuel, lubricants and solid propellant for the operation of the PAC-3 launcher. A small amount of hazardous waste (e.g., used motor oil, coolant) maybe generated during vehicle maintenance. Missile components would be brought to Kwajalein as the initial arrival point and transported to Omelek.

Refer to Section 4.6.1.5 for the analysis and cumulative impact discuss of hazardous material and waste. All 11 USAKA/RTS islands (including Omelek) follow the same requirements as they relate to the management and storage of hazardous material and waste.

4.6.1.4 Kwajalein—Hazardous Material and Waste

Refer to Section 4.6.1.5 for the analysis and cumulative impact discuss hazardous material and waste. All 11 USAKA/RTS islands (including Kwajalein) follow the same requirements as they relate to the management and storage of hazardous material and waste.

4.6.1.5 Gellinam—Hazardous Material and Waste

The Proposed Action activities on Gellinam would require use of diesel fuel, lubricants and solid propellant. A small amount of hazardous waste (e.g., used motor oil, coolant) would be generated during vehicle maintenance. Missile components would be brought to Kwajalein as the initial arrival point and transported to Gellinam.

Hazardous Material Management

The types of hazardous material used during the Proposed Action activities are similar to hazardous materials already in use at USAKA/RTS and would result in only a minor increase over current amounts. Use and management of hazardous materials associated with the use of radars and missile/interceptor launch activities would continue to be performed in accordance with the requirements of the UES and the USAKA Range safety office. Personnel trained in the appropriate procedures to handle potentially hazardous materials would be on standby.

Hazardous Waste Management

Hazardous waste management at USAKA/RTS is performed in accordance with the UES, which requires shipment of hazardous waste back to the continental United States for treatment and/or disposal. Personnel trained in the appropriate procedures to handle potential hazardous waste, including spill containment and cleanup, would be on standby should a mishap occur.

The types of hazardous waste that would potentially be generated from the operation of the radars and launches are similar to wastes already handled at USAKA/RTS. The quantity of hazardous waste that may be generated would represent a small increase over current conditions and would be collected in accordance with the UES. Any washing down of equipment should not result in hazardous material or waste.

Post-Flight Activities

Equipment brought to Gellinam as part of the Proposed Action would be removed. Hazardous wastes generated during activities would be collected and disposed of in accordance USAKA/RTS regulations and the UES.

Cumulative Impacts

Adherence to the standard procedures in place to minimize would preclude the potential accumulation of hazardous materials or waste. As required by the UES, the Army has prepared the KEEP which addresses the procedure for responding to release of hazardous materials and the management of hazardous material (e.g., import, use, and inventory).

4.6.1.6 Illeginni—Hazardous Material and Waste

Refer to Section 4.6.1.5 for the analysis and cumulative impact discuss hazardous material and waste. All 11 USAKA/RTS islands (including Illeginni) follow the same requirements as they relate to the management and storage of hazardous material and waste.

4.6.2 WAKE ISLAND—HAZARDOUS MATERIAL AND WASTE

The operation of the AN/TPY-2 Radar on Wake would require use of diesel fuel to operate the four generators. AN/TPY-2 Radar components are currently located on Wake. The C2BMC would receive power from the same generators supporting the radar; therefore, the operation of the C2BMC would not further impact the hazardous material and waste management for Wake.

Minimal quantities of hazardous waste would be produced by operating the AN/TPY-2 on Wake. These materials are similar to waste already generated and handled at Wake. Management of this hazardous waste is the responsibility of the program and would be accomplished in accordance with applicable regulatory requirements.

The small quantities of waste that are expected to be generated would not represent a significant increase in the amount of hazardous waste currently produced, and no significant impacts from hazardous material and waste would be expected.

Cumulative Impacts

Hazardous materials used and any hazardous waste generated would be very similar to materials and waste presently generated on Wake Island. All materials would be stored and handled according to appropriate health and safety procedures, and all hazardous waste generated during the operation would be handled in accordance to applicable regulatory requirements.

4.6.3 BROAD OCEAN AREA—HAZARDOUS MATERIAL AND WASTE

The Proposed Action is not anticipated to produce an accumulation of hazardous material or waste in the BOA; therefore, no impacts are anticipated to the BOA.

4.7 HEALTH AND SAFETY

4.7.1 UNITED STATES ARMY KWAJALEIN ATOLL/REAGAN TEST SITE (USAKA/RTS)

As part of USAKA/RTS range requirements, a 3-nm no-impact zone must be maintained around all populated islands at USAKA/RTS (Figure 2-1) to preclude debris impacts at any inhabited portion of the launch corridor. A Liquid Propellant Action Response Team and an Explosive Ordnance Disposal Team would be on Kwajalein to meet the incoming THAAD missile due to a small amount of liquid propellant in the Divert and Attitude Control System. The teams would be present for movement of the missile from Kwajalein to Meck.

4.7.1.1 Meck—Health and Safety

Site Preparation Activities

Site preparation activities on Meck would include setup of the AN/TPY-2 (TM) and/or AN/MPQ-65. The health and safety hazards associated with temporary set-up and operation of the Patriot missile radar would involve the potential for exposure to RF radiation. RF radiation is a form of non-ionizing radiation whose primary effect is to cause heating as it interacts with various materials. Radiation keep-out areas are established to the front and sides of the radar face, within the beam's tracking space, and near emitter equipment. All civilian and base personnel are excluded from these electromagnetic radiation areas during flight tests. The radiation hazard zones are indicated by warning signs. Prior to operating on-site radars, a visual survey of the area is conducted to verify that all personnel are outside the hazard zone. Personnel may not enter these hazard zones while the radar unit is in operation. The radar is prevented from illuminating in a designated cutoff zone, in which operators and all other system elements would be located.

THAAD missiles would arrive pre-fueled, and thus no impacts to health and safety from handling or processing solid propellant are anticipated.

Flight Test Activities

Hazards associated with operation of the AN/TPY-2 (TM) were analyzed in both the *Ground Based Radar Family of Radars Environmental Assessment* (U.S. Army Space and Strategic Defense Command, 1993b) and the *Environmental Assessment for Theater Missile Defense Ground Based Radar Testing Program at Fort Devens, Massachusetts* (U.S. Army Space and Strategic Defense Command, 1994c). In both assessments it was concluded that due to the implementation of controlled areas, and limitations in the areas subject to illumination by the AN/TPY-2 (TM) units, no safety hazard would be produced to either the public or the workforce.

Hazards associated with operation of the AN/MPQ-65 system were analyzed in the *Patriot Advanced Capability-3 (PAC-3) Life-cycle Environmental Assessment* (U.S. Army Space and Strategic Defense Command, 1997). The EA concluded that due to the implementation of keep-out zones that exclude civilians and personnel, no safety hazard would be produced to the workforce. Operation of the AN/TPY-2 (TM) or AN/MPQ-65 would be in accordance with designated Army safety procedures, which have been developed to prevent inadvertent exposure to emitted RF radiation. Under these procedures, electromagnetic radiation hazard zones are established within the beam's tracking space and near emitter equipment.

The Proposed Action also includes the launch of THAAD missiles from Meck for BOA intercepts of the target missile. Hazards associated with launch operations would be limited to launch hazards on these islands and the nearby waters. An LHA would be established for each launch to ensure that unauthorized personnel are outside the area, which might be impacted by missile debris. Implementation of LHAs will ensure the safety of members of the public by avoiding impacts to populated islands. Noise levels of 92 dBA would be experienced approximately 4.5 miles away from the THAAD launch site. Sensitive noise receptors are located beyond this noise contour and thus would not be affected.

Post Flight Test Activities

At the conclusion of testing activities on Meck, THAAD program personnel would remove all mobile equipment/assets brought to the range and collect any trash or litter deposited on land during the flight test events. No adverse health and safety impacts are expected.

Cumulative Impacts

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 the cumulative safety impacts attributable to all USAKA/RTS operations within acceptable standards to both workers and the public.

The USAKA Supplemental EIS (U.S. Army Space and Strategic Defense Command, 1993b) evaluated the impacts from multiple launches of missiles per year for several years, a maximum of 28 strategic missiles launched in a single year from Meck. MDA flight tests when combined with other activities are not expected to exceed this number. The increased use of fuel, explosives, and other hazardous materials and the performance of launch and radar-related activities would represent only a small increase in the potential safety risk at USAKA/RTS, and no cumulative impacts are anticipated.

4.7.1.2 Roi-Namur, Kwajalein, and Illeginni—Health and Safety

Site Preparation Activities

Site preparation would be limited to set-up of the AN/TPY-2 (TM) and/or HF Radar systems and placement of the MQM-107E target trailer.

Flight Test Activities

Operations at Roi-Namur, Kwajalein, and Illeginni would be limited to operation of the AN/TPY-2 (TM) and/or the HF Radar systems during flight test operations and a potential for launching an MQM-107E from a trailer. The health and safety hazards for these radar units are similar to those already discussed for the AN/MPQ-65.

Prior to activating the AN/TPY-2 (TM), a visual survey of the area will be conducted to verify that all personnel are outside the hazard zone. Personnel may not enter these hazard zones while the radar unit is in operation. The radar is prevented from illuminating in a designated cutoff zone, in which operators and all other system elements would be located. Potential safety consequences associated with AN/TPY-2 (TM) interference with other electronic and emitter units (flight navigation systems, tracking radars, etc.) were also examined and found to produce no safety hazard to either the public or the workforce.

The specific hazards associated with use of the AN/TPY-2 (TM) at USAKA/RTS were considered in the *U.S. Army Kwajalein Atoll Final Supplemental Environmental Impact Statement* (U.S. Army Space and Strategic Defense Command, 1993a). The analysis considered both program operational requirements and restrictions and USAKA-required safety procedures. It was concluded that the required implementation of all operational safety procedures would preclude any potential for adverse worker exposure to RF radiation.

At Roi-Namur, as at other radar unit operational locations at USAKA/RTS, hazards associated with the Proposed Action would be limited to worker exposure to RF radiation, but also, the potential exists for disturbance of unexploded ordnance, if trenching is necessary. USAKA/RTS has SOPs for explosive safety in place and has explosive ordnance disposal personnel onsite. The RF radiation hazard would be controlled through the implementation of programmatic and USAKA-required safety procedures, which would limit areas which might be illuminated by the radar, the periods during which the radar could be operated, and which would require that appropriate hazard zones be established and kept clear of personnel during radar operation. Based on the conclusions in previous assessments, and the use of safety procedures to limit exposure hazards, the use of the AN/TPY-2 (TM) at Roi-Namur is considered to present no safety hazards to the workforce.

Impacts from MQM-107E launches would be similar to those discussed for other launch systems. An LHA would be established for each launch to ensure that unauthorized personnel are outside the area, which might be impacted by missile debris. Implementation of LHAs will ensure the safety of members of the public by avoiding impacts to populated islands such as Roi-Namur and Kwajalein.

Post Flight Activities

At the conclusion of its testing activities on Roi-Namur, Kwajalein, or Illeginni, program personnel would remove all mobile equipment/assets brought to the range and collect trash and or litter deposited on land during the flight test events. No adverse health and safety impacts are expected.

Cumulative Impacts

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 the cumulative safety impacts attributable to all USAKA/RTS operations within acceptable standards to both workers and the public. According to the 2002 THAAD Pacific Flight Tests EA, the anticipated number of Flight Test missiles launched from RTS could be up to 50 over a period of 4 years, typically ranging from 1 to 14 per year. The USAKA Supplemental EIS (U.S. Army Space and Strategic Defense Command, 1993b) evaluated the impacts from multiple launches of missiles per year for several years, a maximum of 28 strategic missiles launched in a single year from Meck. MDA flight tests when combined with other regional activities are not expected to exceed these numbers and would not be performed at the same time as other missile testing that periodically occurs in the region. The increased use of ordnance, explosives, and other hazardous materials and the performance of launch and radar-related activities would represent a small increase in the potential safety risk at USAKA/RTS, and no cumulative impacts are anticipated.

Flight operations associated with the Proposed Action would also increase the safety risk at USAKA/RTS. However, safety standards are high at USAKA/RTS and would serve to keep the cumulative safety impacts attributable to all USAKA/RTS operations within acceptable standards to both workers and the public.

4.7.1.3 Omelek and Gellinam—Health and Safety

Site Preparation Activities

Approximately 6 to 10 Patriot soldiers would be on-island during set-up, check-out, dry runs, rehearsals, and on firing day. The soldiers would be transported to Omelek or Gellinam from Meck daily using existing marine transportation. They would be housed and fed on Meck. These soldiers would be evacuated from the island during actual firing.

The U.S. OSHA and the U.S. Army have each promulgated standards for exposure to RF radiation in order to prevent excess heat loading. Areas where RF intensity levels might exceed these standards are limited to areas directly within the radar beam in the vicinity of the emitter, and areas immediately surrounding the transmitter site. Exposure control can be achieved through limitation of ground areas illuminated by the beam, and restrictions on occupancy of those areas during radar operation.

Flight Test Activities

Operation of the radar would be in accordance with designated Army safety procedures, which have been developed to prevent inadvertent exposure to emitted RF radiation. Prior to activating the radar, a visual survey of the area will be conducted to verify that all personnel are outside the hazard zone. Personnel may not enter these hazard zones while the radar unit is in operation.

Based on the conclusions in previous assessments, and use of safety procedures to limit exposure hazards, the use of the AN/MPQ-65 at Omelek and Gellinam is considered to present no safety hazards to the workforce.

The PAC-3 Life-cycle EA (U.S. Army Space and Strategic Defense Command, 1997) concluded that due to the implementation of keep-out zones that exclude civilians and personnel, no safety hazard would be produced to the workforce. The maximum noise level is greater than 115 dB within approximately 328 feet of the launch site. An exposure to 115 dB for the time involved in a missile launch is less than 0.4 percent of the daily exposure permitted by OSHA.

Post Flight Activities

At the conclusion of its testing activities, Patriot program personnel would remove all mobile equipment/assets brought to the range and collect trash or litter deposited on land during the test events. No adverse health and safety impacts are expected.

Cumulative Impacts

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 the cumulative safety impacts attributable to all USAKA/RTS operations within acceptable standards to both workers and the public.

The USAKA Supplemental EIS (U.S. Army Space and Strategic Defense Command, 1993b) evaluated the impacts from multiple launches of missiles per year for several years, a maximum of 28 strategic missiles launched in a single year from Meck. MDA flight tests when combined with other activities are not expected to exceed this number. The increased use of explosives

and other prelaunch activities would represent a small increase in the potential safety risk at USAKA/RTS. However, safety standards are high at the USAKA/RTS and would serve to keep the cumulative safety impacts attributable to all USAKA/RTS operations within acceptable standards to both workers and the public, and no cumulative impacts are anticipated.

4.7.2 WAKE ISLAND—HEALTH AND SAFETY

Site Preparation Activities

Target preflight activities, including the transportation and storage of potentially hazardous materials, are considered to be routine operation and would be conducted in accordance with applicable U.S. Army and OSHA health and safety regulations. No substantial health and safety impacts are expected.

Flight Test Activities

Missile launch operations within the military have been conducted for many years. Safety requirements have been developed based on U.S. Army and other applicable health and safety regulations. While risks associated with launch activities will always be present, the use of standard safety procedures minimizes the risks.

All operational activities at the Wake Island Launch Center are subject to Army health and safety regulations. These governing regulations include Army Regulation 385-10, U.S. Army Safety and Occupational Health Program; Army Regulation 385-64, U.S. Army Explosives Safety Program; and R 420-90, Fire and Emergency (which includes operational safety on the island), and medical (which is responsible for Occupational Services). The current safety program at Wake is administered through two Base Operations Support (BOS) departments: safety health issues such as chemical exposure and other hazards. The missile safety program is provided by USAKA/RTS.

The missile range extending from Wake toward USAKA/RTS is under USAKA/RTS jurisdiction. USAKA/RTS Range Safety Manual procedures are applied to missile flight operations such as the ARAV-B launch from Wake. Requirements include presentation of a complete flight performance analysis to the Safety Office of all proposed operations and identification of all potential hazards to the range.

An LHA would be established around the rail launcher that represents the footprint of maximum hazard associated with debris impact and explosive overpressure. Essential personnel would remain within facilities rated to provide adequate blast and debris catastrophic missile failure. Therefore, no health and safety impacts are anticipated from the ARAV-B launch.

MDA IFT activities would not entail any increased hazards, since these activities are considered to be a routine and safe operation. During missile fueling, personnel would be required to wear appropriate protective clothing. In the event of an accident, there is the potential for hazards associated with debris impact, explosion, and release of potentially toxic combustion products. In accordance with the Range Safety Manual, an LHA would be established around the launch facility. Any essential personnel inside this area would remain within facilities rated to provide adequate blast protection. All non-essential personnel would be evacuated to outside the

impact limit line. Therefore, the risk of a health and safety impact resulting from such a failure is not considered substantial.

Post Flight Activities

No health and safety impacts are expected from the removal of mobile equipment/assets brought to the range for MDA IFT activities. Removal activities would be considered routine and would be conducted under a standard of care considered appropriate for such procedures.

Cumulative Impacts

The increased use of fuels, explosives, and the performance of other launch and radar-related activities would represent a small increase in the potential safety risk at Wake. No cumulative impacts to health and safety are predicted as a result of MDA IFT activities.

4.7.3 BROAD OCEAN AREA—HEALTH AND SAFETY

Every reasonable precaution is taken during the planning and execution of test and development activities to prevent injury to human life or property. Each test range conducts missile flight safety, which 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 and hazard area dimensions, review and approval of destruct systems proposals and preparation of the Range Safety Approval and Range Safety Operational Plans required of all programs.

Impact zones in the BOA would be delineated. The location and dimensions of the impact zones would vary for each test flight scenario. Impact zones for each test flight would be determined by range safety personnel based on detailed launch planning and trajectory modeling. This planning and modeling would include analysis and identification of a flight corridor. Flights would be conducted when trajectory modeling verifies that flight vehicles and debris would be contained within predetermined areas, all of which would be over the open ocean and far removed from land and populated areas. Appropriate NOTMARs and NOTAMs would be issued before proceeding with a launch. Consequently, the Proposed Action would have no adverse impacts to public health and safety in the BOA.

Furthermore, prior warning of flight testing and training would enable commercial shipping to follow alternative routes away from test areas. Safety programs described in the USAKA Supplemental EIS include ground safety for general operations and flight safety for the protection of USAKA/RTS personnel, inhabitants of the RMI, and traffic in areas where tests are being conducted. Each mission would have an approved flight safety plan that would define the areas affected by the mission, the caution and hazard areas, and precautions to protect inhabited. Flight safety plans would also include requirements for warning messages, evacuation, and surveillance. Missions affecting the BOA would require the implementation of current range safety measures, such as aircraft and ship clearance for the caution area. NOTAMs and NOTMARs would be published as required.

Cumulative Impacts

Each launch would result in the impact of boosters and the payload into the open ocean. The Proposed Action would result in a temporary increase in missile activities in the BOA. As such, there could be a cumulative impact to health and safety in the BOA. However, the Proposed Action also requires the administration of NOTAMs and NOTMARs to warn aircraft and surface vessels of the potentially hazardous areas and allows them ample time to avoid the hazards. As such, any cumulative health and safety impact in the BOA due to the Proposed Action would be minimal.

4.8 INFRASTRUCTURE

4.8.1 UNITED STATES ARMY KWAJALEIN ATOLL/REAGAN TEST SITE (USAKA/RTS)

4.8.1.1 Meck—Infrastructure

Approximately 120 soldiers and other test-related personnel would be deployed to Meck in support of the Proposed Action.

Transportation

Modes of transportation would not be impacted by the 120 soldiers and other test-related personnel, and personnel would not be provided individual vehicles during their stay on the island. The Proposed Action is not anticipated to impact the movement of any equipment or personnel on the island.

The transportation of radar and launch equipment would be by existing marine transportation. Once on island the equipment and materials would be transported and stored in accordance USAKA/RTS and UES requirements.

Utilities

Water

The on-island water treatment plant is operational and has the capability to supply and maintain the water level to support the personnel during their short stay on the island (60 days). Raw fresh water is available to supplement the drinking water supply. The water produced at Meck meets the requirements of the UES. The Proposed Action is not anticipated to impact the available water on Meck.

Wastewater Treatment

The septic system on Meck is designed to collect wastewater and should not be negatively impacted by the short stay of the personnel. The Proposed Action is not anticipated to impact wastewater treatment on Meck.

Solid Waste

The Proposed Action would generate solid waste. The waste would be collected and taken to the landfill/incinerator facility for processing. The Proposed Action is not anticipated to impact solid waste disposal on Meck.

Electricity

The power furnished to the temporary housing area and the existing dining facility would be provided by the Meck power plant, which is operated by five diesel generators. Standby generators are maintained for backup or power shortage. The Proposed Action is not anticipated to impact electrical demand capacity on Meck.

Cumulative Impacts

The use of the infrastructure on Meck has been analyzed previously in the 1993 Supplemental EIS for Proposed Actions at USAKA and the PAC-3 Life-cycle EA. It was determined in both documents that no cumulative impacts were anticipated. Accordingly, no cumulative impacts are predicted for infrastructure use as a result of this Proposed Action on Meck. Sufficient infrastructure would be available and capable of supporting the personnel associated with the launch activities. The demand on electrical, wastewater, solid waste, water, and marine transport needed to support the personnel is expected to be within the current capacity of the utility systems on Meck.

No adverse impacts to waterway transport are expected from the transport of test components to and from Meck. All modes of transport (land, air or water) would be performed in accordance with established procedures (DOT, FAA, U.S. Coast Guard, and applicable U.S. Army regulations).

4.8.1.2 Roi-Namur, Kwajalein, Gellinam, and Illeginni—Infrastructure

Ground transportation would be accomplished using organic unit assets or vehicles supplied by USAKA/RTS. Generators would be used to supply power to the radars and launch stations. No impacts are anticipated from the Proposed Action; therefore, this resource was not analyzed for these locations.

4.8.1.3 Omelek—Infrastructure

There would be portable toilets on Omelek which content would be pumped out and transported to Kwajalein for treatment in the Wastewater Treatment Plant. Trash generated on Omelek would be collected and transported to Meck to be treated in the incinerator or transported to Kwajalein to be treated in the incinerator, in the event the Meck incinerator is not operational. In the event that Gellinam is used for the IFT-01 mission, the toilets and trash would be managed in the same manner as described for Omelek.

Cumulative Impacts

No cumulative impacts are predicted as a result of executing the Proposed Action on Omelek. Sufficient infrastructure would be available and capable of supporting launch activities.

4.8.2 WAKE ISLAND—INFRASTRUCTURE

The use of infrastructure facilities at Wake for launch activities have been analyzed in previous documents (e.g., Wake Island Launch Center Supplemental EA, 1999; MDA Wake Island Supplemental EA, 2007) and both concluded no cumulative impacts to infrastructure and transportation would be expected from implementing launch test activities. No impacts are anticipated from the Proposed Action; therefore, this resource was not analyzed for Wake Island.

4.8.3 BROAD OCEAN AREA—INFRASTRUCTURE

Infrastructure is not applicable to the BOA; therefore, this resource was not analyzed for this location.

4.9 LAND USE

4.9.1 UNITED STATES ARMY KWAJALEIN ATOLL/REAGAN TEST SITE (USAKA/RTS)

4.9.1.1 Meck, Roi-Namur, Omelek, Kwajalein, Gellinam, and Illeginni—Land Use

There would be no changes in the current land use patterns for USAKA/RTS. The use of the facilities (i.e., placement of radar, launch activities for interceptors or targets) is a normal operation. No impacts are anticipated from the Proposed Action; therefore, this resource was not analyzed for USAKA/RTS.

4.9.2 WAKE ISLAND—LAND USE

The Proposed Action would not alter the current land use pattern for Wake. The use of the facilities for the placement of radar, missile and target launcher is a normal operation. No impacts are anticipated from the Proposed Action; therefore, this resource was not analyzed for Wake Island.

4.10 NOISE

4.10.1 UNITED STATES ARMY KWAJALEIN ATOLL/REAGAN TEST SITE (USAKA/RTS)

4.10.1.1 Meck—Noise (THAAD Launchers, AN/TPY-2 (TM), AN/MPQ-65)

THAAD Launchers and AN/TPY-2 (TM)

The Theater Missile Defense ETR EIS (U.S. Army Space and Strategic Defense Command, 1994a) concluded that up to 48 defensive missile launches per year would not result in significant noise impacts. Potential noise impacts from the launches of strategic launch vehicles and the operation of their support equipment on Meck were also addressed in the USAKA Final Supplemental EIS (U.S. Army Space and Strategic Defense Command, 1993a). The EIS

concluded that the resulting sound pressure levels would cause neither workplace standards to be violated nor noise sensitive receptors to experience maximum short-term noise levels greater than 92 dB. Noise from the PPU would be approximately 85 dBA 98 feet from the truck and thus would not impact sensitive noise receptors. Noise levels of 92 dB would be experienced approximately 4.5 miles away from the THAAD launch site. For comparison purposes, Table 4-5 lists the noise levels of typical equipment. For example, a heavy truck has a noise level of 95 dBA (3 dBA higher than a defensive missile), and, if a person is standing 50 feet away from the heavy truck, the noise level perceived drops to between 84-89 dB. Sensitive noise receptors are located beyond this noise contour and thus would not be affected.

Table 4-5. Typical Equipment Noise Levels

Source	Noise level (peak [dB])	Distance from Source			
		50 feet	100 feet	200 feet	400 feet
Heavy Trucks	95	84-89	73-83	72-77	66-71
Dump Trucks	108	88	82	76	70
Concrete Mixer	105	85	79	73	67
Jackhammer	108	88	82	76	70
Scraper	93	80-89	74-82	68-77	60-71
Dozer	107	87-102	81-96	75-90	69-84
Generator	96	76	70	64	58
Crane	104	75-88	69-82	63-76	55-70
Loader	104	73-86	67-80	61-74	55-68
Grader	108	88-91	82-85	76-79	70-73
Dragline	105	85	79	73	67
Pile Driver	105	95	89	83	77
Fork Lift	100	95	89	83	77

Source: Golden et al., 1980

AN/MPQ-65

Increased noise levels are expected during launch events. Based on the 1997 PAC-3 Life-cycle EA, the predicted maximum sound pressure level contours were anticipated to be 85-95 dB during a PAC-3 missile launch. These maximum levels would last for several seconds and then taper off as the launch vehicle moves away from the launch site. The maximum noise level is greater than 115 dB within approximately 328 feet of the launch site. An exposure to 115 dB for the time involved in a missile launch is less than 0.4 percent of the daily exposure permitted by OSHA. The noise levels from the AN/MPQ-65 are not anticipated to impact personnel as the radar station has a personnel exclusion area established 395 feet to the front and extending 60 degrees to each side of the center of the radar during operations.

Noise generated during removal of all mobile equipment/asset should have minimal impact to the noise environment on or off the island.

Any affect to biological resources from noise is discussed in Section 4.1.3.3, and any impacts from noise on the broad open ocean are discussed in Section 4.3.5.

Cumulative Impacts

The USAKA Supplemental EIS (U.S. Army Space and Strategic Defense Command, 1993a) evaluated the impacts from multiple launches of missiles per year for several years, a maximum of 28 strategic missiles launched in a single year from Meck. According to the 2002 THAAD Pacific Flight Tests EA, the anticipated number of THAAD missiles launched from RTS could be up to 50 over a period of 4 years, typically ranging from 1 to 14 per year. MDA flight tests when combined with other activities are not expected to exceed these numbers. Given the temporary nature of these launch events on Meck, the proposed THAAD test flights and the use of the AN/MPQ-65 would not result in cumulative impacts.

4.10.1.2 Roi-Namur—Noise

The use of radar and land launched target trailer/done are not anticipated to impact the level of noise being generated at Roi-Namur; therefore, this resource was not analyzed for Roi-Namur.

4.10.1.3 Omelek—Noise

Refer to Section 4.10.1.5 below for a discussion of the noise levels (dB) generated during a PAC-3 launch. These noise levels are not anticipated to impact personnel on Omelek as they would be evacuated from the island prior to any launch or firing rehearsal. Noise generated during the removal of all mobile equipment and assets would have minimal impact to the noise environment on or off Omelek.

Cumulative Impacts

No noise sensitive noise receptors are in the vicinity (soldiers would be evacuated from the island during rehearsal and on firing day); thus, no noise impacts are expected. The sound levels generated by each launch would be a short discrete event; the potential cumulative impacts from the noise from the Proposed Action would not be substantial.

Any effects to biological resources from noise are discussed in Section 4.3.1.1, and any impacts from noise on the BOA are discussed in Section 4.3.5.

4.10.1.4 Kwajalein—Noise

The use of land launched target trailer is not anticipated to impact the level of noise being generated on Kwajalein. Therefore, this resource was not analyzed for Kwajalein.

4.10.1.5 Gellinam—Noise (Patriot Launch Station and Radar)

Increased noise levels are expected during launch events. Based on the PAC-3 Life-cycle EA (U.S. Army), the predicted maximum sound pressure level contours are 85-95 dB during a PAC-3 missile launch. These maximum levels would last for several seconds and then taper off as the launch vehicle moves away from the launch site. The maximum noise level is greater than 115 dB within approximately 328 feet of the launch site. An exposure to 115 dB for the time involved in a missile launch is less than 0.4 percent of the daily exposure permitted by OSHA.

These noise levels from the LS are not anticipated to impact personnel as they would be located in the Patriot ECS shelter with applicable protective hearing equipment. The noise levels from the radar are also not anticipated to impact personnel as the radar station has a personnel exclusion area established 395 feet to the front and extending 60 degrees to each side of the center of the radar during operations.

Noise generated during the removal of all mobile equipment and assets would have minimal impact to the noise environment on or off Gellinam.

Any impact to biological resources from noise is discussed in Section 4.3.1.5, and any impacts from noise on the BOA are discussed in Section 4.10.3.

Cumulative Impacts

As with the noise analysis from previous documents, no cumulative impacts are anticipated. Additionally, the sound levels generated by each launch would be a short discrete event; the potential cumulative impacts from the noise from the Proposed Action would not be substantial; thus, no noise impacts are expected on or off Gellinam.

4.10.1.6 Illeginni—Noise

Target launches from a trailer not anticipated to impact the level of noise being generated at Illeginni. As with the noise analysis from previous documents, no cumulative impacts are anticipated. Additionally, the sound levels generated by each launch would be a short discrete event; the potential cumulative impacts from the noise from the Proposed Action would not be substantial; thus, no noise impacts are expected on or off Illeginni.

4.10.2 WAKE ISLAND—NOISE

The operation of the radar system on Wake Island is a normal activity. As concluded in the MDA Wake Island Supplemental EA, with the high ambient noise levels from wind and surf, additional noise generated would be negligible. Therefore, no cumulative impacts from the Proposed Actions would be expected.

4.10.3 BROAD OCEAN AREA—NOISE

Flight and Post Flight Activities

The proposed activities include interceptor and targets launched from USAKA/RTS, Wake, and the BOA. These activities could result in an increase in sound events. These increases would contribute a negligible level of increased sound; however, they would occur in the BOA where typically no sensitive sound receptors are present.

Additional instantaneous sounds over the BOA, such as low level sonic booms, may accompany the proposed missile launches, as is the case for current operations. While the supersonic flight of missiles generates sonic booms, the size, design, and trajectory of interceptors limits the magnitude of the sonic boom generated. In the case of the Proposed Action, the magnitude of the sonic boom is not expected to be loud, and is not expected to impact populated areas.

Cumulative Impacts

No substantial impacts to the BOA and its wildlife from program noise have been identified from current and past missile test activities. Prior analysis has not identified a significant potential for cumulative noise impacts. Test flight activities that would take place in the BOA would be discrete, short-term events, and no adverse cumulative impacts are anticipated.

4.11 SOCIOECONOMICS

4.11.1 UNITED STATES ARMY KWAJALEIN ATOLL/REAGAN TEST SITE (USAKA/RTS)

Meck, Omelek, Gellinam, and Illeginni are unpopulated and do not have any socioeconomic attributes (population size, employment, income generated and type and cost of housing). Kwajalein and Roi-Namur do have socioeconomic attributes. The Proposed Action would have a slight beneficial effect on the potential for new jobs supporting actions on Roi-Namur and Kwajalein. Based on the use of the unpopulated islands and the insignificant affect on Roi-Namur and Kwajalein, this resource was not analyzed for the other USAKA/RTS islands.

4.11.2 WAKE ISLAND—SOCIOECONOMICS

Because of Wake's location, socioeconomic issues are of no factor; therefore, this resource was not analyzed for Wake.

4.11.3 BROAD OCEAN AREA—SOCIOECONOMICS

There are no known commercial fishing and commercial shipping routes in the vicinity of the Proposed Action; therefore, this resource was not analyzed for this location.

4.12 VISUAL AESTHETICS

4.12.1 UNITED STATES ARMY KWAJALEIN ATOLL/REAGAN TEST SITE (USAKA/RTS)

4.12.1.1 Meck, Roi-Namur, Omelek, Kwajalein, Gellinam and Illeginni—Visual Aesthetics

The Proposed Action is not anticipated to alter the current scenic quality of USAKA/RTS; therefore, this resource was not analyzed for USAKA/RTS.

4.12.2 WAKE ISLAND—VISUAL AESTHETICS

The Proposed Action is not anticipated to alter the current scenic quality of Wake.

4.12.3 BROAD OCEAN AREA—VISUAL AESTHETICS

The Proposed Action is not anticipated to alter the current scenic quality of the BOA.

4.13 WATER RESOURCES

4.13.1 UNITED STATES ARMY KWAJALEIN ATOLL/REAGAN TEST SITE (USAKA/RTS)

4.13.1.1 Meck, Omelek, Gellinam and Illeginni—Water Resources

There are no known surface water, groundwater, and flood zones on the islands. In the unlikely event of an accidental release of hazardous material at the storage area, emergency response personnel would comply with the KEEP. No cumulative impacts are expected from the Proposed Action.

4.13.1.2 Roi-Namur and Kwajalein—Water Resources

No impacts are anticipated from the Proposed Action; therefore, this resource was not analyzed for the Roi-Namur and Kwajalein.

4.13.2 WAKE ISLAND—WATER RESOURCES

No impacts are anticipated from the Proposed Action; therefore, this resource was not analyzed for Wake.

4.13.3 BROAD OCEAN AREA—WATER RESOURCES

This section addresses the potential impacts to water resources (e.g., physical and chemical properties, salinity, density, temperature, pH, dissolved gases marine pollutants) due to the Proposed Action.

Flight and Post Flight Activities

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

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

Cumulative Impacts

No cumulative effects to water resources are anticipated as a result of the Proposed Action. The effect of any electric generator or rocket motor emission products deposited in the BOA

would be very transient due to the buffering capacity of sea water and dilution by current mixing and would not be expected to result in any cumulative effects with ongoing USAKA/RTS activities.

4.14 ENVIRONMENTAL EFFECTS OF THE NO-ACTION ALTERNATIVE

Under the No-action Alternative, MDA would not perform integrated flight tests to demonstrate regional BMDS ability to defeat up to five near-simultaneous targets in an operationally-relevant scenario at USAKA/RTS. There would be no additional impacts to the environment based on the No-Action Alternative.

4.15 BEST MANAGEMENT PRACTICES

Best Management Practices are those actions that would be taken by the proponent of the Proposed Action to minimize the potential for impacts to the environment. The following are actions currently in place or put forward to date.

- The existing Air Quality DEP would be reviewed and modified as appropriate to constrain impacts to regional air quality.
- The PPU's, used to power the AN/TPY-2 (TM) system, are self-contained trailers in a noise-dampening shroud that contain two diesel engine-powered generators.
- NOTAMs would be issued to advise avoidance of the AN/MQM-65, AN/TPY-2 (TM), AN/TPY-2, and HF radar areas during IFT activities.
- MDA would coordinate launches with the USAKA/RTS Commander, which would include scheduling to avoid the potential for airspace conflicts.
- Launch operations would be suspended when it is known or suspected that any unauthorized aircraft have entered any part of the surface danger zone until the unauthorized entrant has been removed or a thorough check of the suspected area has been performed.
- Fiber-optic cables would be laid on the ground or along existing road rights of way. If fiber-optic cables require additional protection from vehicle and foot traffic, they would be placed in cable raceways.
- Personnel would be instructed to avoid areas designated as avian nesting or roosting habitat and to avoid all contact with any nest that may be encountered. Sea turtles or turtle nests would also be avoided.
- Appropriate avoidance of protected species may include formal notice to all personnel regarding UES protections for species and habitats, limitations regarding intentional take and transport of species, and cautions regarding incidental take during recreational activities.
- Any intercept debris greater than 11 foot-pounds of energy from mishaps landing in the Kwajalein Lagoon at depths of up to approximately 164 feet of water would be recovered.
- Impermeable ground cover and/or spill-containment berms would be used to offset the effects from spills during refueling of the PPU or leaks from the closed CEU system.

- The radiation hazard area would be visually surveyed for birds and other wildlife prior to the activation of the radar systems.
- Maximum effort would be made to locate the AN/TPY-2 (FBM) radar and communications equipment or the HF Radar so as to avoid areas of herbaceous strand and littoral forest vegetation.
- A substantial re-planting effort of native vegetation will be implemented on the eastern shoreline of Omelek at a 2:1 ratio of re-plants to removal of trees/shrubs, in coordination with USAKA/RTS and other appropriate agencies.
- Personnel would be briefed on the need to respect and protect sensitive island resources, including the remaining native forest, and to avoid harassment of sensitive species.
- Personnel would be instructed to stay on existing roads and paths where possible.
- Immediately prior to shipment, prefabricated buildings and all other materials would be inspected by a certified pest control inspector and, if necessary, treated for the removal of pests (e.g., rats, mice, and ants) and other non-native species.
- Signs would be posted on the northern part of Omelek designating sensitive areas.
- Site preparation activities would be delayed if UES-protected species (such as sea turtles) are observed on the island until any such species observed has moved out of harm's way or leaves the area.
- Project personnel will be briefed during the routine construction briefing for USAKA/RTS regarding the significance of cultural resources and the penalties associated with their disturbance or collection.
- If, during the course of program activities, cultural materials, particularly human remains, are discovered activities in the immediate vicinity of the find would be halted and the USASKA/RTS environmental office notified.
- Prior to emplacing grounding rods and staking down the MQM-107-E trailer, coordination with the USAKA Environmental Coordinator would be conducted.
- The THAAD Launcher will be located on the asphalt road and a steel blast plate will be used to reduce damage to the asphalt and to soils.
- All fuel handling areas will include secondary containment.
- Personnel trained in the appropriate procedures to handle potentially hazardous materials would be on standby.
- Prior to operating on-site radars, a visual survey of the area is conducted to verify that all personnel are outside the hazard zone.
- Personnel and soldiers would be evacuated from the Omelek and Gellinam island during actual firing.
- Impact zones for each test flight would be determined by range safety personnel based on detailed launch planning and trajectory modeling.

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

Proposed activities would be conducted in a manner that would not substantially affect human health and the environment. 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.

4.17 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.

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5.0 References

5.0 REFERENCES

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Republic of the Marshall Islands Environmental Protection Authority (RMIEPA)
Majuro, MH

U.S. Army Kwajalein Atoll/ Reagan Test Site (USAKA/RTS)
USAKA Directorate of Public Works

U.S. Army Space and Missile Defense Command/Army Forces Strategic Command
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Appendix A Distribution List

APPENDIX A

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Wake Island Environmental Manager
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LIBRARIES AND REPOSITORIES

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Roi-Namur Library
Roi-Namur, MH

Republic of the Marshall Islands Environmental Protection Authority
Delap, Majuro, MH

Appendix B

Correspondence

APPENDIX B

CORRESPONDENCE



REPLY TO
ATTENTION OF

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

SMDC-EN

6 June 2012

MEMORANDUM FOR

Commander, U.S. Army Corps of Engineers, ATTN: CEPOH-PP-E (H. Takemoto), Building
252, Ft. Shafter, HI 96858-5440
Commander, U.S. Army Kwajalein Atoll, ATTN: SMDC-RDTC-TEK-W (A. Hoover),
P.O. Box 903, APO, AP 96555-0010

SUBJECT: Missile Defense Agency Integrated Flight Testing Coordinating Draft
Environmental Assessment

1. The U.S. Army Space and Missile Defense Command/U.S. Army Forces Strategic Command (USASMDC/ARSTRAT), in accordance with the U.S. Army Kwajalein Atoll (USAKA) Environmental Standards (UES) and the National Environmental Policy Act, has prepared the enclosed Missile Defense Agency Integrated Flight Testing Coordinating Draft Environmental Assessment (CDEA). Please provide your comments on this CDEA by 9 July 2012 using the enclosed comment form. You may e-mail your comments to Sharon.g.mitchell@us.army.mil.
2. This CDEA examines the potential environmental effects of performing Integrated Flight Tests at the U.S. Army Kwajalein Atoll/Ronald Reagan Ballistic Missile Defense Test Site (USAKA/RTS), Wake Island, and in the broad ocean area (BOA).
3. The analysis will show the potential impacts from the proposed integrated flight testing does not differ from previous tests contemplated in earlier environmental analyses conducted for flight testing at USAKA/RTS and there will be no effect to species protected by the Endangered Species Act or the UES.
4. I am also providing copies of this CDEA, for comment, to Loyal Mehrhoff, U.S. Fish and Wildlife Service; Gerry Davis, National Marine Fisheries Service; Debra Barker-Manase,

SMDC-EN

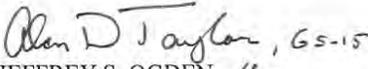
SUBJECT: Missile Defense Agency Integrated Flight Testing Coordinating Draft
Environmental Assessment

Republic of the Marshall Islands Environmental Protection Authority; and W. Norwood Scott,
U.S. Environmental Protection Agency.

5. For questions or concerns, please contact Ms. Sharon Mitchell, Environmental Engineer,
USASMDC/ARSTRAT, Environmental Division, (256) 955-4392, fax (256) 955-6659, or e-mail
her at sharon.g.mitchell@us.army.mil.

FOR THE COMMANDER:

Encl


JEFFREY S. OGDEN /for
Colonel, U.S. Army
Deputy Chief of Staff, Engineer



REPLY TO
ATTENTION OF

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

June 6, 2012

Environmental Division

Loyal Mehrhoff
Field Supervisor
U.S. Fish and Wildlife Service
Pacific Islands Fish and Wildlife Office
P.O. Box 50088
Honolulu, HI 96850

Dear Mr. Mehrhoff:

The U.S. Army Space and Missile Defense Command/U.S. Army Forces Strategic Command (USASMDC/ARSTRAT), in accordance with the U.S. Army Kwajalein Atoll (USAKA) Environmental Standards (UES) and the National Environmental Policy Act, has prepared the enclosed Missile Defense Agency Integrated Flight Testing Coordinating Draft Environmental Assessment (CDEA). Please provide your comments on this CDEA by 9 July 2012 using the enclosed comment form. You may e-mail your comments to Sharon.g.mitchell@us.army.mil.

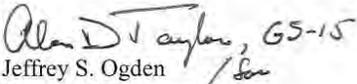
This CDEA examines the potential environmental effects of performing Integrated Flight Tests at the U.S. Army Kwajalein Atoll/Ronald Reagan Ballistic Missile Defense Test Site (USAKA/RTS), Wake Island, and in the broad ocean area (BOA).

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I am also providing copies of this CDEA, for comment, to Gerry Davis, National Marine Fisheries Service; Debra Barker-Manase, Republic of the Marshall Islands Environmental Protection Authority; Helen Takemoto, U.S. Army Corps of Engineers; and W. Norwood Scott, U.S. Environmental Protection Agency.

For questions or concerns, please contact Ms. Sharon Mitchell, Environmental Engineer,
USASMDC/ARSTRAT, Environmental Division, (256) 955-4392, fax (256) 955-6659, or e-mail
her at sharon.g.mitchell@us.army.mil.

Sincerely,


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

Enclosures

CF: Dan Polhemus, U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office,
P.O. Box 50088, Honolulu, HI 96850



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

June 6, 2012

Environmental Division

Gerry Davis.
National Marine Fisheries Service/Pacific Islands Regional Office (NMFS)
Habitat Conservation Division
1601 Kapiolani Blvd, Suite 1110
Honolulu, HI 96814-4700

Dear Mr. Davis:

The U.S. Army Space and Missile Defense Command/U.S. Army Forces Strategic Command (USASMDC/ARSTRAT), in accordance with the U.S. Army Kwajalein Atoll (USAKA) Environmental Standards (UES) and the National Environmental Policy Act, has prepared the enclosed Missile Defense Agency Integrated Flight Testing Coordinating Draft Environmental Assessment (CDEA). Please provide your comments on this CDEA by 9 July 2012 using the enclosed comment form. You may e-mail your comments to Sharon.g.mitchell@us.army.mil.

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For questions or concerns, please contact Ms. Sharon Mitchell, Environmental Engineer,
USASMDC/ARSTRAT, Environmental Division, (256) 955-4392, fax (256) 955-6659, or e-mail
her at sharon.g.mitchell@us.army.mil.

Sincerely,

Alan D Taylor, GS-15
Jeffrey S. Ogden /*For*
Colonel, U.S. Army
Deputy Chief of Staff, Engineer

Enclosures

CF: Steven P. Kolinski, Ph.D., National Marine Fisheries Service/Pacific Islands Regional
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REPLY TO
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DEPARTMENT OF THE ARMY
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ARMY FORCES STRATEGIC COMMAND
POST OFFICE BOX 1500
HUNTSVILLE, ALABAMA 35807-3801

June 6, 2012

Environmental Division

Ms. Deborah Barker-Manase
Republic of the Marshall Islands Environmental Protection Authority
General Manager
P.O. Box 1322
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Dear Ms. Barker-Manase:

The U.S. Army Space and Missile Defense Command/U.S. Army Forces Strategic Command (USASMDC/ARSTRAT), in accordance with the U.S. Army Kwajalein Atoll (USAKA) Environmental Standards (UES) and the National Environmental Policy Act, has prepared the enclosed Missile Defense Agency Integrated Flight Testing Coordinating Draft Environmental Assessment (CDEA). Please provide your comments on this CDEA by 9 July 2012 using the enclosed comment form. You may e-mail your comments to Sharon.g.mitchell@us.army.mil.

This CDEA examines the potential environmental effects of performing Integrated Flight Tests at the U.S. Army Kwajalein Atoll/Ronald Reagan Ballistic Missile Defense Test Site (USAKA/RTS), Wake Island, and in the broad ocean area (BOA).

The analysis will show the potential impacts from the proposed integrated flight testing does not differ from previous tests contemplated in earlier environmental analyses conducted for flight testing at USAKA/RTS and there will be no effect to species protected by the Endangered Species Act or the UES.

I am also providing copies of this CDEA, for comment, to Gerry Davis, National Marine Fisheries Service; Helen Takemoto, U.S. Army Corps of Engineers; and W. Norwood Scott, U.S. Environmental Protection Agency; and Loyal Merhoff, U.S. Fish and Wildlife Service.

For questions or concerns, please contact Ms. Sharon Mitchell, Environmental Engineer,
USASMDC/ARSTRAT, Environmental Division, (256) 955-4392, fax (256) 955-6659, or e-mail
her at sharon.g.mitchell@us.army.mil.

Sincerely,

Alan D Taylor, GS-15
Jeffrey S. Ogden *JSO*
Colonel, U.S. Army
Deputy Chief of Staff, Engineer

Enclosures



REPLY TO
ATTENTION OF

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

June 6, 2012

Environmental Division

Mr. W. Norwood Scott
U.S. Environmental Protection Agency, Region IX
Pacific Islands Office
75 Hawthorne Street (CED-6)
San Francisco, CA 94105

Dear Mr. Scott:

The U.S. Army Space and Missile Defense Command/U.S. Army Forces Strategic Command (USASMDC/ARSTRAT), in accordance with the U.S. Army Kwajalein Atoll (USAKA) Environmental Standards (UES) and the National Environmental Policy Act, has prepared the enclosed Missile Defense Agency Integrated Flight Testing Coordinating Draft Environmental Assessment (CDEA). Please provide your comments on this CDEA by 9 July 2012 using the enclosed comment form. You may e-mail your comments to Sharon.g.mitchell@us.army.mil.

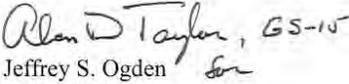
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The analysis will show the potential impacts from the proposed integrated flight testing does not differ from previous tests contemplated in earlier environmental analyses conducted for flight testing at USAKA/RTS and there will be no effect to species protected by the Endangered Species Act or the UES.

I am also providing copies of this CDEA, for comment, to Gerry Davis, National Marine Fisheries Service; Debra Barker-Manase, Republic of the Marshall Islands Environmental Protection Authority; Helen Takemoto, U.S. Army Corps of Engineers; and Loyal Merhoff, U.S. Fish and Wildlife Service.

For questions or concerns, please contact Ms. Sharon Mitchell, Environmental Engineer,
USASMDC/ARSTRAT, Environmental Division, (256) 955-4392, fax (256) 955-6659, or e-mail
her at sharon.g.mitchell@us.army.mil.

Sincerely,


Jeffrey S. Ogden *son*
Colonel, U.S. Army
Deputy Chief of Staff, Engineer

Enclosures



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: eparmi@ntamar.net

July 9, 2012

Sharon G. Mitchell
Environmental Engineer
U.S. Army Space and Missile Defense Command

Dear Ms. Mitchell,

The Republic of the Marshall Islands Environmental Protection Authority wishes to convey the following comments, pursuant to Article VI of Title One of the Compact of Free Association, in which "the Governments of the United States and the Republic of the Marshall Islands declare that it is their policy to promote efforts to prevent or eliminate damage to the environment and biosphere and to enrich understanding of the natural resources of the Republic of the Marshall Islands," and in which the US "shall apply the National Environmental Policy Act Applicability, of 1969, 83 Stat. 852, 42 U.S.C. 4321 et seq., to its activities under the Compact, as amended, and its related agreements as if the Republic of the Marshall Islands were the United States."

These comments are in relation to the MDA Integrated Flight Test Coordinating Draft EA, concerning a series of proposed missile testing actions in the Mid-Corridor area and other locations. Specifically:

1. Section 3.4.2, Section 4.4.2, and other relevant sections regarding Wake Island Cultural Resources. These sections do not properly note or evaluate the traditional cultural property of Wake Island within Marshallese history and culture. More information regarding the identification and evaluation of Traditional Cultural Properties may be found at: <http://www.nps.gov/nr/publications/bulletins/nrb38>. The RMI Historic Preservation Office may be able to provide more information regarding Wake Island's significance. Impacts may be possible.
2. Section 4.11 and other sections regarding Socio-economics. It should be noted that in our view, the statement "Kwajalein does not have any Socio economic attributes" is incorrect. Impacts - positive or negative - on the Ebeye population which works or benefits from larger employment or activities on USAKA should be considered and addressed.
3. Section 4.16 regarding Environmental Justice. This executive order sets forward a directive to analyze disproportionate environmental impacts on low-income populations - here, it is our view that specific attention should be provided to the Ebeye population.
4. Section 4.15, regarding mitigation measures. Some or certain of these measures appear to us to be "standard operating procedure", or common sense, eg a baseline plan of action which would be conducted on a routine basis, particularly those regarding human safety. Therefore, lacking further explanation, some of these items appear to us to be more accurately placed in the

MDA Integrated Flight Test Coordinating Draft EA

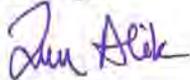
section of described proposed action, instead of environmental mitigation actions, or, alternatively, it should be explained how items are specific mitigation measures connected to otherwise anticipated impacts, and which are not normally undertaken, or would not otherwise be undertaken as a routine practice, but for the specific impacts described herein.

5. General statement regarding cumulative effects. The statement "no cumulative effects are anticipated" or related formulations, is used throughout. It appears to be, in some instances, conclusory in usage and should be further substantiated with connections to specific data and, where possible, thresholds - eg what is considered "cumulative" not only within discrete areas, but across the range of environmental areas within this and other actions. On what basis was the conclusion reached either generally, or within the context of the SEIS/FEIS?

6. General statement regarding decision-making, including section 1.4 "decision to be made". It would be helpful to explain how this EA and environmental effects generally is being integrated within larger agency planning and decision-making, including on a timeline basis. How is early consideration of environmental impacts being undertaken? Given the timeframe of planned actions this summer, and what may be by now a fairly mature level of agency, logistical and technical planning, it would be helpful to explain how the timely consideration of environmental issues, including the no-action alternative, is related to final decision-making.

Thank you for the opportunity to convey these comments.

Sincerely,



Lowell Alik
Acting General Manager, RMI EPA



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

July 10, 2012

SUBJECT: Final Missile Defense Agency Integrated Flight Test Environmental Assessment
(EA) and Draft Finding of No Significant Impacts (FONSI)

To Whom It May Concern:

Please provide space in your library for public access to the enclosed Final Missile Defense Agency (MDA) Integrated Flight Test EA and associated Draft FONSI. These documents should be made available for public access and review through August 20, 2012. Electronic versions of these documents are available from MDA's public website at: http://www.mda.mil/news/environmental_reports.html.

MDA requests and welcomes questions and comments on the enclosed EA and Draft FONSI during the public comment period, which ends August 20, 2012. Please send your written questions and comments via e-mail (preferred) to EnvGrp@mda.mil, fax at 256-450-2528, or by regular mail to:

Missile Defense Agency/DPF
Bldg 5224, Martin Road
Redstone Arsenal, AL 35898
ATTN: Mr. Dan Spiegelberg, P.E.

All questions and comments must be received no later than August 20, 2012 to ensure they are included in the record for this project. My point of contact for this matter is Mr. Dan Spiegelberg and he can be reached by telephone at 256-450-2672 or by e-mail at dan.spiegelberg@mda.mil.

Sincerely,

MARTIN F. DUKE
Director
Facilities, Military Construction,
and Environmental Management

Enclosures:

- (1) MDA Integrated Flight Testing Final EA
- (2) MDA Integrated Flight Testing Draft FONSI



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

July 10, 2012

**Missile Defense Agency
Integrated Flight Testing Final Environmental Assessment (EA) and
Draft Finding of No Significant Impact (FONSI)**

The Missile Defense Agency (MDA) has completed an Environmental Assessment (EA), prepared in accordance with the National Environmental Policy Act (NEPA) of 1969 and the Council on Environmental Quality regulations implementing NEPA. The MDA Integrated Flight Test at U.S. Army Kwajalein Atoll/Ronald Reagan Ballistic Missile Defense Test Site (USAKA/RTS) EA analyzes the potential environmental consequences that could result from performing integrated flight tests at USAKA/RTS, Wake Island, and in the Pacific broad ocean area. MDA needs to demonstrate integrated Ballistic Missile Defense System effectiveness against short range ballistic missile targets, medium range ballistic missile targets, and air-breathing threats in an operationally realistic flight test. Interceptor missiles proposed for use in the tests would be the Aegis Standard Missile, Terminal High Altitude Area Defense missile, and Patriot missile. Previously planned and on-going activities at the alternative sites would continue.

Based on the analysis the MDA has determined that proposed activities are not expected to result in significant impacts to the environment and an Environmental Impact Statement is not required. Copies of these documents are available from MDA's public website at: http://www.mda.mil/news/environmental_reports.html. Copies of these documents are also available at the following libraries:

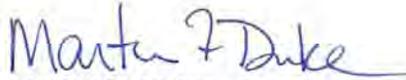
1. Office Lobby of the Republic of the Marshall Islands Environmental Protection Authority
Majuro, Marshall Islands
2. Grace Sherwood Library
Kwajalein, Marshall Islands
3. Roi-Namur Library
Roi-Namur, Marshall Islands

MDA requests and welcomes questions and comments on the enclosed EA and Draft FONSI during the public comment period, which ends August 20, 2012. Please send your written questions and comments via e-mail (preferred) to EnvGrp@mda.mil, fax at 256-450-2528, or by regular mail to:

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Sincerely,



MARTIN F. DUKE
Director
Facilities, Military Construction,
and Environmental Management

Enclosures:

- (1) MDA Integrated Flight Testing Final EA
- (2) MDA Integrated Flight Testing Draft FONSI

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