Arrow System Improvement Program

Environmental Assessment

24 October 2003

U.S. Army Space and Missile Defense Command
P.O. Box 1500
Huntsville, Alabama 35807-3801

ARROW SYSTEM IMPROVEMENT PROGRAM
ENVIRONMENTAL ASSESSMENT

ARROW PROGRAM OFFICE OF THE MISSILE DEFENSE AGENCY

AGENCY: Arrow Program Office (APO) of the Missile Defense Agency (MDA)

ACTION: Finding of No Significant Impact

BACKGROUND: The U.S. Army Space and Missile Defense Command, on behalf of the Arrow Program Office (APO) of the Missile Defense Agency (MDA), has prepared the attached Environmental Assessment (EA) to analyze the potential environmental consequences of conducting missile intercept flight tests as part of the Arrow System Improvement Program (ASIP) at a U.S. test range. The ASIP is focused on designing, implementing, and testing improvements to the Arrow Weapon System (AWS) necessary to ensure system effectiveness against advanced, long-range threats. This EA is only analyzing the flight test portion of the ASIP in the United States, as well as the necessary facility modifications and construction required by the proposed testing. Proposed testing, as currently conceived, would consist of four missile intercept tests divided between two series, or "caravans," of two tests each.

This EA has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, as amended; the Council on Environmental Quality regulations that implement NEPA (Code of Federal Regulations [CFR], Title 40, Parts 1500-1508); Department of Defense (DoD) Instruction 4715.9, *Environmental Planning and Analysis;* the applicable service regulations that implement these laws and regulations (32 CFR Part 651 [*Environmental Analysis of Army Actions*] and Army Regulation 210-20*, Master Planning for Army Installations);* and Executive Order 12114, *Environmental Effects Abroad of Major Federal Actions*. The purpose of ASIP is to enhance the operational capabilities of the AWS to defeat emerging ballistic missile threats, including longer-range missiles and countermeasures. In addition, ASIP would enhance the capability of the AWS to operate with deployed U.S. missile defense systems. The purpose of this EA is to examine the environmental effects of this improvement program, the current AWS, and the improved AWS, during a series of flight tests, including a more challenging and realistic test configuration than allowed by the Israeli geography and test range safety limitations. The development program and associated flight tests would provide phenomenology and technology data for potential use in developing U.S. missile defense systems.

DESCRIPTION OF THE PROPOSED ACTION: The Proposed Action is to conduct intercept flight tests of the AWS at the Naval Air Systems Command Weapons Division–Point Mugu Sea Range (hereinafter Point Mugu Sea Range)

with the AWS interceptor launched from San Nicolas Island. San Nicolas Island is owned and operated by the U.S. Navy. Flight test scenarios would include various short- and long-range threat representative target missiles launched from the open Pacific Ocean area using the Mobile Launch Platform (MLP), Vandenberg Air Force Base (AFB), California, and/or an air launched platform flying in the area of the Point Mugu Sea Range. The AWS radar would be located at San Nicolas Island or Naval Base Ventura County–Point Mugu Main Base (hereinafter Point Mugu).

Two options for the AWS deployment at Point Mugu Sea Range are currently being investigated and evaluated. The first option is described as a "split deployment." In this case, the Arrow Command and Control Area, consisting primarily of the Arrow Fire Control Center (FCC) and Fire Control Radar (FCR) elements, would be located on the mainland of Point Mugu. The Arrow Launcher area elements, consisting of the Launcher Control Center (LCC), mobile launcher, and interceptors, would be located on San Nicolas Island. The second option would entail the whole AWS being positioned on San Nicolas Island. In both options, the Arrow interceptors would be launched from San Nicolas Island to accommodate personnel and facility safety considerations.

Currently two caravans of tests are planned in the United States over a period of 4 years. Caravan 1, currently planned to begin in fiscal year 2004, would consist of two flight tests necessary to evaluate the baseline AWS against threat representative target missiles under conditions that cannot be implemented in Israel due to range size and safety limitations. Caravan 2, currently planned for calendar year 2007, would also consist of two flight tests and would focus on evaluation of the AWS upgrades and system enhancements developed after the previous tests.

The Arrow interceptor would be launched from San Nicolas Island for all flight tests. For U.S. Flight Test 1 (USFT-1), the target missile would be a liquid-fueled target system (LFTS) launched from either the MLP in the Point Mugu Sea Range or Vandenberg AFB. For USFT-2, the target would be a modified Short Range Air Launch Target (SRALT). Target launch locations would include Point Mugu Sea Range. For USFT-3, the target missile would be a Long Range Air Launch Target (LRALT). Should alternative target missiles become available before USFT-3, this EA would be reevaluated and appropriate environmental documentation would be prepared. Target launch locations would include Point Mugu Sea Range. USFT-4 would be a multiple engagement scenario. Target missiles could include a combination of the following: an SRALT launched within Point Mugu Sea Range; an LRALT or alternative target missile launched within Point Mugu Sea Range; and an LFTS launched from the MLP or Vandenberg AFB.

The Arrow interceptor missile is a two-staged vehicle launched from a six-pack mobile launcher. The missile contains approximately 1,670 kilograms (3,600 pounds) of solid rocket propellant in the booster. The interceptor with the propellant has a hazard classification of 1.3 and consists of hydroxyl terminated polybutadiene (HTPB), ammonium perchlorate, and aluminum powder. The interceptor also contains an optical (infrared) seeker and a radar sensor. The payload includes a focused blast-fragmentation warhead, with a hazard classification of 1.1D. Combined, the Arrow interceptor missile with its payload has a hazard classification of 1.1. It is controlled through aerodynamic and thrust vector control and contains a flight termination system.

The towable FCR is an L-band phased-array radar with search, acquisition, track, and fire control functions configured in four vehicles (power, cooling, electronics, and antenna). The FCC is a mobile shelter in which battle management functions are performed. The LCC is a mobile shelter that provides a communication interface between the FCC and the Arrow launcher. Its primary function is to enable monitoring of launcher and missile status, and it also provides missile maintenance and diagnostic capabilities. The LCC can support operations at remote distances from the FCC. Additional support facilities such as a missile assembly building and Test Mission Control Center would also be required.

The AWS would be transported to the Point Mugu Sea Range from Israel (and subsequently returned to Israel) by a contracted commercial sea-carrying vessel and/or commercial air transport. The FCR antenna array and Arrow interceptors would most likely be transported separately by a cargo aircraft from Israel directly to the test range. Ground transportation would then be required from the seaport and/or airfield over existing roads to appropriate storage and staging facilities at the test range. It is possible that the entire AWS could be transported by commercial sea vessel. However, final determination of the transportation plan is highly dependent on selection of specific project sites and available transportation modes at the launch and support locations.

After arrival at the test range, the Arrow launcher would be placed on the launch pad or a hard-packed earth surface and the interceptors would be placed in an approved storage facility. Before each planned test flight, the interceptor would be transported from the storage facility to the ordnance or missile assembly building and prepared for flight. Final assembly and inspection requirements would take place at the assembly building and on the launch pad. Missile impact zones would be confined to open areas at sea. After the second flight test of each caravan, the AWS equipment would be dismantled and packed for shipment back to Israel.

The LFTS is a single stage, liquid-fueled missile that uses a main liquid fuel, an oxidizer, and an initiator fuel for vehicle motor ignition and propulsion. It has an inertial guidance system and a non-separating high-explosive payload. The LFTS

proposed for testing has a maximum range of approximately 300 kilometers (186 miles). The LFTS has a Flight Termination System that is activated by shutting off the flow of fuel, which terminates the flight vehicle's thrust. The LFTS would be launched from the sea-based MLP or Vandenberg AFB. LFTSs with different payloads were successfully flight tested in the Republic of the Marshall Islands at the Ronald Reagan Ballistic Missile Defense Test Site (formerly known as the U.S. Army Kwajalein Missile Range) in 1997 and from Vandenberg AFB in 2002.

The MLP is a converted U.S. Navy helicopter carrier, retrofitted to allow for missile storage and launches and could be used to launch LFTSs. The MLP is a free-floating vessel that would be towed to position prior to testing. It would not be anchored to the ocean floor during launching. The MLP provides the test program the flexibility to launch targets where no ground launch sites are available, and to vary launch azimuths and ranges of targets to accommodate test objectives and safety considerations. MDA is preparing the MLP EA to address and analyze operations of the MLP, including launching of the LFTS. The EA is scheduled to be completed in March 2004. Launching of LFTS targets from the MLP for the ASIP program would be based on the analysis provided in the MLP EA.

The SRALT is carried aloft and launched by a U.S. Air Force Air Mobility Command C-17 or similar aircraft. The LRALT would be carried aloft and launched by a military cargo aircraft C-17. The SRALT and LRALT vehicles would be mounted on a pallet and loaded onto the aircraft through a large aft door that accommodates military vehicles and/or palletized cargo. While in flight, the aft door can be opened, allowing release of the palletized launch vehicle.

ALTERNATIVES TO THE PROPOSED ACTION:

No-action

Under the No-action Alternative, the MDA would not proceed with integrated flight testing of the AWS as described in the Proposed Action. Commitments to Israel to cooperatively develop an effective Israeli Terminal Missile Defense capability would not be fulfilled, and the United States would not realize any benefits to its own Terminal Missile Defense test program from participation in the ASIP.

Alternatives Not Carried Forward

A number of candidate test ranges were examined, in addition to the Point Mugu Sea Range. All of the candidate test ranges were analyzed for various operational and technical considerations including safety, range availability, instrumentation, operational cost, and logistical support. At the conclusion of the evaluation, only the Point Mugu Sea Range met the ASIP test program requirements.

ENVIRONMENTAL EFFECTS:

Methodology

To assess the significance of any impact, a list of activities necessary to accomplish the Proposed Action was developed. The affected environment at all applicable locations was then described. Next, those activities with the potential for environmental consequences were identified. The degree of analysis of proposed activities is proportionate to their potential to cause environmental impacts.

Thirteen broad areas of environmental consideration were considered to provide a context for understanding the potential effects of the Proposed Action and to provide a basis for assessing the severity of 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, water resources, and environmental justice. The areas were analyzed as applicable for each proposed location or activity.

Conclusions of the analyses were made for each of the areas of environmental consideration based on the application of the described methodology. Within each resource summary, only those activities for which a potential environmental concern was determined are described.

Air Quality. The overall impact to the ambient air at San Nicolas Island, Point Mugu, and Vandenberg AFB is expected to be minimal. Facility modifications and site preparation activities necessary for the Arrow tests would have a localized, minimal impact on air quality. In the event that pouring of additional asphalt would be necessary at San Nicolas Island, further air analysis would occur and operations would be subject to Ventura County Air Pollution Control District permitting requirements for a stationary source. Fueling operation activities at Vandenberg AFB would utilize existing fueling equipment and would qualify for the Santa Barbara County Air Pollution Control District Rule 202 de minimis exemption. Missile launches are short-term, discrete events, thus allowing time between launches for emissions to be dispersed.

No exceedance of air quality standards or health-based standards of non-criteria pollutants would be anticipated.

Airspace. No adverse impacts to airspace above San Nicolas, Point Mugu, or Vandenberg AFB are anticipated. The required scheduling and coordination procedures with the Federal Aviation Administration for the use of airspace within restricted and warning areas would obviate the potential for significant impacts. Furthermore, all ASIP activities would take place within existing restricted area or warning area airspaces that would be cleared of non-participating aircraft. Missile

launches are short-term, discrete events, and the joint-use restricted/warning area airspace would be released to other users after each test flight.

Testing in the open ocean area would require clearance of various areas of airspace and may cause rerouting or rescheduling of flights. Because the airspace is not heavily used by commercial aircraft, and is far removed from the en route airways and jet routes crossing the Point Mugu Sea Range, the impacts to controlled and uncontrolled airspace would be minimal. Missile flight test are short-term discrete events that are required to abide by scheduling processes for international airspace, which would minimize the potential for significant impacts to airspace involving canceled flights or flight delays.

Biological Resources. Applicable regulatory agencies were consulted, as part of the Naval Air Warfare Center Weapons Division EIS process, on the potential impacts to biological resources. There would be little to no ground disturbance and resultant impact to vegetation from modification activities. All AWS components and support equipment would be placed on graded and packed earth or existing concrete pads where possible. State sensitive plant species and federal and state sensitive wildlife habitat would be avoided to the extent practicable when siting AWS components and when modifying the sites selected, including the approximately 0.1-hectare (0.25-acre) disturbed area. All transportation of equipment and materials would be conducted in accordance with applicable spill prevention, containment, and control measure regulations, which would preclude impacts to biological resources. Fire from a test mishap could potentially adversely affect vegetation near the launch area, but such fires are extinguished quickly as a result of the implementation of standard fire prevention procedures.

Nominal Arrow interceptor launch activities during dry conditions could result in the deposition of very small amounts of aluminum oxide and hydrogen chloride from missile exhaust. Most of these amounts would be suspended in air and dispersed over extremely large areas and are not expected to injure or affect wildlife; the amount deposited in surface waters would have little effect. Combustion products generated by the target missile would dissipate quickly based on their relatively small amounts, prevailing winds, and rapid decrease in ambient temperature from ground level to their respective altitudes.

In the event of a launch mishap of the AWS or solid propellant target, the debris generated by the destruction of the missile would contain some unburned propellant, including ammonium perchlorate. This ammonium perchlorate could be released to the ground or surface water from scattered pieces of burning propellant. The propellant would biologically degrade over time. Powdered aluminum would oxidize to aluminum oxide, which is nontoxic at the prevailing pH levels in the surface waters. In the ocean, the aluminum perchlorate would slowly leach out into a chlorate component that is toxic to plant life and fish.

However, toxic concentrations would be expected only within a few yards of the source. The overall concentration and toxicity of dissolved solid propellant is expected to be negligible with no measurable effect on marine biological resources.

Applicable regulatory agencies were consulted on the potential for impacts to biological resources as part of the assessment of prior target launches at Vandenberg AFB. A launch mishap or early flight termination of the LFTS could result in the unlikely, but possible, limited emission of nitric acid from the release of inhibited red fuming nitric acid propellant. However, the low levels of the emission and the natural buffering capacity of seawater combined with strong currents would neutralize the reaction in a relatively short period of time. The proposed launches from San Nicolas Island, Vandenberg AFB, and the open ocean would have no discernible or measurable effect on the ocean's overall physical and chemical properties, and thus would have no impacts to the overall marine biology.

The increased presence of personnel would tend to cause birds and other mobile species of wildlife to temporarily leave the areas that would be subject to the highest level of noise. Therefore, no direct physical auditory effects to wildlife are anticipated. Proposed activities may affect, but are unlikely to adversely affect, threatened or endangered birds in the area. Proposed activities are not anticipated to result in impacts to the threatened southern sea otter or other sensitive marine mammals in adjacent offshore areas.

Disturbance from the launches would be brief and, based on existing analysis of prior and current launches from the same areas, is not expected to have a lasting impact nor a measurable negative effect on wildlife, including migratory bird populations and threatened or endangered species. The transient noise produced from missile overflight is not expected to exceed the acoustic disturbance criteria for marine mammals. Debris impact and booster drops in the broad ocean area off the coast are not expected to adversely affect marine mammal species. Early flight termination could result in widely scattered debris, but the probability of this debris hitting wildlife is remote. Harbor seal monitoring would be conducted during the pupping season (March through June) in accordance with Vandenberg AFB guidelines. Nominal launch activities are not expected to adversely impact Essential Fish Habitat.

In terms of the potential for electromagnetic radiation impacts to wildlife, the power densities emitted from the FCR are unlikely to cause any biological effects in animals or birds. The FCR is not expected to radiate lower than 5 degrees, which would preclude electromagnetic radiation impacts to terrestrial species on the beach. Nominal AWS launches are not anticipated to result in adverse impacts to environmentally sensitive habitat.

Cultural Resources. Minor construction on San Nicolas Island would result in a small amount of ground disturbance. Coordination would occur with the Point Mugu Environmental Planning and Management Department to ensure the protection of cultural resources. Personnel would receive a brief orientation involving a definition of cultural resources and protective federal regulations. Potential effects could result from launch mishap debris striking the ground where surface or subsurface archaeological deposits are located. The probability of this occurring, however, is considered remote, and negligible adverse effects are anticipated.

Minor modifications to existing facilities at Point Mugu would result in little to no ground disturbance, and no impacts to cultural resources are anticipated.

No modifications are anticipated for Vandenberg AFB. The probability of debris striking the ground where surface or subsurface archaeological deposits are located is considered remote, and negligible adverse effects are anticipated.

Geology and Soils. Best Management Practices, such as regular watering of excavated material, would reduce the potential for soil erosion during construction. No geology or soils impacts would result from site preparation activities on San Nicolas Island. Because of the very low amount of launch emissions and the very low number of AWS launches, no significant soils impacts would result from emissions from the proposed missile launches. The overall concentration and toxicity of propellant released during a launch failure would be negligible and would not have any substantial adverse effect on soils of San Nicolas Island.

Fueling operations would utilize containment measures, spill control kits would be available at the AWS launch site, and bulk fuel would be stored at an approved facility. Therefore, no significant soils impacts would result from fuel spills associated with the proposed AWS launches. No launch activities would occur at Point Mugu, and no permanent facility construction is proposed. The small area of soil disturbance would not result in any geology or soils impacts at Point Mugu. Due to the mobile nature of the LFTS itself, only a small portion of the launch exhaust would be emitted near the ground and these emissions would have a minimal impact on soil quality at Vandenberg AFB. The overall concentration and toxicity of propellant released during a launch failure would be negligible and would not have any substantial adverse effect on soils at Vandenberg AFB.

Hazardous Materials and Hazardous Waste. AWS and LFTS equipment and components, including ordnance and hazardous materials, would be transported, stored, and handled in accordance with applicable state and Department of Transportation regulations and military standards. Missile components would be packaged in shipping containers designed according to federal and military

requirements for protection of missile components and reduction of fire/explosion or risk of hazardous materials release in the event of an accident.

Potentially hazardous materials associated with the AWS and LFTS operations include compressed gases, fuels, cleaning solvents, lubricants, hydraulic fluids, and coolants for the FCR. These materials are common to Range operations at each of the locations and the increased throughput would not be considered significant.

Small amounts of potentially hazardous and non-hazardous wastes are expected to be generated during interceptor and target launch operations. Wastes would be segregated as nonhazardous, hazardous, and possibly special wastes for collection and disposal in accordance with applicable state and federal requirements and range procedures. Adherence to state and federal requirements and range procedures would preclude any impact in the environment from AWS and LFTS associated hazardous materials and waste as a result of routine usage or accumulation.

Health and Safety. All defensive missile operations involving explosives at the proposed locations would require implementation of a written procedure that has been approved by the Naval Air Warfare Center Weapons Division Safety Office (Range Safety Approval), or Vandenberg AFB for land-based LFTS launches, and must be conducted under the supervision of an approved ordnance officer using explosive-certified personnel. All potentially hazardous materials, including fuels/propellants, would be assessed for possible toxic hazards from a launch mishap. Explosive safety quantity-distances would be established around propellant handling and explosive storage facilities to ensure safety in the event of an explosion. Launch Hazard Areas and surface danger zones would be established and Notices to Airmen and Notices to Mariners issued to minimize the potential for impacts during launches.

All ASIP operations would be conducted in accordance with the Occupational Safety and Health Administration, and military requirements for health and safety to control exposure to occupational safety and health hazards. Implementation of standard safety procedures and the similarity to current operations reduce the potential for safety hazards as well as provide the means for mitigating adverse effects if an accident were to occur. No effects to workers or the public are anticipated.

Infrastructure. Potable water may need to be provided for personnel at San Nicolas Island. At each of the locations, electricity demand, potable water (at all other sites), wastewater usage, and solid waste disposal would be within capacity of current systems. No impacts to area transportation are anticipated.

Land Use. The proposed activities on San Nicolas Island, Point Mugu, and Vandenberg AFB would only use existing facilities or require minor modifications on military installations already used for launching missiles. All missile flight tests would be scheduled and approved by the Naval Air Warfare Center Weapons Division Safety Office or Vandenberg AFB. Thus the possibility of any significant adverse, incremental land use impacts would be avoided. In addition, all ASIP operations would be consistent with the California Coastal Zone Management Program.

Noise. Noise impacts from prior missile launches at San Nicolas Island and Vandenberg AFB have been determined to be short term and insignificant. Launches of the Arrow interceptor at San Nicolas Island and the LFTS from Vandenberg AFB would likely fall within or below the noise level measurements of previously approved launch vehicles. Noise from system transportation, launch preparation activities, and post launch activities would also be insignificant and of a short duration.

Socioeconomics. Construction and modification materials and personnel would not represent significant economic impacts to the community at Point Mugu or Vandenberg AFB. A small positive cumulative socioeconomic impact would occur through the activities associated with the ASIP.

Water Resources. Implementation of Best Management Practices and other procedures at San Nicolas Island are expected to minimize water quality impacts. The levels of exhaust emissions of the interceptor would be comparable to those typically produced at San Nicolas Island and within the bounds of launch vehicles previously analyzed in the Point Mugu Naval Air Warfare Center Weapons Division EIS. Due to the mobile nature of the missile itself, only a small portion of the launch exhaust would be emitted near the ground and these emissions would have a minimal impact on regional water quality.

It is anticipated that the levels of exhaust emissions of the LFTS would be similar to previously launched vehicles at Vandenberg AFB. Due to the mobile nature of the missile itself, only a small portion of the launch exhaust would be emitted near the ground and these emissions would have a minimal impact on regional water quality.

In the event of a testing mishap the potential results would cause localized, short-term impacts to water quality in the form of combustion by-products and potentially hazardous materials seeping into regional water. Provisions would be made for the availability of fire suppression, hazardous materials emergency response, and emergency medical teams during launch operations. These provisions, in combination with the low probability of a launch mishap, would result in only a short-term, localized impact to water quality.

Environmental Justice. No effects have been identified that would result in disproportionately high or adverse effects on minority or low-income populations. Activities would not discriminate against persons because of their race, color, national origin, or socioeconomic status.

Cumulative Impacts

There is little to no potential for significant cumulative impacts at San Nicolas Island, Point Mugu, Vandenberg AFB, and the open ocean as a result of the proposed ASIP testing.

CONCLUSION: The resulting environmental analysis shows that no significant impacts would occur from the proposed ASIP activities. Preparation of an Environmental Impact Statement, therefore, is not required. A follow-up action list will be developed and completed by the Executing Agent to ensure compliance with the actions described in the EA.

DEADLINE FOR RECEIPT OF WRITTEN COMMENTS: 25 November 2003

POINT OF CONTACT: Submit written comments or requests for a copy of the ASIP EA to:

U.S. Army Space and Missile Defense Command
Attention: SMDC-EN-V (Tom Craven)
Post Office Box 1500
Huntsville, AL 35807-3801

ARROW SYSTEM IMPROVEMENT PROGRAM
ENVIRONMENTAL ASSESSMENT

AGENCY: Arrow Program Office (APO) of the Missile Defense Agency (MDA)

ACTION: Finding of No Significant Impact

PROPONENT:

_____ DATE: _____

LARRY D. JOHNSTON
ASIP Program Director
Arrow Program Office

APPROVED:

_____ DATE: _____

MARK D. SHACKELFORD
Brigadier General, USAF
Deputy for Test and Assessment

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19. ABSTRACT *(Continue on reverse if necessary and identify by block number)*

The Arrow Program is a cooperative effort between the United States and the Government of Israel to develop a missile defense system for the State of Israel. The United States derives considerable benefits from its participation in the Arrow Program. The presence of a ballistic missile defense system in Israel developed under this project helps ensure U.S. freedom of action in future contingencies and provides protection against ballistic missile attacks to U.S. forces deployed to the region. The cooperative effort also provides risk reduction and alternative technologies for U.S. ballistic missile defense programs as well as phenomenology and kill assessment data. This Environmental Assessment is only analyzing the flight test portion of the Arrow System Improvement Program.

The Proposed Action is to conduct intercept flight tests of the Arrow Weapon System (AWS) at the Point Mugu Sea Range in the Pacific Ocean with the interceptor launched from San Nicolas Island. Flight test scenarios would include various short- and long-

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Mr. Thomas M. Craven	(256) 955-1533	SMDC-EN-V

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range threat representative target missiles launched from Vandenberg Air Force Base, California or the surrounding test range open ocean area using the Mobile Launch Platform, depending on its availability and certification, and/or an air launched platform flying in the area of the Point Mugu Sea Range.

Currently two series, or caravans, of tests are planned in the United States over a period of 4 years. Caravan 1 would consist of two flight tests necessary to evaluate the baseline AWS against threat representative target missiles under conditions that cannot be implemented in Israel due to range size and safety limitations. Caravan 2 would also consist of two flight tests and would focus on evaluation of the AWS upgrades and system enhancements developed after the previous tests.

EXECUTIVE SUMMARY

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Introduction

Israel and the United States have a strong history of ballistic missile defense cooperation. The Arrow Program is a cooperative effort between the United States and the Government of Israel to develop a missile defense system for the State of Israel. Cooperation between the nations on the Arrow Program began early to validate the program concept and develop the interceptor prototype and launcher. U.S. participation is directed by the Missile Defense Agency and managed by the Arrow Program Office. Israeli development efforts are led by the Israel Missile Defense Organization. The Arrow Weapon System (AWS) is operated by the Israeli Air Force.

The United States derives considerable benefits from its participation in the Arrow Program. The presence of a ballistic missile defense system in Israel developed under this project helps ensure U.S. freedom of action in future contingencies and provides protection against ballistic missile attacks to U.S. forces deployed to the region. The cooperative effort also provides risk reduction and alternative technologies for U.S. ballistic missile defense programs as well as phenomenology and kill assessment data.

A rigorous and realistic test program is essential to ensure that the Arrow missile would function properly in times of war. To date, the AWS has been tested only in Israel. Because of the limitations of geography, airspace, and instrumentation, the Israeli test range cannot support testing against longer-range targets. Since the purpose of the Arrow System Improvement Program (ASIP) is to develop the capability to defeat longer-range missiles, the AWS must be brought to the United States to test this capability. U.S. flight testing of the AWS would also provide better range instrumentation, higher fidelity targets, more realistic engagements, and combined interoperability testing.

Missile intercept flight tests are being proposed at a U.S. test range as part of the ASIP. The ASIP is focused on designing, implementing, and testing improvements to the AWS necessary to ensure system effectiveness against advanced, long-range threats. Proposed testing, as currently conceived, would consist of four missile intercept tests divided between two series, or "caravans," of two tests each.

Proposed Action

The Proposed Action is to conduct intercept flight tests of the AWS at the Naval Air Systems Command Weapons Division–Point Mugu Sea Range (hereinafter Point Mugu Sea Range) with the AWS interceptor launched from San Nicolas Island. San Nicolas Island is owned and operated by the U.S. Navy. Flight test scenarios would include various short- and long-range threat representative target missiles launched from Vandenberg Air Force Base (AFB), California or from the open Pacific Ocean area using the Mobile Launch Platform (MLP), and/or an air launched platform flying in the area of the Point Mugu Sea Range. The AWS radar would be located at San Nicolas Island or Naval Base Ventura County–Point Mugu Main Base (hereinafter Point Mugu).

Two options for the AWS deployment at Point Mugu Sea Range are currently being investigated and evaluated. The first option is described as a "split deployment." In this case, the Arrow Command and Control Area, consisting primarily of the Arrow Fire Control Center (FCC) and

Fire Control Radar (FCR) elements, would be located on the mainland of Point Mugu. The Arrow Launcher area elements, consisting of the Launcher Control Center (LCC), mobile launcher, and interceptors, would be located on San Nicolas Island. The second option would entail the whole AWS being positioned on San Nicolas Island. In both options, the Arrow interceptors would be launched only from San Nicolas Island to accommodate personnel and facility safety considerations.

Currently two caravans of tests are planned in the United States over a period of 4 years. Caravan 1, currently planned to begin in fiscal year 2004, would consist of two flight tests necessary to evaluate the baseline AWS against threat representative target missiles under conditions that cannot be implemented in Israel due to range size and safety limitations. Caravan 2, currently planned for calendar year 2007, would also consist of two flight tests and would focus on evaluation of the AWS upgrades and system enhancements developed after the previous tests.

The Arrow interceptor would be launched from San Nicolas Island for all flight tests. For U.S. Flight Test 1 (USFT-1), the target missile would be a liquid fueled target system (LFTS) launched from either the MLP in the Point Mugu Sea Range or Vandenberg AFB. For USFT-2, the target would be a modified Short Range Air Launch Target (SRALT). Target launch locations would include Point Mugu Sea Range. For USFT-3, the target missile would be a Long Range Air Launch Target (LRALT). Should alternative target missiles become available before USFT-3, this EA would be reevaluated and appropriate environmental documentation would be prepared. Target launch locations would include Point Mugu Sea Range. USFT-4 would be a multiple engagement scenario. Target missiles could include a combination of the following: an SRALT launched within Point Mugu Sea Range; an LRALT or alternative target missile launched within Point Mugu Sea Range; and an LFTS launched from the MLP or Vandenberg AFB.

The Arrow interceptor missile is a two-staged vehicle launched from a six-pack mobile launcher. The missile contains approximately 1,670 kilograms (3,600 pounds) of solid rocket propellant in the booster. The interceptor with the propellant has a hazard classification of 1.3 and consists of hydroxyl terminated polybutadiene (HTPB), ammonium perchlorate, and aluminum powder. The interceptor also contains an optical (infrared) seeker and a radar sensor. The payload includes a focused blast-fragmentation warhead, with a hazard classification of 1.1D, to eliminate incoming missiles. Combined, the Arrow interceptor missile with its payload has a hazard classification of 1.1. It is controlled through aerodynamic and thrust vector control and contains a flight termination system.

The towable FCR is an L-band phased-array radar with search, acquisition, track, and fire control functions configured in four vehicles (power, cooling, electronics, and antenna). The FCC is a mobile shelter in which battle management functions are performed. The LCC is a mobile shelter that provides a communication interface between the FCC and the Arrow launcher. Its primary function is to enable monitoring of launcher and missile status, and it also provides missile maintenance and diagnostic capabilities. The LCC can support operations at remote distances from the FCC. Additional support facilities such as a missile assembly building and Test Mission Control Center would also be required.

The AWS would be transported to the Point Mugu Sea Range from Israel (and subsequently returned to Israel) by a contracted commercial sea-carrying vessel and/or commercial air

transport. The FCR antenna array and Arrow interceptors would most likely be transported separately by a cargo aircraft from Israel directly to the test range. Ground transportation would then be required from the seaport and/or airfield over existing roads to appropriate storage and staging facilities at the test range. It is possible that the entire AWS could be transported by commercial sea vessel. However, final determination of the transportation plan is highly dependent on selection of specific project sites and available transportation modes at the launch and support locations.

After arrival at the test range, the Arrow launcher would be placed on the launch pad or a hard-packed earth surface and the interceptors would be placed in an approved storage facility. Before each planned test flight, the interceptor would be transported from the storage facility to the ordnance or missile assembly building and prepared for flight. Final assembly and inspection requirements would take place at the assembly building and on the launch pad. Missile impact zones would be confined to open areas at sea. After the second flight test of each caravan, the AWS equipment would be dismantled and packed for shipment back to Israel.

The LFTS is a single stage, liquid-fueled missile that uses a main liquid fuel, an oxidizer, and an initiator fuel for vehicle motor ignition and propulsion. It has an inertial guidance system and a non-separating high-explosive payload. The LFTS has a Flight Termination System that is activated by shutting off the flow of fuel, which terminates the flight vehicle's thrust. The LFTS would be launched from the sea-based MLP or Vandenberg AFB. LFTSs with different payloads were successfully flight tested in the Republic of the Marshall Islands at the Ronald Reagan Ballistic Missile Defense Test Site (formerly known as the U.S. Army Kwajalein Missile Range) in 1997 and from Vandenberg AFB in 2002.

The MLP is a converted U.S. Navy helicopter carrier, retrofitted to allow for missile storage and launches and could be used to launch LFTSs. The MLP is a free-floating vessel that would be towed to position prior to testing. It would not be anchored to the ocean floor during launching. The MLP provides the test program the flexibility to launch targets where no ground launch sites are available, and to vary launch azimuths and ranges of targets to accommodate test objectives and safety considerations. Launching of LFTS targets from the MLP for the ASIP program would be based on the analysis provided in the MLP EA. The MLP EA is being prepared by MDA to address and analyze operations of the MLP, including launching of the LFTS. The EA is scheduled to be completed in March 2004.

The SRALT is carried aloft and launched by a U.S. Air Force Air Mobility Command C-17 or similar aircraft. The LRALT would be carried aloft and launched by a military cargo aircraft C-17. The SRALT and LRALT vehicles would be mounted on a pallet and loaded onto the aircraft through a large aft door that accommodates military vehicles and/or palletized cargo. While in flight, the aft door can be opened, allowing release of the palletized launch vehicle.

No-action Alternative

Under the No-action Alternative, the Missile Defense Agency would not proceed with integrated flight testing of the AWS as described in the Proposed Action. Commitments to Israel to cooperatively develop an effective Israeli Terminal Missile Defense capability would not be fulfilled, and the United States would not realize any benefits to its own Terminal Missile Defense test program from participation in the ASIP.

Methodology

To assess the significance of any impact, a list of activities necessary to accomplish the Proposed Action was developed. The affected environment at all applicable locations was then described. Next, those activities with the potential for environmental consequences were identified. The degree of analysis of proposed activities is proportionate to their potential to cause environmental impacts.

Thirteen broad areas of environmental consideration were considered to provide a context for understanding the potential effects of the Proposed Action and to provide a basis for assessing the severity of 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, water resources, and environmental justice. The areas were analyzed as applicable for each proposed location or activity.

Results

This section summarizes the conclusions of the analyses made for each of the areas of environmental consideration based on the application of the described methodology. Within each resource summary, only those activities for which a potential environmental concern was determined are described.

Air Quality. The overall impact to the ambient air at San Nicolas Island, Point Mugu, and Vandenberg AFB is expected to be minimal. Facility modifications and site preparation activities necessary for the Arrow tests would have a localized, minimal impact on air quality. In the event that pouring of additional asphalt would be necessary at San Nicolas Island, further air analysis would occur and operations would be subject to Ventura County Air Pollution Control District permitting requirements for a stationary source. Fueling operation activities at Vandenberg AFB would utilize existing fueling equipment and would qualify for the Santa Barbara County Air Pollution Control District Rule 202 de minimis exemption. Missile launches are short-term, discrete events, thus allowing time between launches for emissions to be dispersed.

No exceedance of air quality standards or health-based standards of non-criteria pollutants would be anticipated.

Airspace. No adverse impacts to airspace above San Nicolas, Point Mugu, or Vandenberg AFB are anticipated. The required scheduling and coordination procedures with the Federal Aviation Administration for the use of airspace within restricted and warning areas would obviate the potential for significant impacts. Furthermore, all ASIP activities would take place within existing restricted area or warning area airspaces that would be cleared of non-participating aircraft. As such, missile launches are short-term, discrete events, and the joint-use restricted/warning area airspace would be released to other users after each test flight.

Testing in the open ocean area would require clearance of various areas of airspace and may cause rerouting or rescheduling of flights. Because the airspace is not heavily used by commercial aircraft, and is far removed from the en route airways and jet routes crossing the Point Mugu Sea Range, the impacts to controlled and uncontrolled airspace would be minimal. Missile flight test are short-term discrete events that are required to abide by scheduling processes for international airspace, which would minimize the potential for significant impacts

to airspace involving canceled flights or flight delays. Furthermore, most ASIP activities would occur in remote areas that would have little effect on air traffic.

Biological Resources. Applicable regulatory agencies were consulted, as part of the Naval Air Warfare Center Weapons Division EIS process, on the potential impacts to biological resources. There would be little to no ground disturbance and resultant impact to vegetation from modification activities. All AWS components and support equipment would be placed on graded and packed earth or existing concrete pads where possible. State sensitive plant species and federal and state sensitive wildlife habitat would be avoided to the extent practicable when siting AWS components and when modifying the sites selected, including the approximately 0.1-hectare (0.25-acre) disturbed area. All transportation of equipment and materials would be conducted in accordance with applicable spill prevention, containment, and control measure regulations, which would preclude impacts to biological resources. Fire from a test mishap could potentially adversely affect vegetation near the launch area, but such fires are extinguished quickly as a result of the implementation of standard fire prevention procedures.

Nominal Arrow interceptor launch activities during dry conditions could result in the deposition of very small amounts of aluminum oxide and hydrogen chloride from missile exhaust. Most of these amounts would be suspended in air and dispersed over extremely large areas and are not expected to injure or affect wildlife; the amount deposited in surface waters would have little effect. Combustion products generated by the target missile would dissipate quickly based on their relatively small amounts, prevailing winds, and rapid decrease in ambient temperature from ground level to their respective altitudes.

In the event of a launch mishap of the AWS or solid propellant target, the debris generated by the destruction of the missile would contain some unburned propellant, including ammonium perchlorate. This ammonium perchlorate could be released to the ground or surface water from scattered pieces of burning propellant. The propellant would biologically degrade over time. Powdered aluminum would oxidize to aluminum oxide, which is nontoxic at the prevailing pH levels in the surface waters. In the ocean, the aluminum perchlorate would slowly leach out into a chlorate component that is toxic to plant life and fish. However, toxic concentrations would be expected only within a few yards of the source. The overall concentration and toxicity of dissolved solid propellant is expected to be negligible with no measurable effect on marine biological resources.

Applicable regulatory agencies were consulted on the potential for impacts to biological resources as part of the assessment of prior target launches at Vandenberg AFB. A launch mishap or early flight termination of the LFTS could result in the unlikely, but possible, limited emission of nitric acid from the release of inhibited red fuming nitric acid propellant. However, the low levels of the emission and the natural buffering capacity of seawater combined with strong currents would neutralize the reaction in a relatively short period of time. The proposed launches from San Nicolas Island, Vandenberg AFB, and the open ocean would have no discernible or measurable effect on the ocean's overall physical and chemical properties, and thus would have no impacts to the overall marine biology.

The increased presence of personnel would tend to cause birds and other mobile species of wildlife to temporarily leave the areas that would be subject to the highest level of noise. Therefore, no direct physical auditory effects to wildlife are anticipated. Proposed activities may affect, but are unlikely to adversely affect, threatened or endangered birds in the area.

Proposed activities are not anticipated to result in impacts to the threatened southern sea otter or other sensitive marine mammals in adjacent offshore areas.

Disturbance from the launches would be brief and, based on existing analysis of prior and current launches from the same areas, is not expected to have a lasting impact nor a measurable negative effect on wildlife, including migratory bird populations and threatened or endangered species. Most missile overflights are at altitudes greater than 30 meters (100 feet) in a few seconds, and the transient noise produced is not expected to exceed the acoustic disturbance criteria for marine mammals. Debris impact and booster drops in the broad ocean area off the coast are not expected to adversely affect marine mammal species. Early flight termination could result in widely scattered debris, but the probability of this debris hitting wildlife is remote. Harbor seal monitoring would be conducted during the pupping season (March through June) in accordance with Vandenberg AFB guidelines. Nominal launch activities are not expected to adversely impact Essential Fish Habitat.

In terms of the potential for electromagnetic radiation impacts to wildlife, the power densities emitted from the FCR are unlikely to cause any biological effects in animals or birds. The FCR is not expected to radiate lower than 5 degrees, which would preclude electromagnetic radiation impacts to terrestrial species on the beach. Nominal AWS launches are not anticipated to result in adverse impacts to environmentally sensitive habitat.

Cultural Resources. Minor construction on San Nicolas Island would result in a small amount of ground disturbance. Coordination would occur with the Point Mugu Environmental Planning and Management Department to ensure the protection of cultural resources. Personnel would receive a brief orientation involving a definition of cultural resources and protective federal regulations. Potential effects could result from launch mishap debris striking the ground where surface or subsurface archaeological deposits are located. The probability of this occurring, however, is considered remote, and negligible adverse effects are anticipated.

Minor modifications to existing facilities at Point Mugu would result in little to no ground disturbance, and no impacts to cultural resources are anticipated.

No modifications are anticipated for Vandenberg AFB. The probability of debris striking the ground where surface or subsurface archaeological deposits are located is considered remote, and negligible adverse effects are anticipated.

Geology and Soils. Best Management Practices, such as regular watering of excavated material, would reduce the potential for soil erosion during construction. No geology or soils impacts would result from site preparation activities on San Nicolas Island. Because of the very low amount of launch emissions and the very low number of AWS launches, no significant soils impacts would result from emissions from the proposed missile launches. The overall concentration and toxicity of propellant released during a launch failure would be negligible and would not have any substantial adverse effect on soils of San Nicolas Island.

Fueling operations would use containment measures; spill control kits would be available at the AWS launch site; and bulk fuel would be stored at an approved facility. Therefore, no significant soils impacts would result from fuel spills associated with the proposed AWS launches.

No launch activities would occur at Point Mugu, and no permanent facility construction is proposed. The small area of soil disturbance would not result in any geology or soils impacts at Point Mugu.

Due to the mobile nature of the LFTS itself, only a small portion of the launch exhaust would be emitted near the ground and these emissions would have a minimal impact on soil quality at Vandenberg AFB. The overall concentration and toxicity of propellant released during a launch failure would be negligible and would not have any substantial adverse effect on soils at Vandenberg AFB.

Hazardous Materials and Hazardous Waste. AWS and LFTS equipment and components, including ordnance and hazardous materials, would be transported, stored, and handled in accordance with applicable state and Department of Transportation regulations and military standards. Missile components would be packaged in shipping containers designed according to federal and military requirements for protection of missile components and reduction of fire/explosion or risk of hazardous materials release in the event of an accident.

Potentially hazardous materials associated with the AWS and LFTS operations include compressed gases, fuels, cleaning solvents, lubricants, hydraulic fluids, and coolants for the FCR. These materials are common to Range operations at each of the locations, and the increased throughput would not be considered significant.

Small amounts of potentially hazardous and non-hazardous wastes are expected to be generated during interceptor and target launch operations. Wastes would be segregated as nonhazardous, hazardous, and possibly special wastes for collection and disposal in accordance with applicable state and federal requirements and range procedures. Adherence to state and federal requirements and range procedures would preclude any impact in the environment from AWS and LFTS associated hazardous materials and waste as a result of routine usage or accumulation.

Health and Safety. All defensive missile operations involving explosives at the proposed locations would require implementation of a written procedure that has been approved by the Naval Air Warfare Center Weapons Division Safety Office (Range Safety Approval), or Vandenberg AFB for land-based LFTS launches, and must be conducted under the supervision of an approved ordnance officer using explosive-certified personnel. All potentially hazardous materials, including fuels/propellants, would be assessed for possible toxic hazards from a launch mishap. Explosive safety quantity-distances would be established around propellant handling and explosive storage facilities to ensure safety in the event of an explosion. Launch Hazard Areas and surface danger zones would be established and Notices to Airmen and Notices to Mariners issued to minimize the potential for impacts during launches.

All ASIP operations would be conducted in accordance with the Occupational Safety and Health Administration, and military requirements for health and safety to control exposure to occupational safety and health hazards. Implementation of standard safety procedures and the similarity to current operations reduce the potential for safety hazards as well as provide the means for mitigating adverse effects if an accident were to occur. No effects to workers or the public are anticipated.

Infrastructure. Potable water may need to be provided for personnel at San Nicolas Island. At each of the locations, electricity demand, potable water (at all other sites), wastewater usage, and solid waste disposal would be within capacity of current systems. No impacts to area transportation are anticipated.

Land Use. The proposed activities on San Nicolas Island, Point Mugu, and Vandenberg AFB would only use existing facilities or require minor modifications on military installations already used for launching missiles. All missile flight tests would be scheduled and approved by the Naval Air Warfare Center Weapons Division Safety Office or Vandenberg AFB. Thus the possibility of any significant adverse, incremental land use impacts would be avoided. In addition, all ASIP operations would be consistent with the California Coastal Zone Management Program.

Noise. Noise impacts from prior missile launches at San Nicolas Island and Vandenberg AFB have been determined to be short term and insignificant. Launches of the Arrow interceptor at San Nicolas Island and the LFTS from Vandenberg AFB would likely fall within or below the noise level measurements of previously approved launch vehicles. Noise from system transportation, launch preparation activities, and post launch activities would also be insignificant and of a short duration.

Socioeconomics. Construction and modification materials and personnel would not represent significant economic impacts to the community at Point Mugu or Vandenberg AFB. A small positive cumulative socioeconomic impact would occur through the activities associated with the ASIP.

Water Resources. Implementation of Best Management Practices and other procedures at San Nicolas Island are expected to minimize water quality impacts. The levels of exhaust emissions of the interceptor would be comparable to those typically produced at San Nicolas Island and within the bounds of launch vehicles previously analyzed in the Point Mugu Naval Air Warfare Center Weapons Division EIS. Due to the mobile nature of the missile itself, only a small portion of the launch exhaust would be emitted near the ground and these emissions would have a minimal impact on regional water quality.

It is anticipated that the levels of exhaust emissions of the LFTS would be similar to previously launched vehicles at Vandenberg AFB. Due to the mobile nature of the missile itself, only a small portion of the launch exhaust would be emitted near the ground and these emissions would have a minimal impact on regional water quality.

In the event of a testing mishap the potential results would cause localized, short-term impacts to water quality in the form of combustion by-products and potentially hazardous materials seeping into regional water. Provisions would be made for the availability of fire suppression, hazardous materials emergency response, and emergency medical teams during launch operations. These provisions, in combination with the low probability of a launch mishap, would result in only a short-term, localized impact to regional water quality.

Environmental Justice. No effects have been identified that would result in disproportionately high or adverse effects on minority or low-income populations. Activities would not discriminate against persons because of their race, color, national origin, or socioeconomic status.

Cumulative Impacts

There is little to no potential for significant cumulative impacts at San Nicolas Island, Point Mugu, Vandenberg AFB, and the open ocean as a result of the proposed ASIP testing.

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1.0
PURPOSE AND NEED

1.0 PURPOSE AND NEED

The National Environmental Policy Act (NEPA) of 1969, as amended, the Council on Environmental Quality regulations that implement NEPA (Code of Federal Regulations [CFR], Title 40, Parts 1500-1508), Department of Defense (DoD) Instruction 4715.9, *Environmental Planning and Analysis*, the applicable service regulations that implement these laws and regulations (32 CFR Part 651 [*Environmental Analysis of Army Actions*] and Army Regulation 210-20*, Master Planning for Army Installations*), and Executive Order 12114, *Environmental Effects Abroad of Major Federal Actions*, direct DoD lead agency officials to consider potential environmental consequences when authorizing or approving federal actions.

The Arrow Program Office (APO) of the Missile Defense Agency (MDA) has prepared this Environmental Assessment (EA) to analyze the potential environmental consequences of conducting missile intercept flight tests as part of the Arrow System Improvement Program (ASIP) at a U.S. test range. The ASIP is focused on designing, implementing, and testing improvements to the Arrow Weapon System (AWS) necessary to ensure system effectiveness against advanced, long-range threats. This EA is only analyzing the flight test portion of the ASIP in the United States, as well as the necessary facility modifications and construction required by the proposed testing. The proposed testing, as currently conceived, would consist of four missile intercept tests divided between two series, or "caravans," of two tests each. Testing is proposed as follows:

The AWS interceptor would be launched from San Nicolas Island, within the Naval Air Systems Command Weapons Division—Point Mugu Sea Range (hereinafter Point Mugu Sea Range) in California. Target missile launches would occur from Vandenberg Air Force Base (AFB) or over the open Pacific Ocean area using the Mobile Launch Platform (MLP), depending on the MLP's availability and certification, and/or an air launched platform flying in the area of the Point Mugu Sea Range. The AWS radar would be located at San Nicolas Island or Naval Base Ventura County–Point Mugu Main Base (hereinafter Point Mugu).

The Arrow Program is a cooperative effort between the United States and the Government of Israel to develop a missile defense system for the State of Israel. Israel and the United States have a strong history of ballistic missile defense cooperation, and cooperation between the nations on the Arrow Program began early to validate the program concept and develop the interceptor prototype and launcher. U.S. participation is directed by the MDA and managed by the APO. Israeli development efforts are led by the Israel Missile Defense Organization. The AWS is operated by the Israeli Air Force.

The United States derives considerable benefits from its participation in the Arrow Program. The presence of a ballistic missile defense system in Israel developed under this project helps ensure U.S. freedom of action in future contingencies and provides protection against ballistic missile attacks to U.S. forces deployed to the region. The cooperative effort also provides risk reduction and alternative technologies for U.S. ballistic missile defense programs, as well as phenomenology and kill assessment data.

1.1 SCOPE OF ENVIRONMENTAL ASSESSMENT

This EA describes the events necessary to conduct the proposed ASIP intercept flight tests at the Point Mugu Sea Range and not the efforts being implemented within the State of Israel. It also presents the decisionmaker with a concise analysis of anticipated environmental consequences that would result from conducting the proposed ASIP intercept flight tests. Potential missile defense launches from Point Mugu Sea Range and from air and mobile sea-based launch platforms were analyzed in environmental documentation performed previously and listed in section 1.4. Missile launches and testing at Point Mugu Sea Range were analyzed in the *Point Mugu Sea Range Environmental Impact Statement (EIS)/Overseas EIS*. The Deputy Assistant Secretary of the Navy (Environment) signed the Record of Decision on 24 July 2002. Liquid propellant missiles and their use in flight testing have been described and analyzed previously in several NEPA documents, including the *Liquid Propellant Missile (LPM) Site Preparation and Launch Environmental Assessment* (U.S. Department of Defense, Missile Defense Agency, 2002a), and the *Theater Ballistic Missile Targets Programmatic Environmental Assessment Vandenberg Air Force Base, California* (U.S. Department of the Air Force, 1997).

Use of air and mobile sea-based launch platforms for launching missiles was analyzed in the *Development and Demonstration of the Long Range Air Launch Target System Environmental Assessment* (U.S. Department of Defense, Missile Defense Agency, 2002c), the *Mobile Launch Platform Proof-of-Principle Record of Environmental Consideration* (U.S. Department of Defense, Missile Defense Agency, 2002b), the *Pacific Missile Range Facility Enhanced Capability Environmental Impact Statement* (Pacific Missile Range Facility, Barking Sands, 1998)*, the Air Drop Target System Program Programmatic Environmental Assessment* (Ballistic Missile Defense Organization, 1998), the *Final Theater Missile Defense Extended Test Range Supplemental Environmental Impact Statement—Eglin Gulf Test Range* (Air Force Development Test Center, 1998), and the *Theater Missile Defense Extended Test Range Environmental Impact Statement* (U.S. Army Space and Strategic Defense Command, 1994).

1.2 PURPOSE OF AND NEED FOR THE PROPOSED ACTION

1.2.1 PURPOSE

The purpose of ASIP is to enhance the operational capabilities of the AWS to defeat emerging ballistic missile threats, including longer-range missiles and countermeasures. In addition, ASIP would enhance the capability of the AWS to operate with deployed U.S. missile defense systems. The purpose of this EA is to examine the environmental effects of this improvement program, the current AWS, and the improved AWS, during a series of flight tests, including a more challenging and realistic test configuration than allowed by the Israeli geography and test range safety limitations. The development program and associated flight tests would provide phenomenology and technology data for potential use in developing U.S. missile defense systems.

1.2.2 NEED

A rigorous and realistic test program is essential to ensure that the Arrow would function properly in times of war. To date, the AWS has been tested only in Israel. Because of the limitations of geography, airspace, and instrumentation, the Israeli test range cannot support

testing against longer-range targets. Since the purpose of ASIP is to develop the capability to defeat longer-range missiles, the AWS must be brought to the United States to test this capability. U.S. flight testing of the AWS would also provide better range instrumentation, higher fidelity targets, more realistic engagements, and combined interoperability testing. The first ASIP test caravan is scheduled for 2004 and would consist of two flight tests. The purpose of this caravan is to test the existing AWS against longer-range and more realistic targets than is possible in Israel. The test results would provide a foundation for the further development of the Arrow. The second caravan in 2007 would test the enhanced AWS against longer-range threats.

1.3 DECISIONS TO BE MADE

The APO of the MDA is the proponent for this action. The Director of the MDA will decide whether to conduct ASIP missile intercept flight tests at the Point Mugu Sea Range. The Commanders of the proposed installations, Point Mugu Sea Range, Point Mugu (Main Base), and Vandenberg AFB, will decide whether to allow use of installation facilities for testing of the AWS. Supporting decisions by the Director, MDA would include:

- Which launch and radar sites to use for the AWS
- Which launch sites and methods to use for target missiles

Based on information presented in this EA, the Director of MDA will determine if the EA is sufficient to warrant a Finding of No Significant Impact, or if an Environmental Impact Statement (EIS) is required to further assess environmental impacts of the Proposed Action. A Finding of No Significant Impact would allow the Proposed Action or one of the alternatives to proceed without the need to do further environmental analysis.

1.4 RELATED ENVIRONMENTAL DOCUMENTATION

As appropriate, the conclusions of the NEPA studies below have been summarized and included in this document. The development of these studies included conducting requisite agency consultations. These consultations encompass the activities and analyses addressed in this EA; therefore, additional consultations were not performed.

Final Supplemental Environmental Impact Statement for Airborne Laser Program, June 2003

Development and Demonstration of the Long Range Air Launch Target System Environmental Assessment, October 2002

Mobile Launch Platform Proof-of-Principle Record of Environmental Consideration, September, 2002

Liquid Propellant Missile (LPM) Site Preparation and Launch Environmental Assessment, July 2002

Point Mugu Sea Range Final Environmental Impact Statement/Overseas Environmental Impact Statement, March 2002

Pacific Missile Range Facility Enhanced Capability Environmental Impact Statement, December 1998

Final Theater Missile Defense Extended Test Range Supplemental Environmental Impact Statement—Eglin Gulf Test Range, June 1998

Air Drop Target System Program Programmatic Environmental Assessment, May 1998

Theater Ballistic Missile Targets Programmatic Environmental Assessment Vandenberg Air Force Base, California, December 1997

Final Environmental Assessment for the California Spaceport, February 1995

Theater Missile Defense Extended Test Range Environmental Impact Statement, January 1994

2.0
DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

2.0 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

The sections below describe the Proposed Action, options to the Proposed Action, the No-action Alternative, and alternatives considered but not carried forward.

2.1 PROPOSED ACTION

The Proposed Action is to conduct intercept flight tests of the AWS at the Point Mugu Sea Range with the interceptor launched from San Nicolas Island. Flight test scenarios would include various short- and long-range threat representative target missiles launched from Vandenberg AFB or the surrounding test range open ocean area. The radar would be located at either Point Mugu Main Base or at San Nicolas Island. Proposed missile systems and test activities are described in the following sections. Discussions include weapon and target missile system transportation to test sites, use of range support facilities, launch site preparation, weapon and target system pre-flight activities, flight tests, and post-flight activities.

2.1.1 FLIGHT TEST SCENARIOS

Currently two series, or caravans, of tests are planned in the United States over a period of 4 years. Caravan 1, currently planned to begin in fiscal year 2004, would consist of two flight tests necessary to evaluate the baseline AWS against threat representative target missiles under conditions that cannot be implemented in Israel due to range size and safety limitations. The primary objectives of Caravan 1 include the following:

- Assess the performance of the AWS against a full-range liquid fueled target system (LFTS)
- Assess the performance of the AWS against a surrogate LFTS
- Collect data to support simulation development and validation
- Collect data to support development or enhancement of AWS object identification and kill assessment functionality
- Demonstrate capability of the AWS to support theater ballistic missile track data exchange and cueing functionality with available U.S. systems under realistic live-fire conditions

Caravan 2, currently planned for calendar year 2007, would also consist of two flight tests and would focus on evaluation of the AWS upgrades and system enhancements developed after the previous tests. The primary objectives of Caravan 2 include the following:

- Verify the ability of the ASIP-enhanced AWS to counter the evolving, longer-range threat facing Israel
- Verify the ability of the AWS to conduct multiple simultaneous engagements
- Collect data to support simulation development and validation

- Collect data to support enhancement of AWS object identification, target object mapping, and kill assessment functionality
- Demonstrate capability of the AWS to support theater ballistic missile track data exchange and cueing and engagement coordination functionality with U.S. Terminal Missile Defense (TMD) systems under realistic live-fire conditions

The debris fields shown in figures 2-1 through 2-4 were generated using the Kinetic Impact Debris Dispersion model with assumptions including 3 sigma June winds and an intercept altitude of 65 kilometers (40 miles). The debris plots indicate lethal debris of 1.4 kilogram-meters (11 foot-pounds) and were modeled all the way to the surface of the earth. The debris footprints shown are preliminary and the actual footprints are expected to be smaller. Range analysis and planning do not have impacts to San Nicolas Island or near the California coastline for either U.S. Flight Test (USFT) 1 or 2. (Peppers, 2003b) The potential flight test scenarios are described in the following sections and summarized in table 2-1.

Table 2-1: Potential Flight Test Scenarios

Alternative Launch Sites	Caravan 1 Launches			Caravan 2 Launches		
	AWS USFT-1, USFT-2	Target		AWS USFT-3, USFT-4	Target	
		USFT-1	USFT-2		USFT-3	USFT-4
Alternative 1—Point Mugu Sea Range						
San Nicolas Island/Point Mugu	X			X		
Vandenberg AFB		Opt. 2				Opt. 3
Open Ocean—Airborne Launch			X		X	X/Opt. 1
Open Ocean—Sea-based Launch		Opt. 1				Opt. 2

Note: Caravan 2, USFT-4 includes dual target launches.
AWS = Arrow Weapon System
USFT = U.S. Flight Test

2.1.1.1 U.S. Flight Test 1

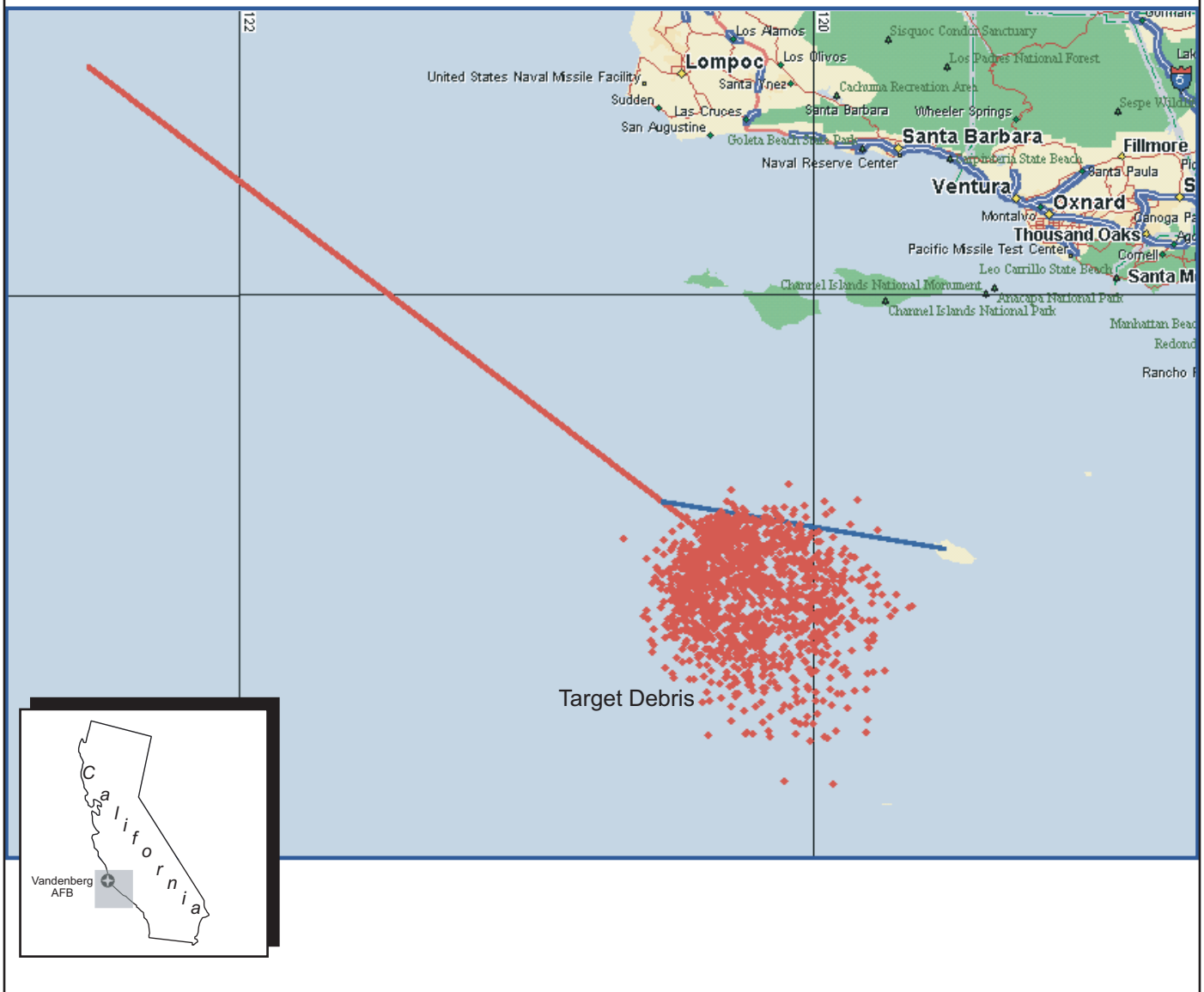
For USFT-1), the AWS is launched from San Nicolas Island and the target missile would be an LFTS launched from either the MLP in Point Mugu Sea Range (figure 2-1) or Vandenberg AFB (figure 2-2).

2.1.1.2 U.S. Flight Test 2

For USFT-2, the AWS is launched from San Nicolas Island and the target would be a modified Short Range Air Launch Target (SRALT). Target launch locations would include Point Mugu Sea Range (figure 2-3).

2.1.1.3 U.S. Flight Test 3

For USFT-3, the AWS is launched from San Nicolas Island and the target missile would be a Long Range Air Launch Target (LRALT). Should alternative target missiles become available before USFT-3, this EA would be reevaluated and appropriate environmental documentation would be prepared. Target launch locations would include Point Mugu Sea Range (figure 2-4).



Source: Arrow Program Office, 2003

EXPLANATION

- Water
- Land
- Target flight path
- Interceptor flight path

Scale

0 25.6 51.2 kilometers

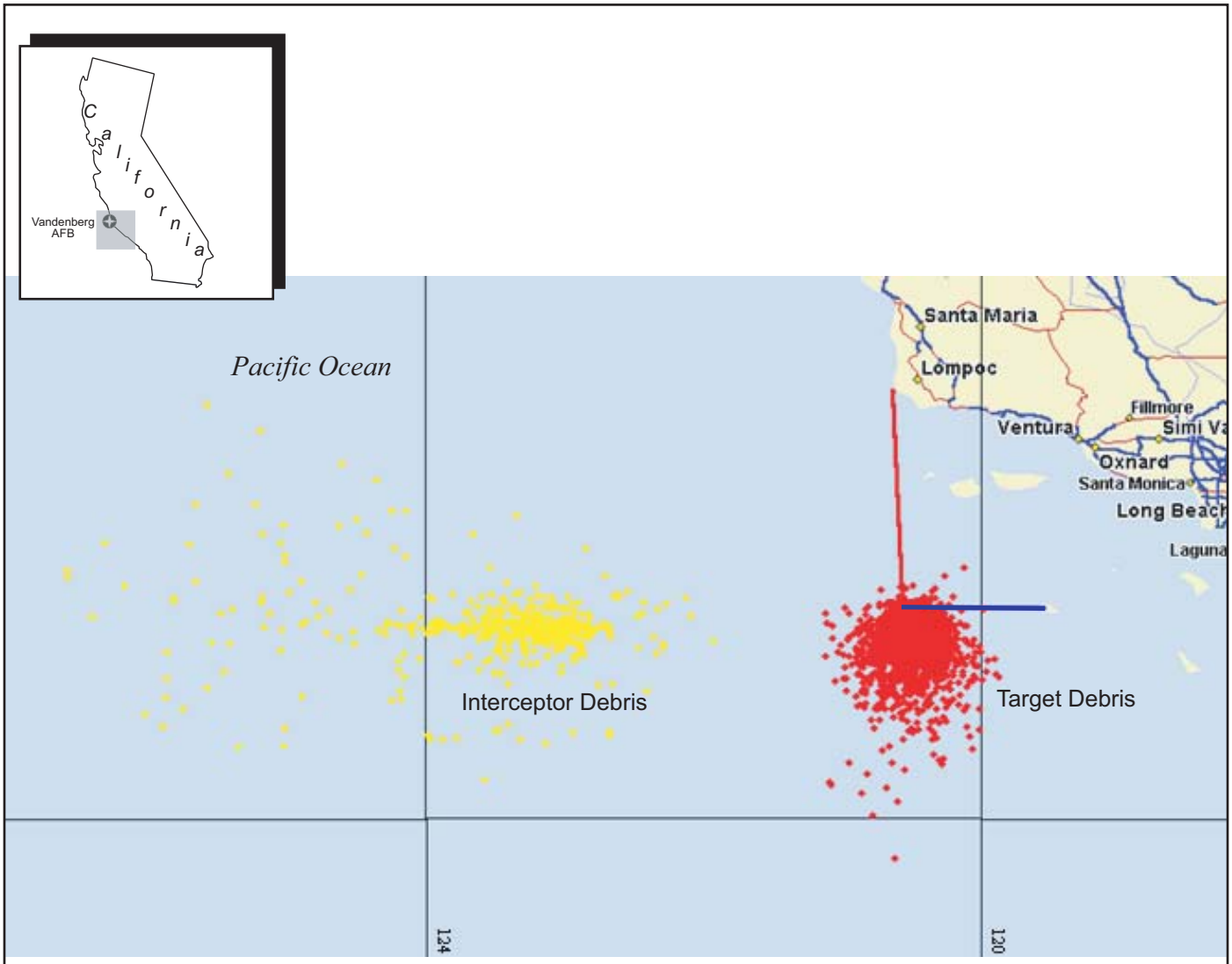
0 16 32 miles

NORTH

10-14-03 Target Debris 5

U.S. Flight Test 1: Target Launched from MLP, Intercepted from San Nicolas Island

Figure 2-1



Source: Arrow Program Office, 2003

EXPLANATION

- Water
- Land
- Target flight path
- Interceptor flight path

Scale

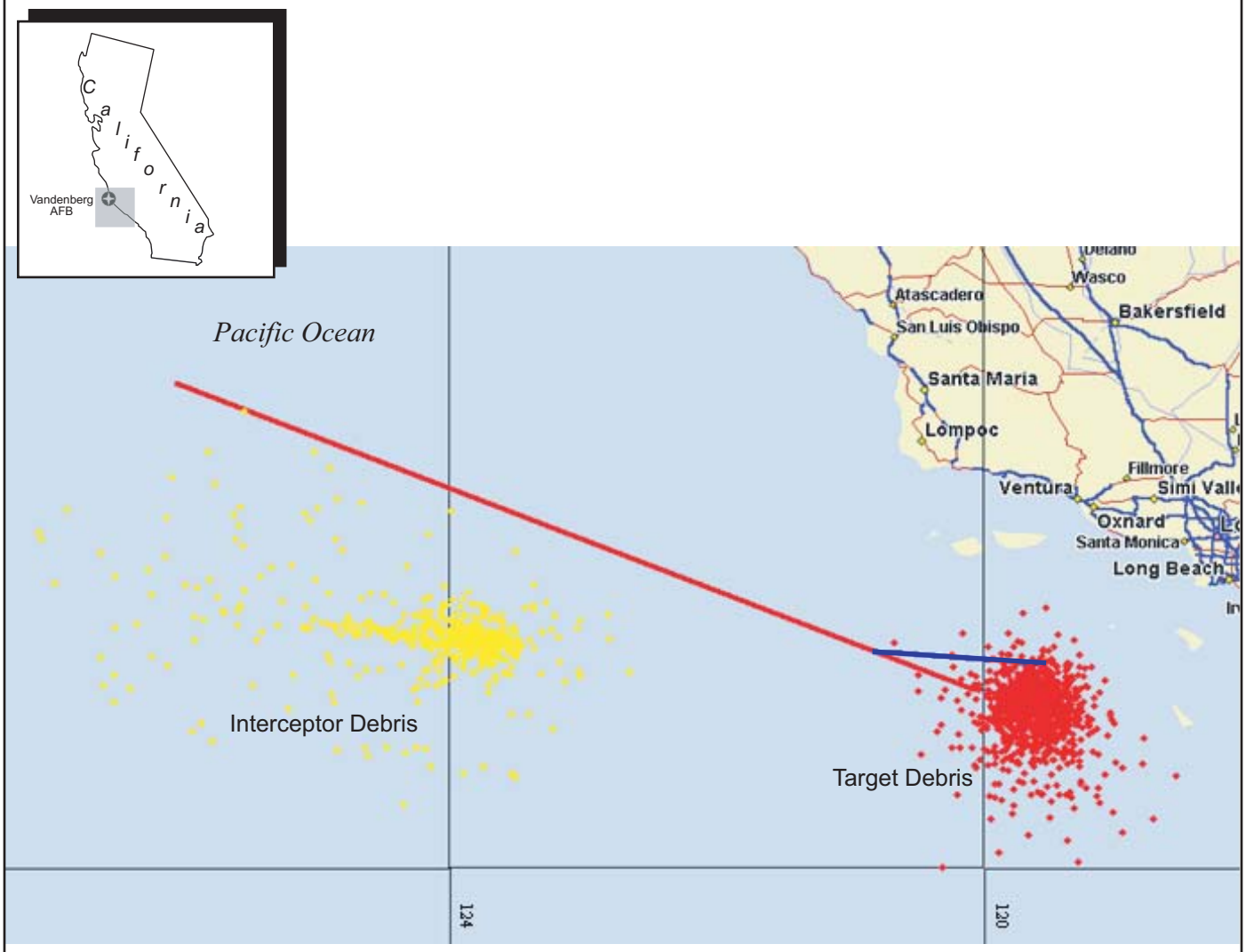
0 54.5 109 kilometers

NORTH 0 33.9 67.8 miles

10-14-03 Debris field 2

U.S. Flight Test 1: Target Launched from Vandenberg Air Force Base, Intercepted from San Nicolas Island

Figure 2-2



Source: Arrow Program Office, 2003

EXPLANATION

- Water
- Land
- Target flight path
- Interceptor flight path

NORTH

Scale

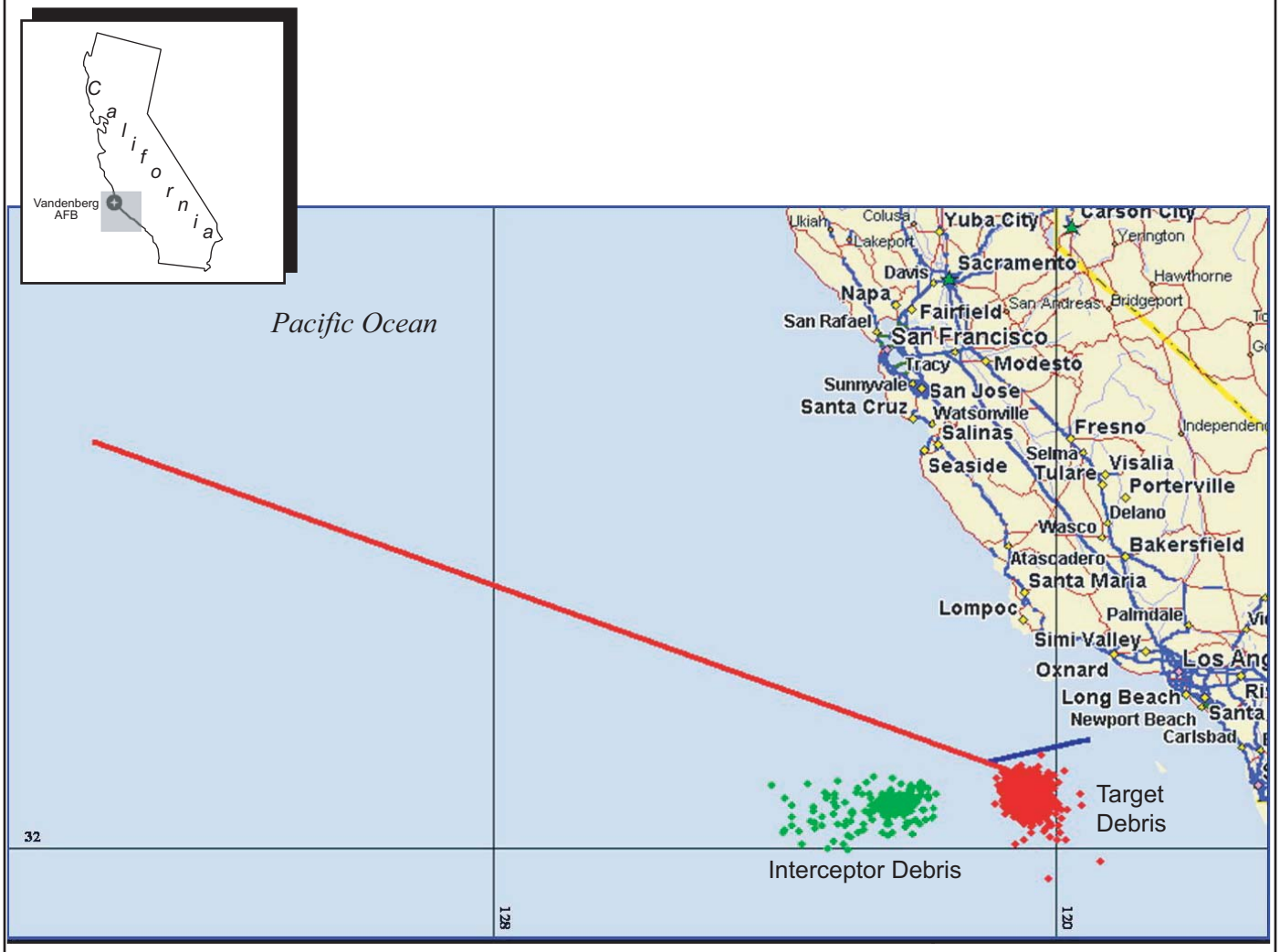
0 57.3 114.6 kilometers

0 35.6 71.2 miles

10-14-03 Debris field 3

U.S. Flight Test 2: Target Launched from Air, Intercepted from San Nicolas Island

Figure 2-3



Source: Arrow Program Office, 2003

EXPLANATION

- Water
- Land
- Target flight path
- Interceptor flight path

Scale

0 112.1 224.2 kilometers

0 69.7 139.3 miles

NORTH

10-14-03 Debris field 4

U.S. Flight Test 3: Target Launched from Air, Intercepted from San Nicolas Island

Figure 2-4

2.1.1.4 U.S. Flight Test 4

For USFT-4, a multiple engagement scenario, the AWS is launched from San Nicolas Island. Target missiles could include an airborne launch and a combination of the following:

- An SRALT launched within Point Mugu Sea Range
- An LRALT or alternative target missile launched within Point Mugu Sea Range
- An LFTS launched from the MLP or Vandenberg AFB

The graphical depiction of USFT-4 would be a combination of two scenarios described in USFT-1, USFT-2, or USFT-3 as shown in figures 2-1 through 2-4.

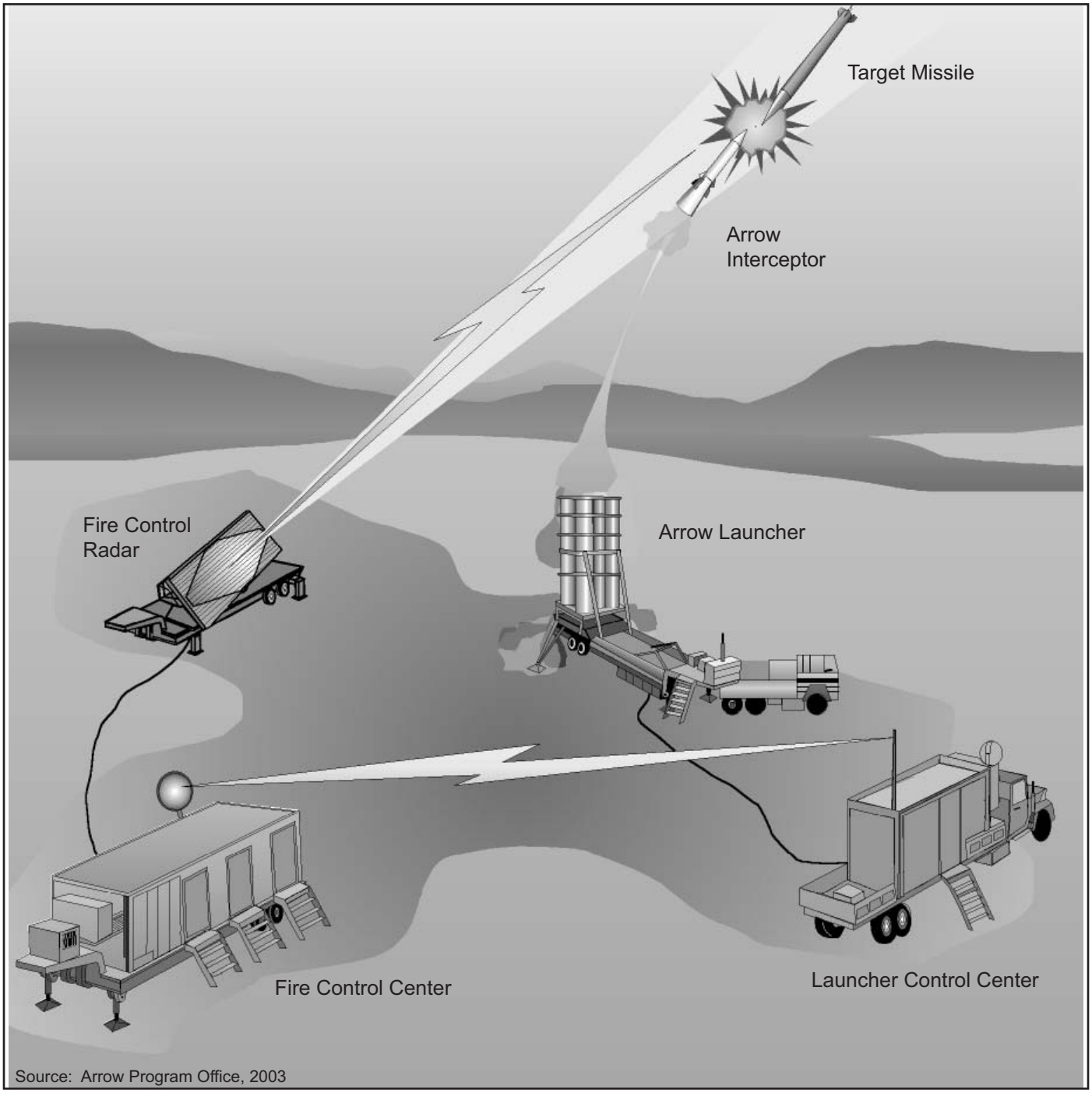
2.1.2 MISSILE SYSTEMS

This section describes the interceptor and target missile systems and the general activities proposed for the flight test portions of the ASIP.

2.1.2.1 Arrow Weapon System

The AWS is composed of the Arrow interceptor, the mobile launcher, the Launcher Control Center (LCC), and the Command and Control Area (CCA). The CCA includes the Fire Control Radar (FCR), the Fire Control Center (FCC), and associated equipment (figure 2-5). The Arrow interceptor missile is a two-staged vehicle launched from a six-pack mobile launcher (figure 2-6). The missile is approximately 7 meters (23 feet) long, weighs approximately 2,500 kilograms (5,500 pounds) at launch, and contains approximately 1,670 kilograms (3,600 pounds) of solid rocket propellant in the booster. The interceptor with the propellant has a hazard classification of 1.3 (explosives that have a fire hazard and either a minor blast hazard or a minor projection hazard, or both, but not a mass explosion hazard that affects almost the entire load instantaneously) and consists of hydroxyl terminated polybutadiene (HTPB), ammonium perchlorate, and aluminum powder. The interceptor also contains an optical (infrared) seeker and a radar sensor. The payload includes a focused blast-fragmentation warhead, with a hazard classification of 1.1D (high explosives that can be expected to detonate when any component is initiated), to eliminate incoming missiles. Combined, the Arrow interceptor missile with its payload has a hazard classification of 1.1 (explosives that have a mass explosion hazard that is expected to mass-detonate when a small portion is initiated by any means). It is controlled through aerodynamic and thrust vector control and contains a Flight Termination System (FTS).

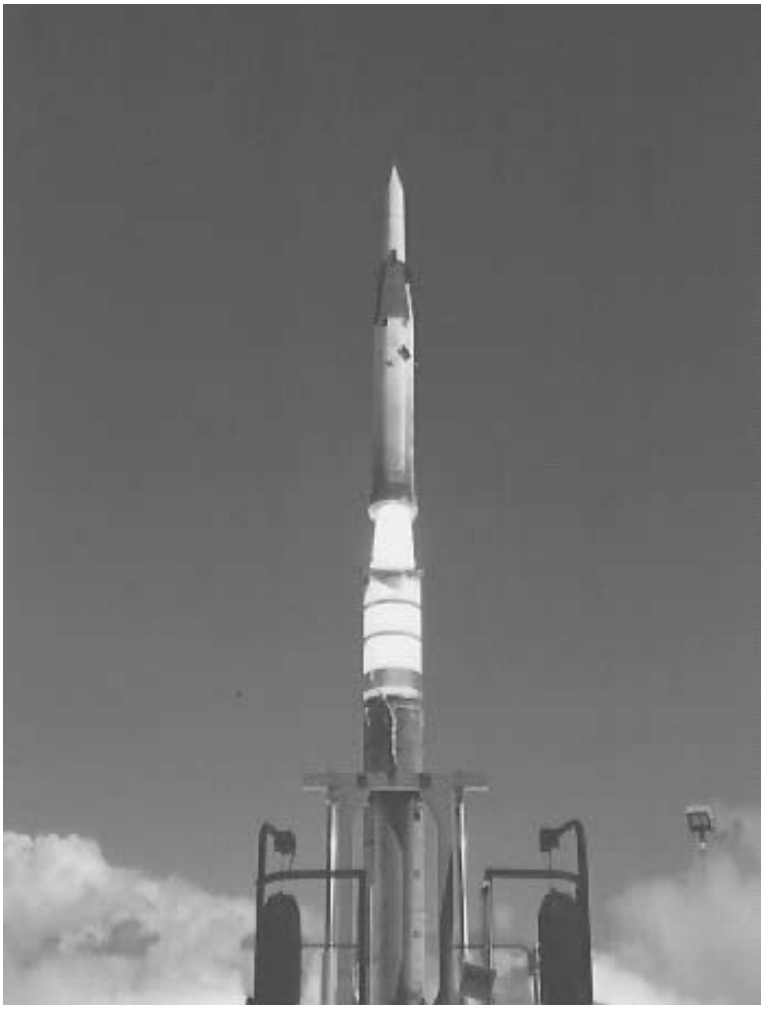
The FCR is an L-band phased-array radar with search, acquisition, track, and fire control functions configured in four vehicles (power, cooling, electronics, and antenna) (figure 2-7). The FCR is towable, using range supplied vehicles on improved roads. The vehicle with the antenna is approximately 4.6 meters (15.1 feet) wide, 4.7 meters (15.4 feet) high, and 17 meters (56 feet) long, and weighs approximately 50,000 kilograms (55 tons). The FCR contains approximately 3,630 kilograms (865 gallons) of ethylene glycol as coolant.



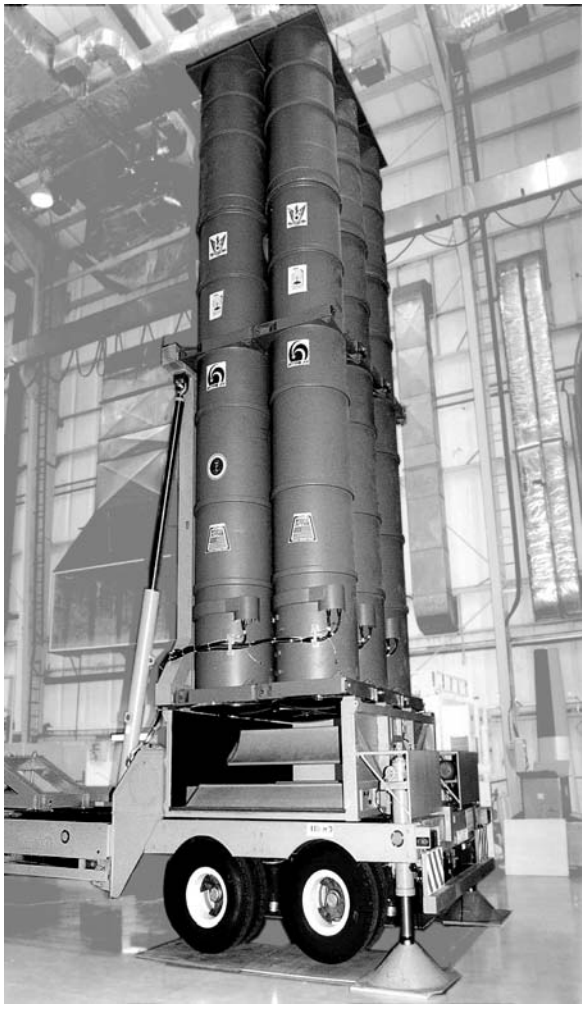
Arrow Weapon System Primary Components

Not to Scale

Figure 2-5



Arrow Interceptor Missile



Six-Pack Mobile Launcher

Source: Arrow Program Office, 2003

Arrow Interceptor and Launcher

Figure 2-6

Radar Antenna

Command Electronics Shelter

Power Vehicle

Cooling Vehicle

Source: Arrow Program Office, 2003

Fire Control Radar System Components

Not to Scale

Figure 2-7

The FCC is a mobile shelter in which battle management functions are performed (figure 2-8). It contains integrated battle management workstations for the command group, the engagement operations analysts, and intelligence officers. It connects through multiple high-capacity communications interfaces to support communications with the FCR and other FCCs. The FCC is approximately 13.7 meters (45 feet) long, 3.7 meters (12 feet) wide, and 3 meters (10 feet) high.

The LCC (figure 2-9) is a mobile shelter that provides a communication interface between the FCC and the Arrow launcher. Its primary function is to enable monitoring of launcher and missile status, and it also provides missile maintenance and diagnostic capabilities. The LCC can support operations at remote distances from the FCC. The LCC is approximately 4.6 meters (15 feet) long, 2.1 meters (7 feet) wide, and 2.7 meters (9 feet) high.

In addition to the AWS tactical elements, supporting test systems and facilities are planned to be included in the test architecture to support day-to-day operations, pre-mission, mission, and post-mission activities. These elements are listed in table 2-2.

Table 2-2: Arrow Weapon System Test Elements

Arrow Weapon System Tactical Elements	Supporting Test Systems/Elements
Command and Control Area	Test Mission Control Center
Fire Control Radar	Missile Assembly Building
Battle Management Command	Warhead Storage Magazine
System Test Facility	Logistics support and provision (common/separated)
Launch Site	General accommodations
Launcher plus missile(s)	
Test and preparation equipment	
Launcher Control Center Site	

Notional launch site and CCA layouts are shown in figures 2-10 and 2-11, respectively. Approximately five diesel generators (ranging from 20 to 1,200 kilowatts [kW]) would supply power to the AWS, with several smaller miscellaneous generators used for various support equipment. These smaller generators would be obtained from the operating range, if available; otherwise they would be shipped to the range with the other system components, or rented locally. Generator engines associated with ASIP are exempt from permit requirements because the equipment qualifies as Military Tactical Support Equipment under California's Portable Equipment Registration Program. Diesel fuel supporting the cumulative expected generator consumption rate would be provided from local sources at the range on a periodic basis. Up to ten 42-liter (1.48-cubic-foot) nitrogen tanks would be kept at the launch control area. Nitrogen would be used to cool the on-board electro-optical sensor of the missile.

Exterior View

Interior View

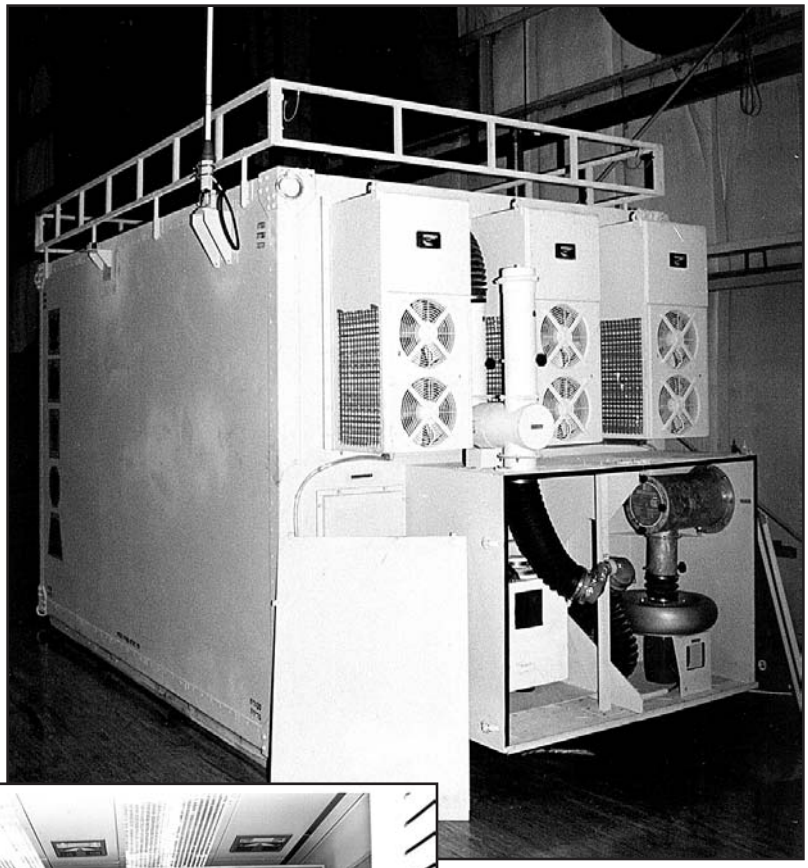
Source: Arrow Program Office, 2003

Fire Control Center

Not to Scale

Figure 2-8

Exterior View



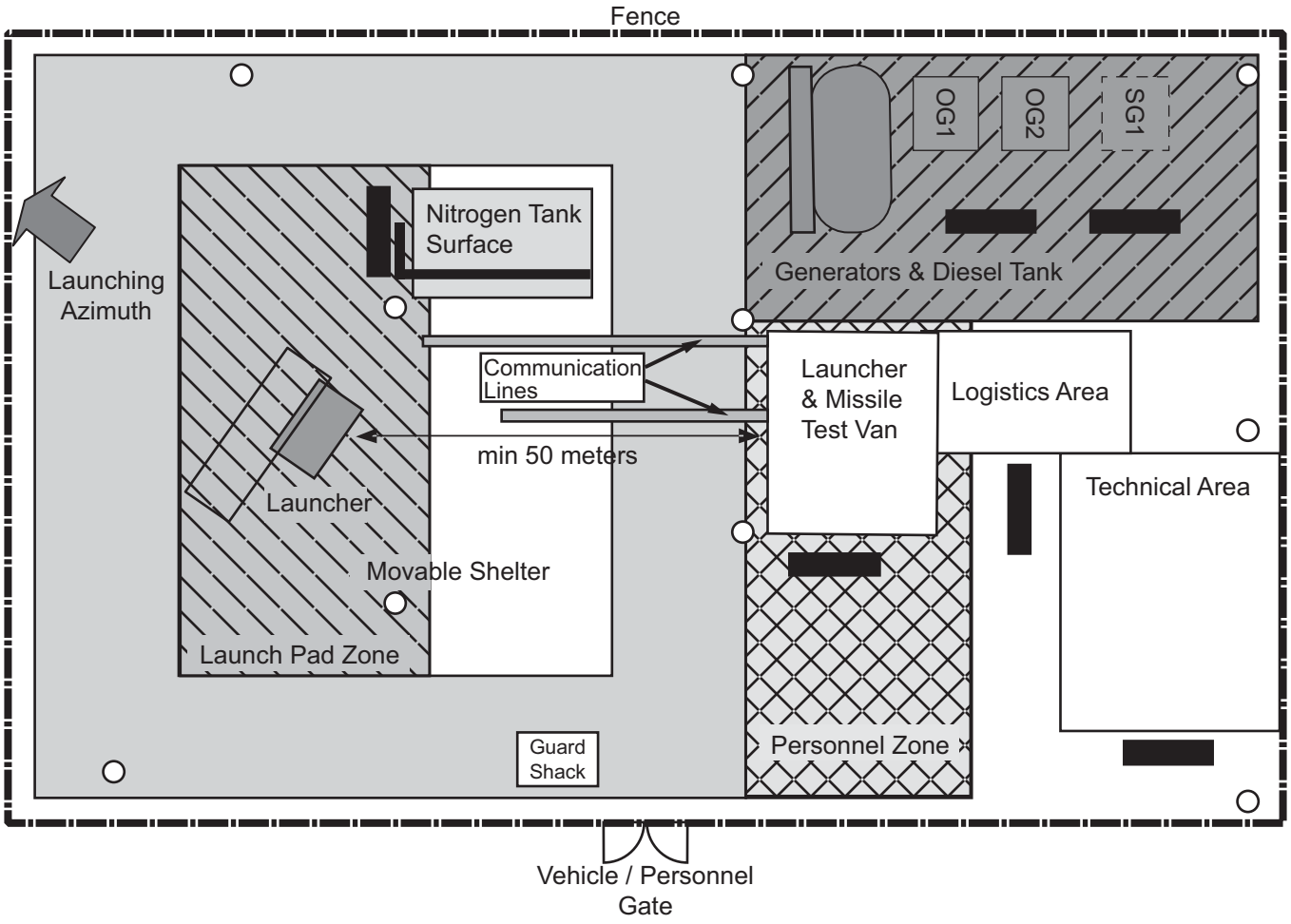
Interior View

Source: Arrow Program Office, 2003

Launcher Control Center

Not to Scale

Figure 2-9



Source: Arrow Program Office, 2003

EXPLANATION

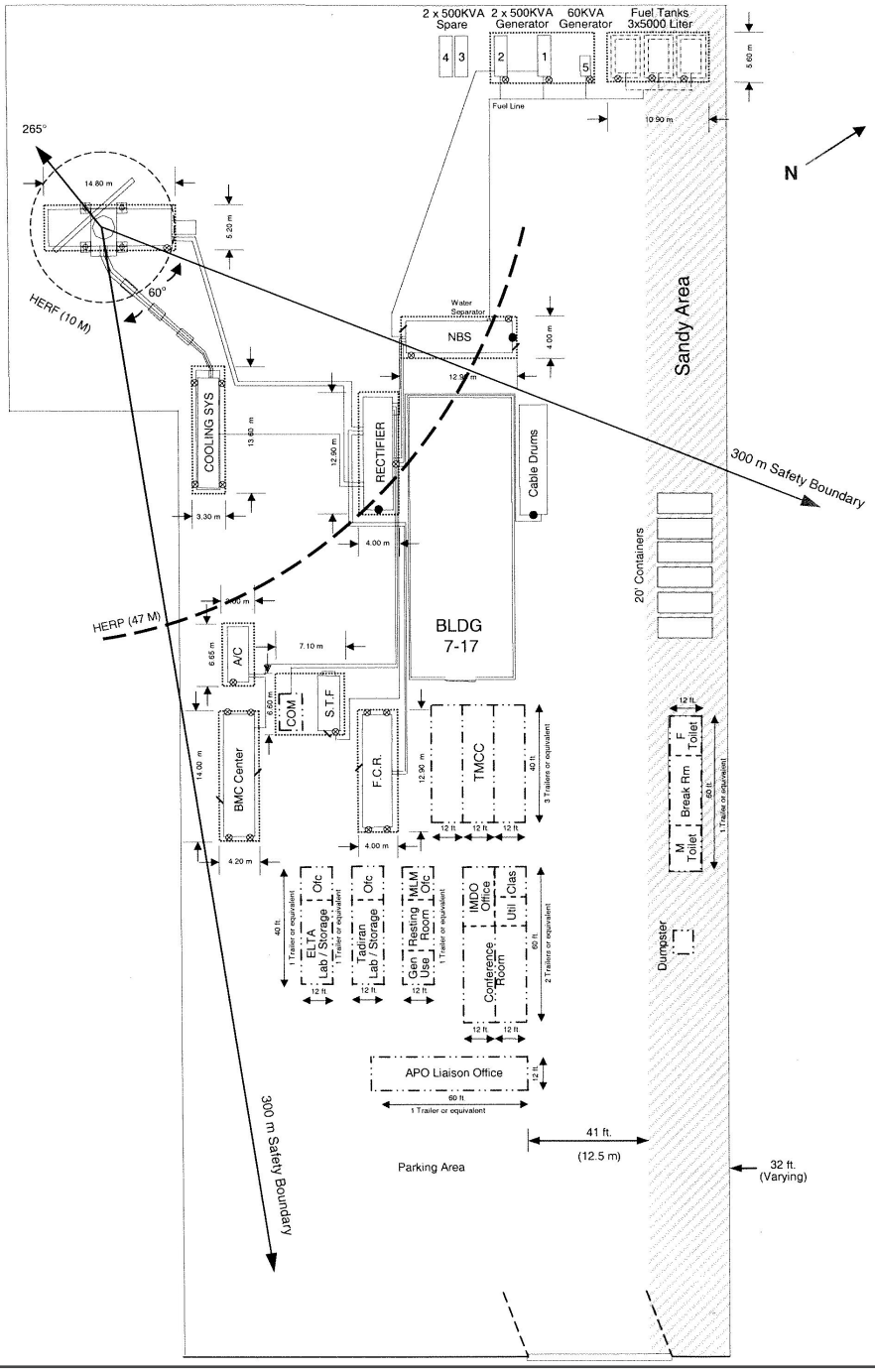
- Launch Pad Zone
- Generators and Diesel Tanks
- Personnel Zone
- Junction Box
- Clear Zone
- Fence
- Lighting

Not to Scale

OG1 = Operational Generator 1
OG2 = Operational Generator 2
SG1 = Stand-by Generator 1

Notional Launch Site Layout

Figure 2-10



EXPLANATION

- Contractor Furnished Equipment (CFE)
- Test range Facilities Equipment (TRFE)
- Ground
- Grounding point
- Door

Scale

0 244 488 meters

0 151.5 303 feet

ELTA - ELTA Systems Ltd.
MLM - Military Liaison Mission
IMDO - Israel Missile Defense Organization
APO - Arrow Program Office
STF - System Test Facility
FCR - Fire Control Radar
TMCC - Test Mission Control Center
NBS - Non-Break System
COM - Communications
HERF - Hazards of Electromagnetic Radiation to Fuel
HERP - Hazards of Electromagnetic Radiation to Personnel
BMD - Battle Management Command
kVA - Kilovolt-Ampere

Command and Control Area Site Layout

Figure 2-11

10-14-03 CCA Layout 2

2.1.2.1.1 Arrow Weapon System Transportation

The AWS would be transported to the Point Mugu Sea Range from Israel (and subsequently returned to Israel) by a contracted commercial sea-carrying vessel and/or commercial air transport. While final transportation plans are still to be determined, the most likely scenario envisions a sea vessel departing from Haifa, Israel, carrying the majority of AWS system elements, ground support equipment, and special support equipment. The FCR antenna array and Arrow interceptors would most likely be transported separately by a cargo aircraft from Israel directly to the test range. Ground transportation would then be required from the seaport and/or airfield over existing roads to appropriate storage and staging facilities at the test range.

It is possible that the entire AWS could be transported by commercial sea vessel. Inspections by the U.S. Customs and Agriculture Departments would take place at the initial port of entry into the United States. For sea carrier mode, all equipment would be offloaded into a secure area, inspected, cleared, and then loaded onto a local contracted commercial sea carrier to continue to the port. At the harbor the AWS equipment would be offloaded from the ship into a secure staging area.

Likewise, additional elements, such as FCR components, might be airlifted. Final determination of the transportation plan is highly dependent on selection of specific project sites and available transportation nodes at the launch and support locations. The specific air route of the contracted aircraft transporting the interceptor and FCR is currently unknown, but inspections by the U.S. Customs and Agriculture Departments would take place at the first port of entry into the United States. This is anticipated to be a military base with provisions for refueling of aircraft and change of aircrew for continued transport. Upon arrival at the range, all equipment would be offloaded into a secure staging area, inspected, cleared, and then prepared for ground movement to the storage facilities at the range. Any necessary arrangements required for transport of the equipment would be coordinated with the Departments of the Army, Air Force, Navy, and Transportation before arrival and convoy movement.

2.1.2.1.2 Launch Preparation

Interceptor launches would occur from San Nicolas Island within the Point Mugu Sea Range. Power and communication cables would be placed on the ground or in cable trenching. Telephone, water, and commercial power lines would be required at the launch site. Temporary trailers would be used to house administrative functions, and radar power generators would be moved to the site. Point Mugu Sea Range would ship diesel out to San Nicolas Island and would also supply spill containment and control equipment and personnel.

AWS components, support equipment, and program personnel would begin to arrive at the test range within approximately 2 to 3 months before a scheduled launch. Miscellaneous flight readiness testing would occur during this time period at either the Alpha Complex (Building 7-17) at Point Mugu or Building N-189 on San Nicolas Island. Launch equipment would consist of the launcher, FCR, FCC, LCC, radar power generators, administrative trailers, supporting light vehicles for equipment and supply transportation, and miscellaneous small equipment and supplies. A maximum of about 100 personnel would be located at San Nicolas Island and Point Mugu to perform pre-launch, launch/intercept, and post-launch operations.

After arrival at the test range, the Arrow launcher would be placed on the launch pad or a hard-packed earth surface and the interceptors would be placed in an approved storage facility. Before each planned test flight, the interceptor would be transported from the storage facility to the ordnance or missile assembly building and prepared for flight. The components and equipment would be stored in an approved ordnance or missile assembly building for final preflight assembly and integration and necessary preflight tests. During the integration phase, the interceptors would be transported to the launch pad, where they would remain for a few weeks before testing.

For Caravan 1, two interceptor missiles would be available. The missile for USFT-1 would be stored in the assembly building until needed for the test. The missile for USFT-2 would be placed in long-term storage or stored in the assembly building until needed.

For Caravan 2, three interceptor missiles would be available. The missile for USFT-3 would be stored in the assembly building until needed for the first flight test. For USFT-4, two Arrow interceptors would be readied for either simultaneous or consecutive flights.

Final assembly and inspection requirements would take place at the assembly building and on the launch pad. Preflight and testing operations would be considered routine activities for the range, and no additional permanent range facility personnel would be required. No increases to infrastructure capacity demands would be necessary to support these operations. Minor mechanical repairs would be performed at existing repair shops on the base. Refueling operations for motorized vehicles and generators would also be performed. Refueling operations would take place at authorized sites on the test range. No hazardous wastes would be generated during final assembly.

2.1.2.1.3 Flight Testing

Interceptor launch activities would be controlled from the FCC and LCC, Test Mission Control Center (TMCC), and Test Range. Shortly before launch, all mission-essential personnel would be evacuated from the launch control area. Non-mission-essential personnel would be evacuated from the island. During launch, there is a potential for missile malfunction, resulting in explosion, fire, and debris impact in the launch site vicinity. Successful launches involve only small potential hazards, mainly for personnel in the immediate area; these personnel are protected or evacuated from the area and potential hazards are thus controlled. On the other hand, a launch pad or near-launch anomaly or termination requires stricter controls.

The establishment of a Launch Hazard Area (LHA) by the Range Flight Safety Office is required for each test flight mission to provide protection for mission-essential personnel. The LHA provides a designated area from which personnel are cleared based upon potential hazards from any missile debris that may result from launch or near-launch difficulties. The sizes of the planning LHAs for potential launch sites are determined based upon a composite of potential mission profiles and vehicle performance characteristics. However, for each mission, a mission-specific LHA would be established based upon the actual flight profile, launch site, and system performance. The LHA for the AWS is currently anticipated to be approximately 6,100 meters (20,000 feet) in radius.

In the event a flight is cancelled, the preferred location for the de-arming of the payload would be at the launch site. The area required would be approximately 6 by 15 meters (20 by 50 feet) and rated for Class 1.1 explosives.

Before missile launch, Range Safety officials would issue Notices to Airmen (NOTAMs) and Notices to Mariners (NOTMARs), which would identify areas to remain clear of and the times that avoidance of the area is advised. The Range Safety officials would then determine that the areas are clear of both surface vessels and aircraft. If ships or fishing boats are seen in a designated impact area, their cooperation would be requested to leave the area voluntarily. Missile launches would be put on hold until the impact area is clear of surface and air traffic. Range clearance and access control would be in accordance with existing range procedures.

After the LHA and launch corridors for the interceptor and target are both verified clear, the launch command would be given from the launch control area. Standard protective procedures would be followed during test activities to provide hearing protection of workers and minimize any noise impacts associated with launch activities. Missile impact zones would be confined to open areas at sea. The standard operating and safety procedures mentioned above would be tailored for these specific missions as necessary. Implementation of these procedures for missile launching and testing would minimize the risk of any adverse health or safety impacts associated with the program.

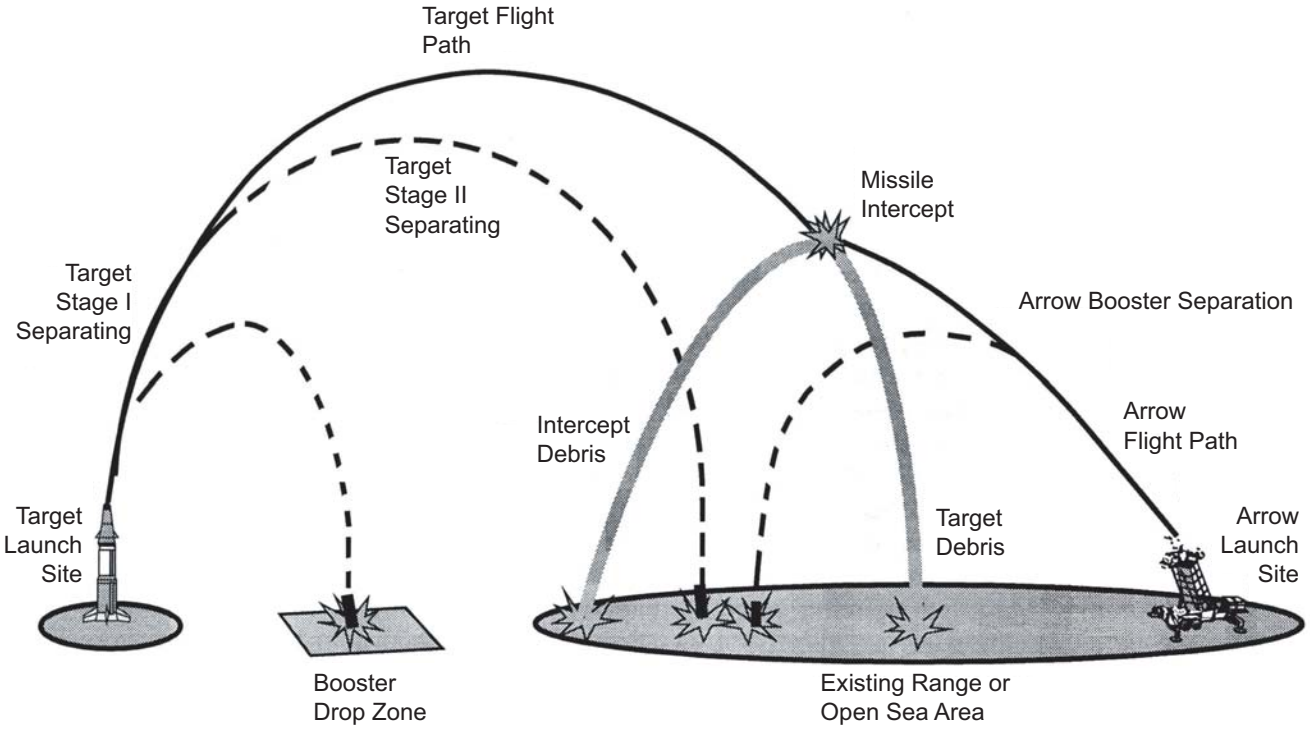
Figure 2-12 shows a schematic diagram of a representative Arrow missile flight test.

2.1.2.1.4 Test Mishaps

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

A test mishap termination of a flight on the launcher/launch pad would be characterized by an explosion and/or detonation of the missile propellants and explosives, or a scenario in which the missile propellants and explosives burn without detonation or explosion. An Explosive Safety Quantity-Distance (ESQD) surrounding the launcher/launch pad would be calculated based on the equivalent explosive force of all propellant and pyrotechnic materials contained in the flight vehicle. For the AWS the ESQD is currently anticipated to be 549 meters (1,800 feet). All hazardous debris resulting from a termination on the launcher/launch pad would be contained within the ESQD. The ESQD would be cleared of unprotected personnel.

Termination of a flight shortly after liftoff would result in all hazardous debris being contained within the LHA. Non-mission-essential personnel are excluded from the LHA during launch operations. Personnel working within the LHA would be protected in blast-resistant buildings or behind berms.



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

Representative Arrow Flight Test Profile

Not to Scale

Figure 2-12

Termination of a flight after it has exited the vicinity of the launcher would occur in the event of an off-course flight. The FTS would be activated, terminating the flight vehicle's thrust, and the flight vehicle would then fall in a ballistic trajectory into a controlled area of the sea. Before each flight, a flight corridor and debris footprint potential would be established such that the probability of human casualties or property damage would be extremely remote in the event of a command destruct event or missile anomaly. This debris footprint also takes into account all planned missile body impact points and potential intercept debris patterns within the Point Mugu Sea Range. Mission planning and procedures would be developed to activate the FTS in time to ensure that the flight vehicle would fall within a Range Safety defined area in the event of an off-course flight. No efforts are planned at this time to recover a missile from a failed missile intercept that falls into the ocean.

Figure 2-13 depicts typical target and defensive missile LHAs, booster drop zones, intercept debris impact zones, and intact target vehicle and defensive missile impact zones. Impact zones are areas in which hardware impacts are planned. The location and dimensions of the impact zones may vary for each flight test scenario. Impact areas for expended boosters, target vehicles, defensive missile debris resulting from a successful intercept, and intact defensive missile payloads (in the event of a failed intercept) would be determined by range safety personnel for each flight based on detailed launch planning and trajectory modeling. This planning and modeling would include analyses and identification of a flight corridor based on a flight failure during any point in the flight trajectory. Fire suppression, hazardous materials emergency response, and emergency medical teams would be available during launch operations.

2.1.2.1.5 Post-Launch Activities

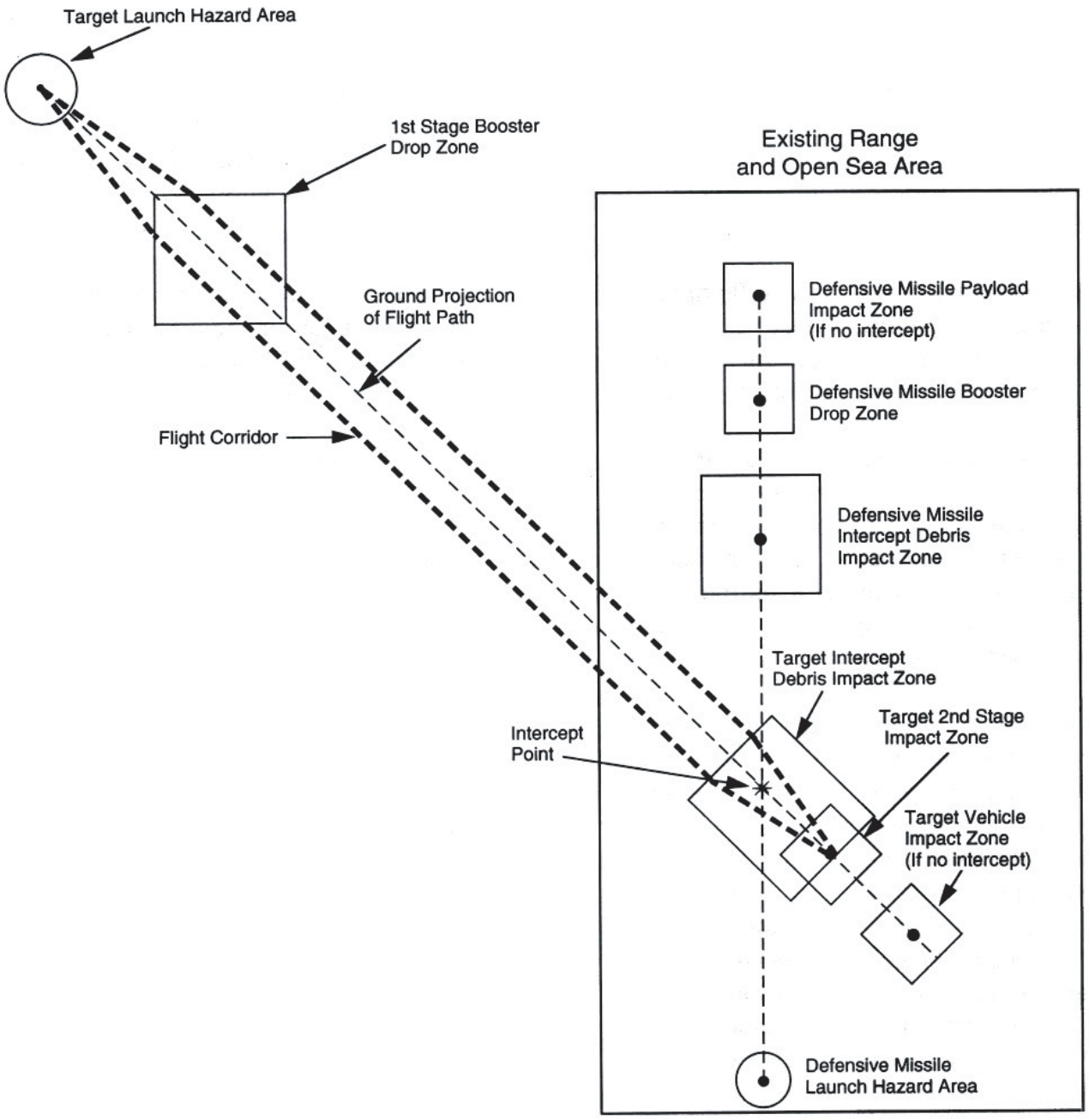
After the second flight test of each caravan, the AWS equipment would be dismantled and packed for shipment back to Israel. Any waste materials generated would be disposed of according to applicable regulations and range procedures and policy by Point Mugu Sea Range or other host installation, depending on whether the material is determined to be hazardous or solid waste.

2.1.2.2 Target Missile Systems

Several target missile systems are proposed for intercept testing of the AWS. Because most of these target missile systems have been described and analyzed in previous NEPA documentation, they are only briefly described here. The LRALT is currently planned for USFT-3 and is evaluated in this document. However, other targets could be considered at a later time and if another target alternative is used, the environmental analysis will be reevaluated as necessary. Table 2-3 lists the propellants found in the target missile systems.

2.1.2.2.1 Liquid Fueled Target System

The LFTS is a single stage, liquid-fueled missile that uses a main liquid fuel, an oxidizer, and an initiator fuel for vehicle motor ignition and propulsion. It has an inertial guidance system and a non-separating high explosive payload. The LFTS proposed for testing is approximately 11 meters (36 feet) long and has a diameter of 0.88 meter (2.9 feet). When fueled, the missile weighs approximately 5,865 kilograms (12,930 pounds). With the high explosive payload, the LFTS has a hazard classification of 1.1 (explosives that have a mass explosion hazard that is expected to



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

Representative Impact Zones

Not to Scale

Figure 2-13

mass-detonate when a small portion is initiated by any means). The LFTS has an FTS that is activated by shutting off the flow of fuel, which terminates the flight vehicle's thrust. Support equipment normally associated with the LFTS includes the mobile launcher used to launch the missile, a truck mounted pad equipment shelter, a launch control van, the propellant transfer system, and a propellant operation and staging trailer.

Table 2-3: Propellants in Target Missile Systems

Target missile	Fuel	Oxidizer	Initiators
Liquid fueled target system	Kerosene-based liquid	Inhibited red fuming nitric acid	Triethylamine and Dimethylaniline
Short Range Air Launch Target	Ammonium perchlorate-based solid	NA	NA
Long Range Air Launch Target	Ammonium perchlorate-based solid	NA	NA

NA = Not applicable

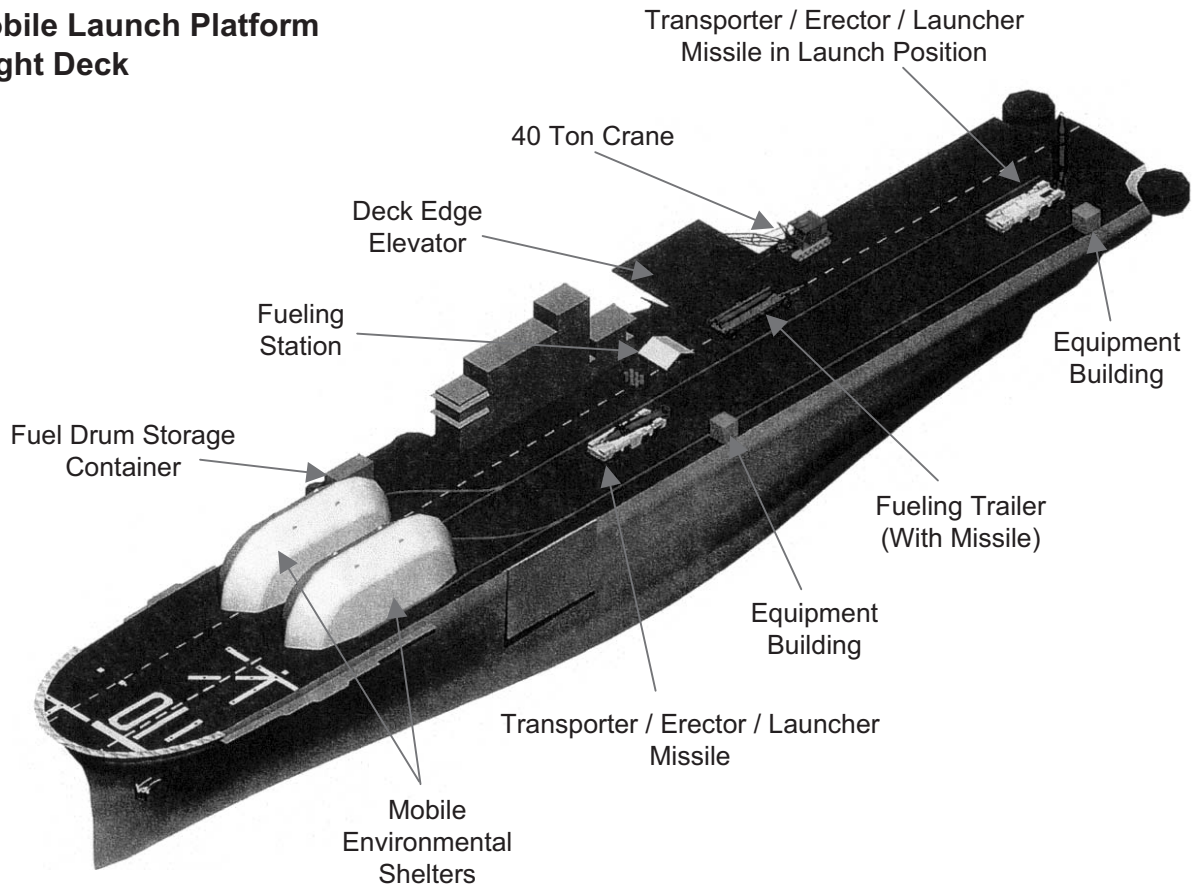
The LFTS would be launched from the sea-based MLP or Vandenberg AFB. LFTS missiles with different payloads were successfully flight tested in the Republic of the Marshall Islands at the Ronald Reagan Ballistic Missile Defense Test Site (RTS) (formerly known as the U.S. Army Kwajalein Missile Range) in 1997 and from Vandenberg AFB in 2002.

Sea-Based Target Launch Platform

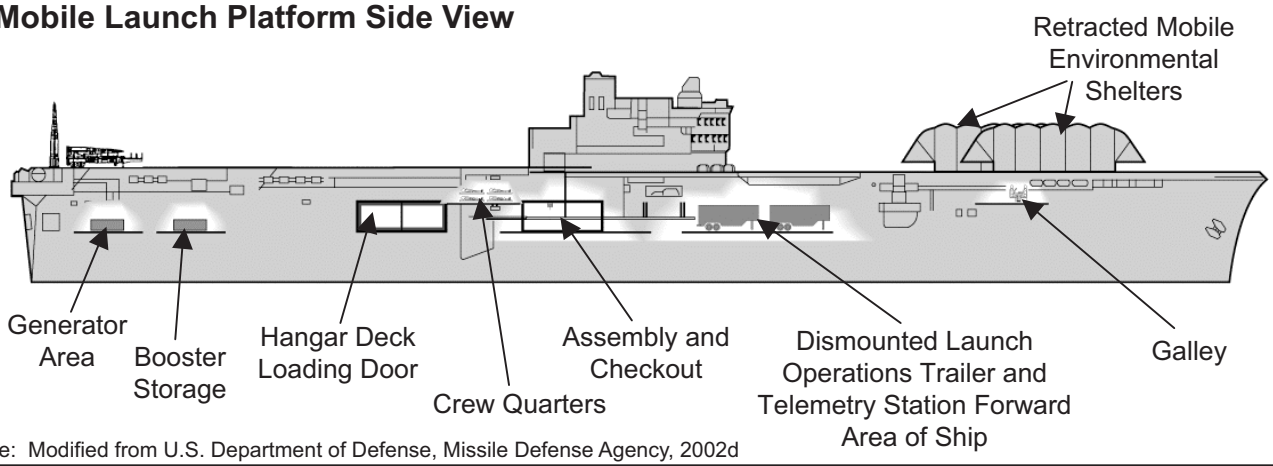
A sea-based launch platform known as the MLP could be used to launch LFTSs. The MLP is a converted U.S. Navy LPH-10 helicopter carrier, retrofitted to allow for missile storage and launches (figure 2-14). It is currently berthed at Mare Island, California. The MLP would not only serve as a target launch platform but would also hold recording, communications, and measuring equipment. The MLP is approximately 183 meters (602 feet) long, 32 meters (104 feet) wide, and 9.8 meters (32 feet) high, with about 17,055 metric tons (18,800 tons) displacement fully loaded. It has stowage capacity of about 400 square meters (4,300 square feet) for vehicles and approximately 1,059 cubic meters (37,400 cubic feet) for palletized items. The MLP has quarters for 100 people, a full galley, and a control/operations room with a full suite of communications and launch support equipment. Although capable of holding more, the MLP would contain about 113,600 liters (30,000 gallons) of JP-5 fuel for the on-board generators during a campaign. It would also be stocked with about 1,041 liters (275 gallons) of lubricating oil, 15,140 liters (4,000 gallons) of hydraulic oil, and 379 liters (100 gallons) of antifreeze. These materials would be stored in tanks onboard the ship. The MLP is a free-floating vessel that would be towed to position prior to testing. It would not be anchored to the ocean floor during launching. The MLP provides the test program the flexibility to launch targets where no ground launch sites are available, and to vary launch azimuths and ranges of targets to accommodate test objectives and safety considerations.

The MLP has large open and enclosed decks, good sea-state stability, onboard living quarters, and a deck-edge elevator. The MLP would carry fresh water using both existing ship holding tanks and bottled drinking water. Wastewater would be held in existing ship holding tanks within the regulatory distance from shore. There are no planned on-board helicopter operations, but personnel pick-up from hover only can be supported in the case of an emergency or accident.

Mobile Launch Platform Flight Deck



Mobile Launch Platform Side View



Source: Modified from U.S. Department of Defense, Missile Defense Agency, 2002d

Mobile Launch Platform Configurations

Not to Scale

Figure 2-14

The MLP would be used to launch the LFTS and/or other supportable target system. The MLP is capable of launching for engagement with an interceptor launched from San Nicolas Island.

If the MLP is used, liquid propellant fuel and oxidizer and other liquid target missile components and support equipment would be loaded onboard the ship while docked at explosive anchorage where fueling would occur. To support an intercept, the MLP would then be towed to a determined launch location in the open ocean. Final assembly and checkout of the target missile, as well as fueling operations for the back-up missile if necessary, would be performed in the open ocean. All of these activities, while the MLP is docked or at sea, would be accomplished in accordance with hazardous waste and spill contingency plans and standard operating procedures for health and safety that would be developed. No air or other permit requirements would be anticipated. The MLP would remain at sea for a maximum of approximately 21 days during a launch support mission and carry up to 100 personnel during operations. Launching of LFTS targets from the MLP for the ASIP program would be based on the analysis provided in the MLP EA. The MLP EA is being prepared by MDA to address and analyze operations of the MLP, including launching of the LFTS. The EA is scheduled to be completed in March 2004.

Land-Based Target Launch

The LFTS may be launched from the southern portion of Vandenberg AFB. Candidate sites include the Space Service Incorporated (SSI) site and the Space Launch Complex (SLC) -3W site. LFTS launches from northern Vandenberg AFB and launches from the SSI site were addressed in the *Liquid Propellant Missile (LPM) Site Preparation and Launch Environmental Assessment* (U.S. Department of Defense, Missile Defense Agency, 2002a) and the *Environmental Assessment for the California Spaceport* (U.S. Department of the Air Force, 1995).

Provisions for Vandenberg AFB LHAs are established in Eastern and Western Range 127-1. Each proposed mission-specific LHA is approved by 30th Space Wing/Safety Office (30 SW/SE) based upon mission-specific parameters and the capabilities of on-base range instrumentation. The size of a mission-specific LHA can be considerably smaller than the planning LHA but would in all cases be fully contained within the planning LHA, which represents the area bounding all potential hazardous debris impact points. The LHA does not encompass all areas wherein secondary effects, such as fire risk, may result during launch.

2.1.2.2.2 Short Range Air Launch Target

The SRALT vehicle consists of a re-entry vehicle, a guidance and control module, an interstage assembly (Minuteman II 2/3 interstage), an SR19-AJ-1 motor, and an aft skirt assembly. The target vehicle is approximately 10 meters (33 feet) long and has a maximum diameter of about 154 centimeters (60.5 inches). The vehicle weighs approximately 9,072 kilograms (20,000 pounds). The launch vehicle includes a guidance and control system, an inertial navigation system, a global positioning system receiver, and a telemetry system. The SR19-AJ-1 motor is equipped with an FTS to terminate thrust if unsafe conditions develop during powered flight. The SRALT would be modified to allow for separation of the re-entry during flight.

The air launch target motor would be shipped by truck to the target missile integration site at Yuma Proving Ground from Hill AFB, Utah. Other components, such as the ground control system, aft skirt and fins, and sled-and-pallet assembly, would be shipped to the target missile

integration site from other contractor locations. When the solid rocket motor and other components arrive at the target missile integration site, the motor would then be transferred to a missile assembly building for installation of the FTS and integration of the other components. The target vehicle would then be attached to the pallet-and-sled equipment. The target and sled assembly would be transported to Point Mugu by C-17 aircraft or remain at Yuma Proving Ground. A C-17 or similar aircraft would then fly the air launch target from either Yuma Proving Ground or Point Mugu to the flight test area. Approximately 20 to 35 personnel would be required to maintain the air launch program.

The SRALT is carried aloft and launched by a U.S. Air Force Air Mobility Command C-17 or similar aircraft. The SRALT vehicle would be mounted on a pallet and loaded onto the aircraft through a large aft door that accommodates military vehicles and/or palletized cargo. While in flight, the aft door would be opened, allowing release of the palletized launch vehicle. A more detailed description and use of the SRALT system may be found in the *Air Drop Target System Program Programmatic Environmental Assessment* (Ballistic Missile Defense Organization, 1998).

The FTS is initiated by receipt of a radio command from the missile flight safety officer. The FTS is able to detect a premature separation of the booster stages and initiate thrust termination action. Thrust is terminated by initiation of a linear shaped charge, which splits the motor casing, venting any gases into the atmosphere. If a malfunction occurs following release of the SRALT from the aircraft and descent by parachute, the flight safety officer could also send commands through the FTS, which would inhibit the start of powered flight.

2.1.2.2.3 Long Range Air Launch Target

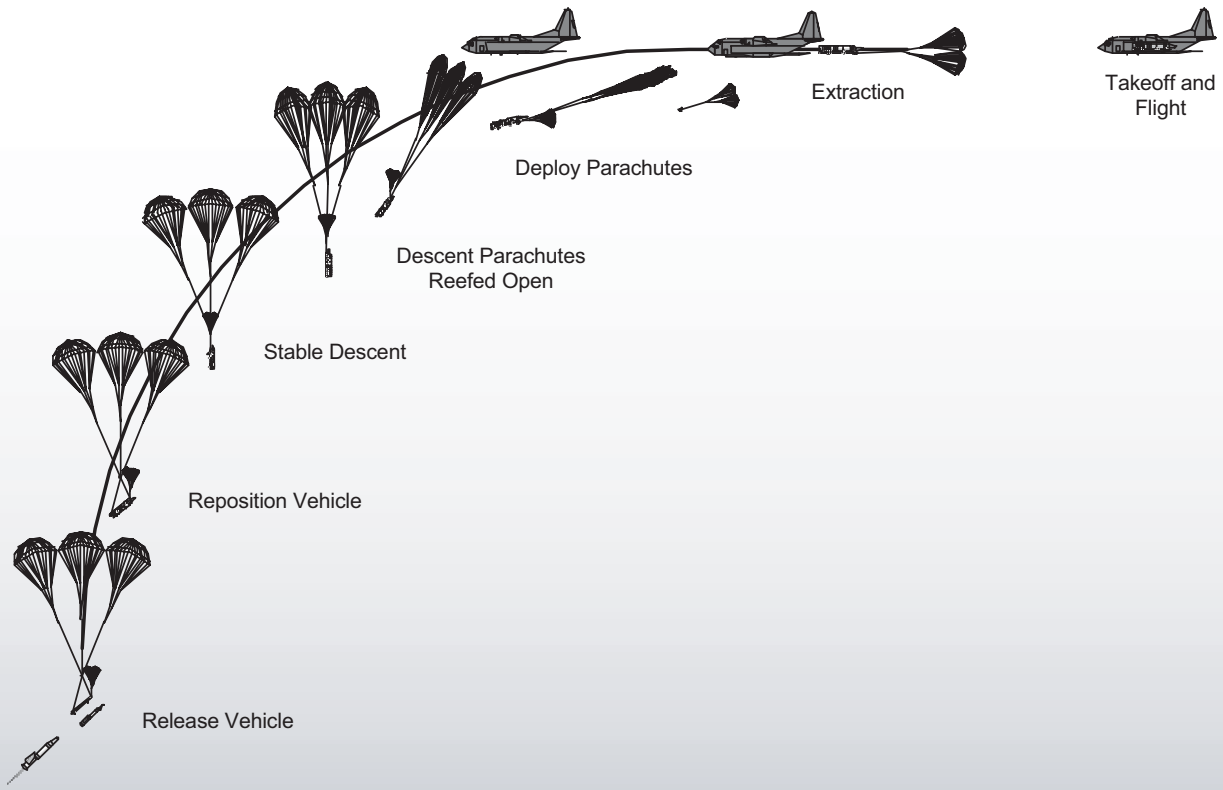
The LRALT vehicle consists of a single reentry vehicle, a guidance and control unit, two SR19-AJ-1 rocket motors, an interstage assembly, and an aft skirt assembly. The target vehicle is about 11 meters (36 feet) long with a maximum diameter of 154 centimeters (60.5 inches), and weighs approximately 15,876 kilograms (35,000 pounds).

The SR19 motors are equipped with an FTS to terminate thrust if unsafe conditions develop during powered flight, as was described for the SRALT.

The LRALT would be carried aloft and launched by a military cargo aircraft C-17. The LRALT vehicle would be mounted on a pallet and loaded onto the aircraft through a large aft door that accommodates military vehicles and/or palletized cargo. While in flight, the aft door can be opened, allowing release of the palletized launch vehicle. Figure 2-15 depicts an LRALT deployment scenario. The deployment scenario for an SRALT would be similar.

Target Systems Transportation and Readiness for the LRALT is the same as was described for the SRALT.

A more detailed description of the LRALT, support equipment, and other components used with the aircraft delivery system may be found in the *Development and Demonstration of the Long Range Air Launch Target System Environmental Assessment* (U.S. Department of Defense, Missile Defense Agency, 2002c).



Source: Modified from U.S. Department of Defense, Missile Defense Agency, 2002c

LRALT Deployment Scenario

Not to Scale

Figure 2-15

2.1.3 PROPOSED ACTION OPTIONS

The proposed action includes two options for the AWS deployment at Point Mugu Sea Range that are currently being investigated and evaluated.

- Option 1: "Split Deployment"—The Arrow CCA (FCC and FCR elements) would be located on the mainland at Point Mugu. Arrow Launcher elements (LCC, launcher, and interceptors) would be located on San Nicolas Island.
- Option 2: "Full Deployment"—All elements of the AWS would be located on San Nicolas Island, including the Arrow CCA and the Arrow Launcher elements.
- In both configurations, the Arrow interceptors would be launched only from San Nicolas Island to accommodate personnel and facility safety considerations.

2.1.4 TEST LOCATIONS

Proposed range and support locations (table 2-4 and figure 2-16) for ASIP flight testing are described in the following sections.

2.1.4.1 San Nicolas Island

San Nicolas Island, which is owned and operated by the U.S. Navy, is one of the Channel Islands and is an off-lying facility of Point Mugu Sea Range at Point Mugu, California (figure 2-16). The island is approximately 14 kilometers (9 miles) long, 5.8 kilometers (3.6 miles) wide, and is located approximately 105 kilometers (65 miles) southwest of Point Mugu. San Nicolas Island encompasses about 5,411 hectares (13,370 acres) of land and is a major element of the Point Mugu Sea Range (figure 2-17). Because of its strategic location offshore, the island is important to the Sea Range because it can be used to simulate shipboard launches of missile and targets. An airfield is located on San Nicolas Island near the southeastern edge of the island's central mesa. The landing area consists of one 3,050-meter (10,000-foot) concrete and asphalt runway. The island is extensively instrumented with metric tracking radar, electro-optical devices, telemetry, and communications equipment necessary to support long-range and over-the-horizon weapons testing. It houses facilities that support all aspects of range operations, such as missile and target launches and missile impacts and scoring.

2.1.4.1.1 System Transportation to San Nicolas Island

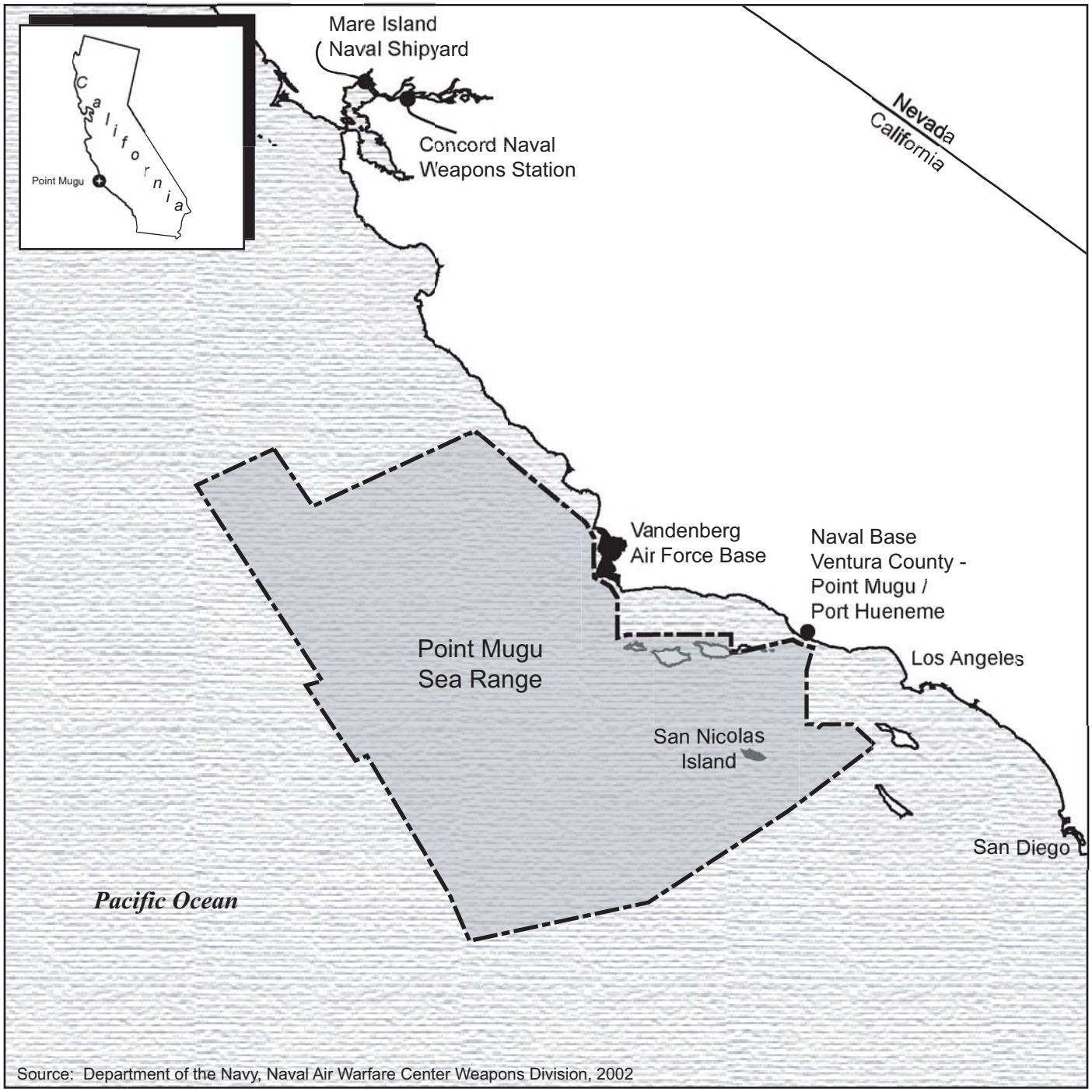
Transportation of the AWS to San Nicolas Island would be accomplished by commercial sealift and airlift. For cargo transported by air, the first port of entry into the United States is not known at this time, but would require U.S. Customs/Department of Agriculture inspection before continuing to the final destination at San Nicolas Island. It is anticipated that the only requirement at this node is for airfield/runway operations such as refueling and U.S. Customs inspection at a temporary holding area on the tarmac within airfield ground operations. Any subsequent airfield nodes utilized before reaching final destination would be required only for refueling operations or for emergencies. The airfield at San Nicolas Island would be final destination for the AWS airlift operations. It is anticipated that the only requirement at this node is for airfield/runway operations such as offloading upon arrival and reloading upon departure. The AWS would then be transported by road to emplacement sites on the island.

Table 2-4: ASIP Option Scenarios

	San Nicolas Island									Point Mugu	
Deployment Option	**Rock Crusher (N807)**	**Vandal Launch Pad (N314)**	**Mobile 1**	**Misc. Pads**	**Unknown Bunker**	**SLAM Site**	**Unnamed Orange Bunker**	**Building 189 Block-house**	**N165**	**Alpha**	**Nike Zeus**
Split				*Launcher/LSE*				*LSE*[*]		*CCA*	*Ant*
Full	*Launcher*	*Ant*		*CCA*	*CCA*[*]	*LSE*					
	Launcher		*CCA*			*LSE*			*Ant*		
	Launcher	*Ant*		*CCA*	*CCA*[*]		*LSE*				
	Launcher		*CCA*				*LSE*		*Ant*		
		Launcher	*CCA*	*LSE*				*LSE*[*]	*Ant*		

Ant = Calibration Antenna for Radar
CCA = Command and Control Area
LSE = Launch Support Equipment
SLAM = Standoff Land Attack Missile
TMCC = Test Mission Control Center

* May be used as a secondary Support Location in addition to the Miscellaneous Pads
NOTE: TMCC to be located at Building N189 Blockhouse (San Nicolas Island) or Building 53 Range Operations Center (Point Mugu)



EXPLANATION

- Water
- Land
- Point Mugu Sea Range

Range and Support Locations

NORTH

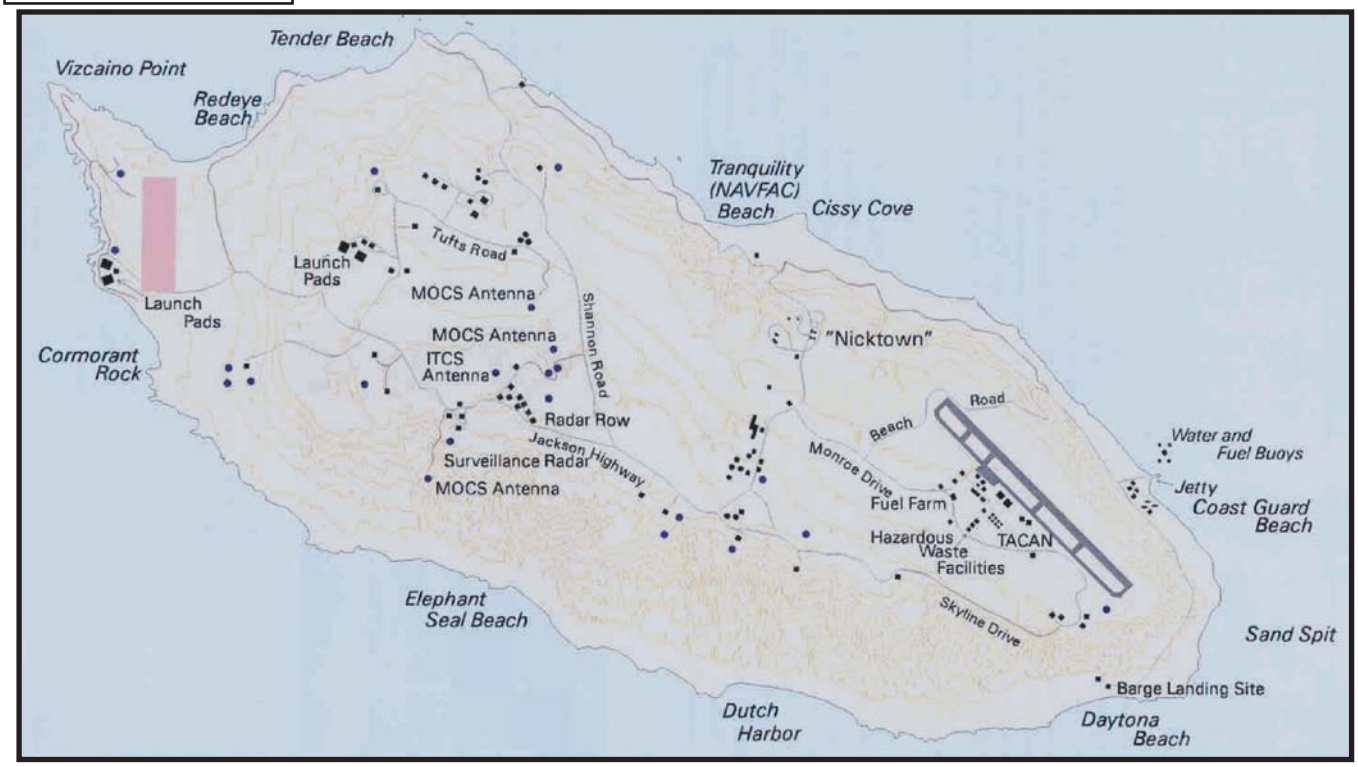
Scale

0 60 120 kilometers

0 37.5 75 miles

10-14-03 Point Mugu

Figure 2-16



Source: Department of the Navy, Naval Air Warfare Center Weapons Division, 2002

EXPLANATION

Standoff Land Attack Missile (SLAM) Operational Area

Buildings

ITCS - Integrated Target Control Systems
MOCS - Multilateral Operations Control System
NAVFAC - Naval Facility
TACAN - Tactical Air Navigation

Scale
0 1.05 2.1 kilometers
0 0.65 1.3 miles
NORTH

10-14-03 San Nicolas Fac

San Nicolas Island Facilities

Figure 2-17

For cargo transported by sea, the first port of entry into the United States would be the port facilities at Port Hueneme, California. The requirements at either port would include unloading docks for commercial freighters, secure and temporary storage for U.S. Customs inspection of the AWS, and loading facilities for barge operations. The barge landing site on San Nicolas Island would be the final destination for all AWS sealift operations. The AWS would then be transported by road to emplacement sites on the island.

In accordance with the Record of Decision for the Point Mugu Sea Range EIS, signed on 24 July 2002 by the Deputy Assistant Secretary of the Navy (Environment), the U.S. Navy would incorporate mitigation and monitoring procedures as set forth in the San Nicolas Island Biological Opinion. One of the procedures includes the thorough cleaning and inspection of construction equipment, vehicles, and supplies at existing washdown areas before their shipment to San Nicolas Island to reduce the potential for introduction of non-native species.

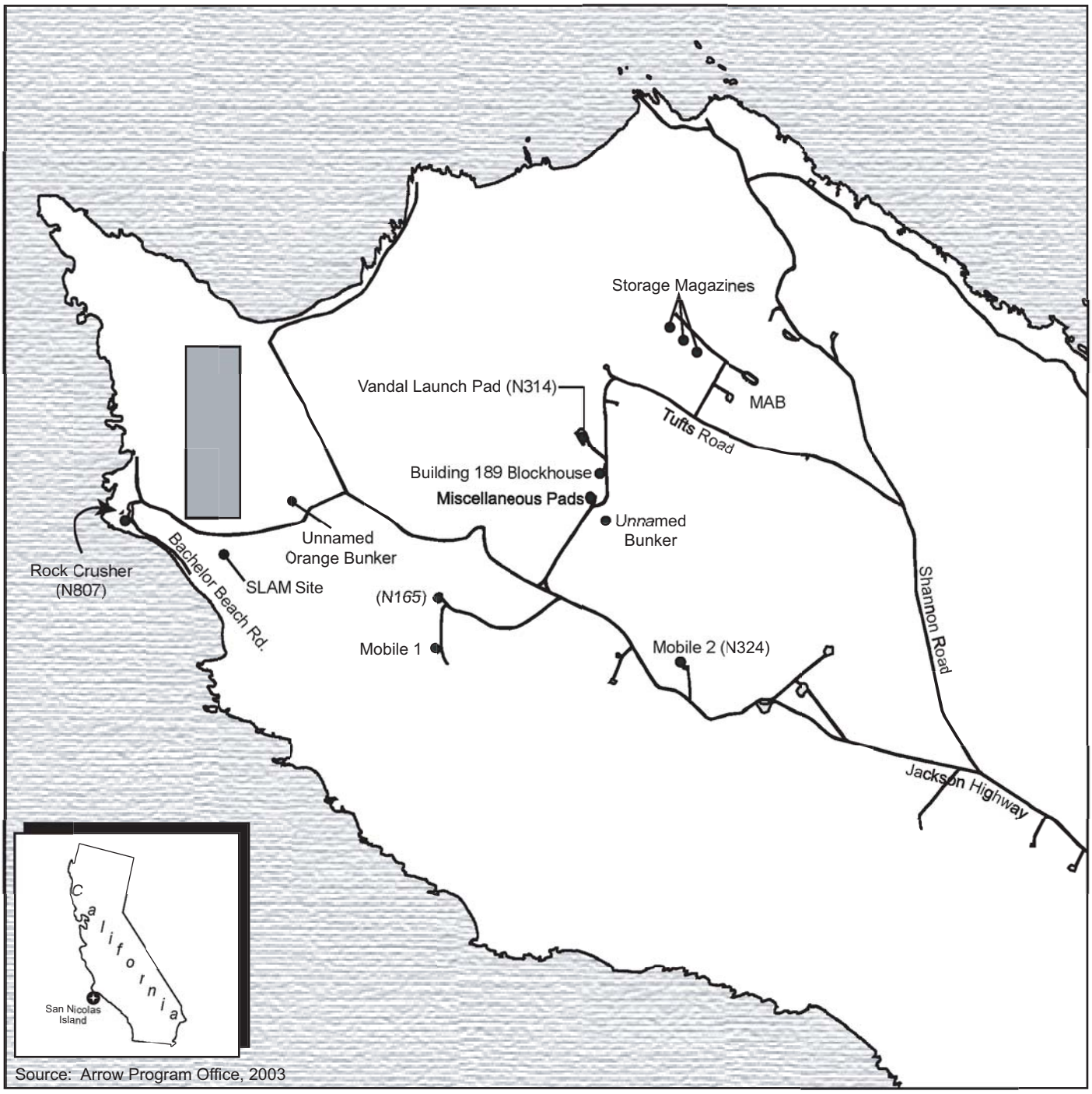
2.1.4.1.2 Facilities and Logistics

A number of proposed sites and facilities, shown in figure 2-18 and in table 2-4, are being evaluated on San Nicolas Island. Proposed CCA (Arrow FCC, FCR, and associated equipment) site alternatives at San Nicolas include the Miscellaneous Pads (potentially with Unknown Bunker site as Support Location) and Mobile 1 (vicinity N165). Proposed Launcher Area (Arrow LCC, Launcher, and Interceptors) candidates include the Rock Crusher site (vicinity N807), the Vandal Launch Pad (vicinity N314) and the Miscellaneous Pads site. The TMCC is an administrative test mission control center for Arrow operations. The candidate location for the TMCC on San Nicolas Island would be Building 189 Blockhouse.

The additional launch support equipment would be placed near the Standoff Land Attack Missile (SLAM) site or Unnamed Orange Bunker if the Rock Crusher site is chosen as the interceptor launch site. The Miscellaneous Pads (potentially with Building 189 Blockhouse as Support Location) would be used if the Vandal Launch Pad or Miscellaneous Pads site is chosen for interceptor launch.

Additional facilities proposed for use at San Nicolas Island include Ordnance Assembly Building 110 or 290 (for use as a missile assembly building); storage magazines 106 or 107; N314 and an administrative support facility for the FCC; and the Nicktown area on San Nicolas Island, which would be used for test personnel housing, dining, and medical support. Portable toilets would be located as required to support deployed personnel. Over the 4 to 5 months required for each caravan, a maximum of 100 personnel would be located at the range. Either the Point Mugu or San Nicolas Island motor pool would provide all vehicles. Test personnel would be transported on-island by shuttle buses or dedicated test site passenger vans.

At Point Mugu, normal range operations would be required for test support only. Airfield operations would be required only from Point Mugu to San Nicolas Island and back for the transport of test personnel, personal items, and small cargo items such as repair parts.



EXPLANATION

- Standoff Land Attack Missile (SLAM) Operational Area
- Water
- Roads
- Proposed Emplacement Site

MAB - Missile Assembly Building

Scale

0 508 1,016 meters

NORTH 0 1,666.5 3,333 feet

10-14-03 W-San

San Nicolas Island Proposed Emplacement Sites

Figure 2-18

2.1.4.1.3 Facility Modifications

No permanent facility construction would be planned at San Nicolas Island. Minor construction changes to existing areas and facilities at San Nicolas Island would be accomplished with temporary support assets in the immediate vicinity. Approximately 0.1 hectare (0.25 acre) would be disturbed at San Nicolas Island from the proposed activities. In the event that fiber optic cable is installed underground, additional ground disturbance would occur, potentially greater than 0.4 hectare (1 acre).

All AWS components would be placed on graded and packed earth or existing concrete after the final site layout has been determined. Rock Crusher site N807 has existing concrete and asphalt pad areas that would serve as a candidate launch pad; however, additional asphalt would need to be poured at the existing area to achieve the required grade level.

The Vandal Launch Pad (Site N314) also has existing concrete and has been proposed as a candidate launch pad. Provisions for pylons would need to be added within the concreted area, or steel matting used depending on soil density.

The Miscellaneous Pads site has an existing concrete pad; however, the pad may not be large enough and may not have adequate bearing strength to support the weight of the radar or launcher and expected loads. Additional concrete may need to be poured to extend the existing concrete pad and include pylons to a depth of several feet within the existing pad and extension. The pylon would be required to support the FCR antenna trailer extended leg-mount load and provide stabilization. Depending on soil density, steel matting could be placed on the ground in lieu of concrete pads to support the FCR. Minimal clearing and leveling around the Unnamed Bunker would be required for emplacement of support or administrative facilities.

Mobile 1 has two existing concrete pads, neither of which is large enough for emplacement of the FCR and associated equipment. The concrete pads would have to be extended, or concrete pylons added to support the FCR. Minimal clearing and leveling to enlarge and prepare the site to make it suitable for the remaining CCA components would be required.

Two or more small temporary trailers would be used to house administrative functions in proximity to the CCA. These would be placed on existing concrete slabs or existing asphalt. Additionally, a calibration tower for the FCR would be temporarily sited on San Nicolas Island. If the CCA is located at the Miscellaneous Pads, the calibration antenna would be located at Vandal Launch Pad (N314). If the CCA is located at Mobile 1, the calibration antenna would be at Building N165. Lightning protection poles would be installed as necessary.

Additionally, in accordance with the Record of Decision for the Point Mugu Sea Range EIS, whenever feasible, staging areas for temporary storage of equipment and materials would be sited in areas with low island night lizard densities. Also, when practicable, proposed facility construction projects sites and associated access roads would be placed to avoid habitat that may harbor island night lizards.

Communication cables may be installed between facilities as required. Cables would be installed in existing conduits, where available. If existing conduits are not available, the cables would be installed either aboveground or underground. The new cable would be placed in

approved routes designed to avoid environmental impacts. If possible, the communication cables would be installed along existing roads.

2.1.4.2 Naval Base Ventura County—Point Mugu Main Base

Point Mugu (figure 2-19) is located on the Southern California coast, approximately 105 kilometers (65 miles) northwest of Los Angeles. It is in the southeastern corner of the Oxnard Plain in Ventura County, where the plain, the ocean, and the Santa Monica Mountains meet.

Point Mugu has scheduling authority over a series of contiguous operational warning areas with expansion north and south to encompass approximately 672,000 square kilometers (196,000 square nautical miles) and west with NOTAMs and NOTMARs. A Federal Aviation Administration (FAA) approved low-level route between the Point Mugu Sea Range and the Land Range at China Lake is used for Cruise Missile testing. Operations are also frequently linked with Vandenberg AFB and the Navy's Southern California Offshore Range (SCORE), to encompass an area from Baja California north to Big Sur. In addition, with proper coordination with FAA, an existing expansion area would be used to the west of the Point Mugu Sea Range.

2.1.4.2.1 System Transportation to Point Mugu

Transportation of the AWS to Point Mugu would be accomplished by commercial sealift and/or airlift. For cargo transported by air, the first port of entry into the United States is not known at this time but would require U.S. Customs/Department of Agriculture inspection before continuing to the final destination at Point Mugu. Any subsequent airfield nodes utilized before reaching final destination would be required only for refueling operations or for emergencies.

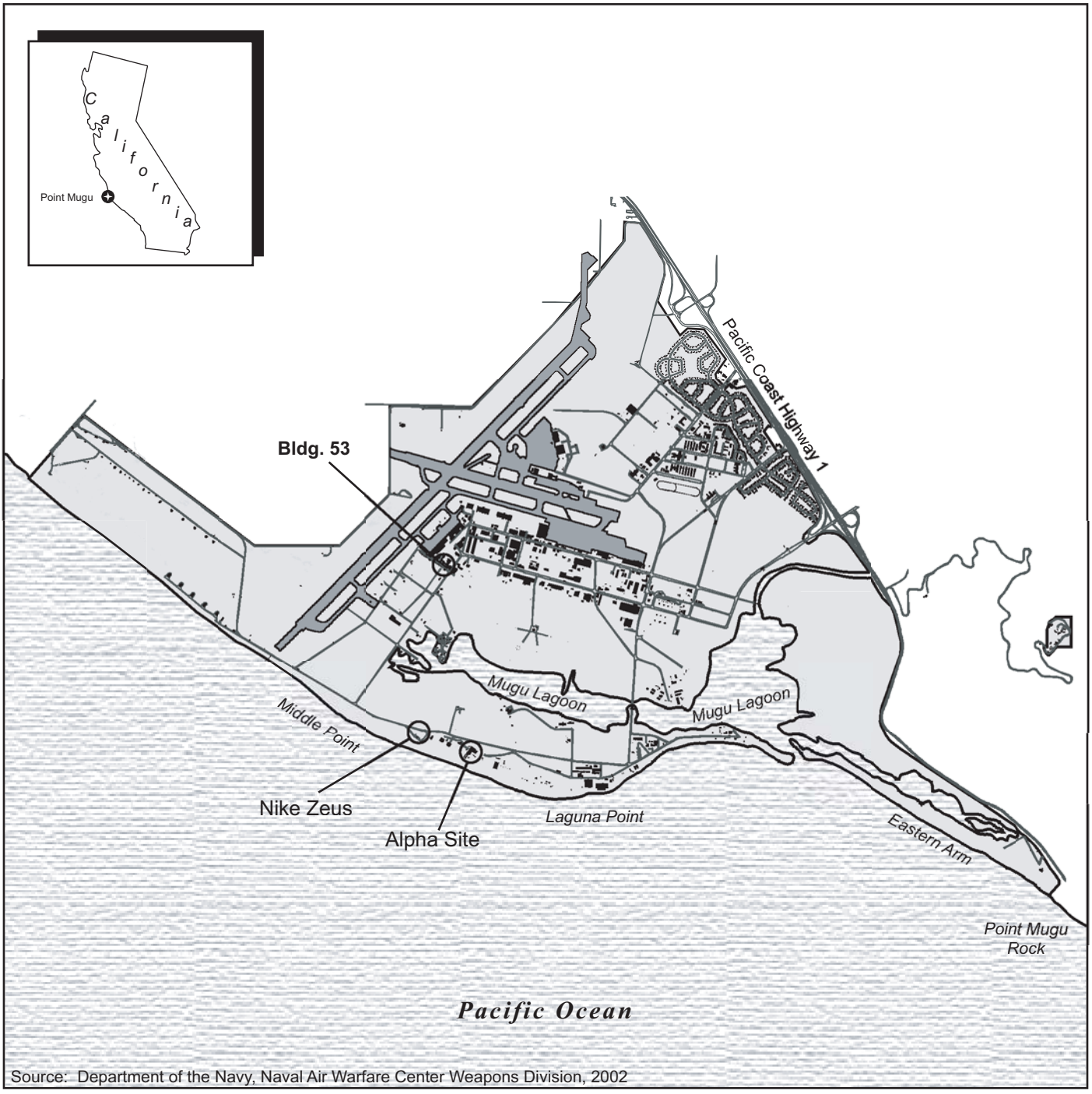
The airfield at Point Mugu would be the final destination for the AWS airlift operations. It is anticipated that the only requirement at this node is for airfield/runway operations such as offloading upon arrival and reloading upon departure.

For cargo transported by sea, the first port of entry into the United States would be the port facility at Port Hueneme, California. The requirements would include unloading docks for commercial freighters, secure and temporary storage for U.S. Customs inspection of the AWS, and loading facilities for barge operations. The AWS equipment would then be transported by road to the final emplacement sites at Point Mugu.

2.1.4.2.2 Facilities and Logistics

Facilities proposed for use at Point Mugu include the Alpha Complex, in the vicinity of Building 7-17, for emplacement of the CCA, including the FCR, FCC, and associated equipment; administrative and equipment storage space; a room within the Point Mugu Range Operations Center Building 53 (for the Arrow TMCC); dining, and medical support. The Nike Zeus site would also be used for the calibration antenna. All vehicles required to support the CCA and TMCC integration activities would be provided by the Point Mugu motor pool.

All AWS components would be placed on graded and packed earth or existing concrete or steel matting after the final site layout has been determined. As shown in figure 2-11, all components would be located within a 60-degree arc behind the FCR antenna.



EXPLANATION

- Water
- Land
- Installation
- Airfield
- Roads
- Buildings

Scale

0 635 1,270 meters

NORTH 0 2,083.5 4,167 feet

10-14-03 NAS Point Mugu

Naval Base Ventura County - Point Mugu

Point Mugu, California

Figure 2-19

Should the FCR be located at Point Mugu Alpha Complex, along with the FCC, new concrete pads or pylons would be required to support the FCR antenna trailer and provide stabilization. Point Mugu has a current plan to demolish a portion of the Alpha site (specifically an old tower and some concrete foundations). Alternatively, depending on soil density, steel matting could be placed on the ground to support the FCR. All other CCA components could be emplaced on existing concrete or asphalt.

Two or more small temporary trailers would be used to house administrative functions in proximity to the CCA. These would be placed on existing concrete slabs or existing asphalt. Additionally, the calibration tower for the FCR would be sited near the Alpha Complex at the Nike Zeus site.

2.1.4.2.3 Facility Modifications

No permanent facility construction would be planned at Point Mugu. Minor construction changes to existing Point Mugu areas and facilities would be accomplished with temporary support assets in the immediately vicinity.

An existing room within the Range Operations facility (Building 53) would be used to house the Arrow TMCC communications and electronics equipment consoles. The TMCC is an administrative test management area for AWS test preparation and conduct. This TMCC would be linked with Range and Target control facilities. Minor room alterations would be accomplished to support communications and data processing. These alterations could include extension of communications lines, removal of walls or inclusion of subfloors for electronic equipment, and modifications to the air conditioning system.

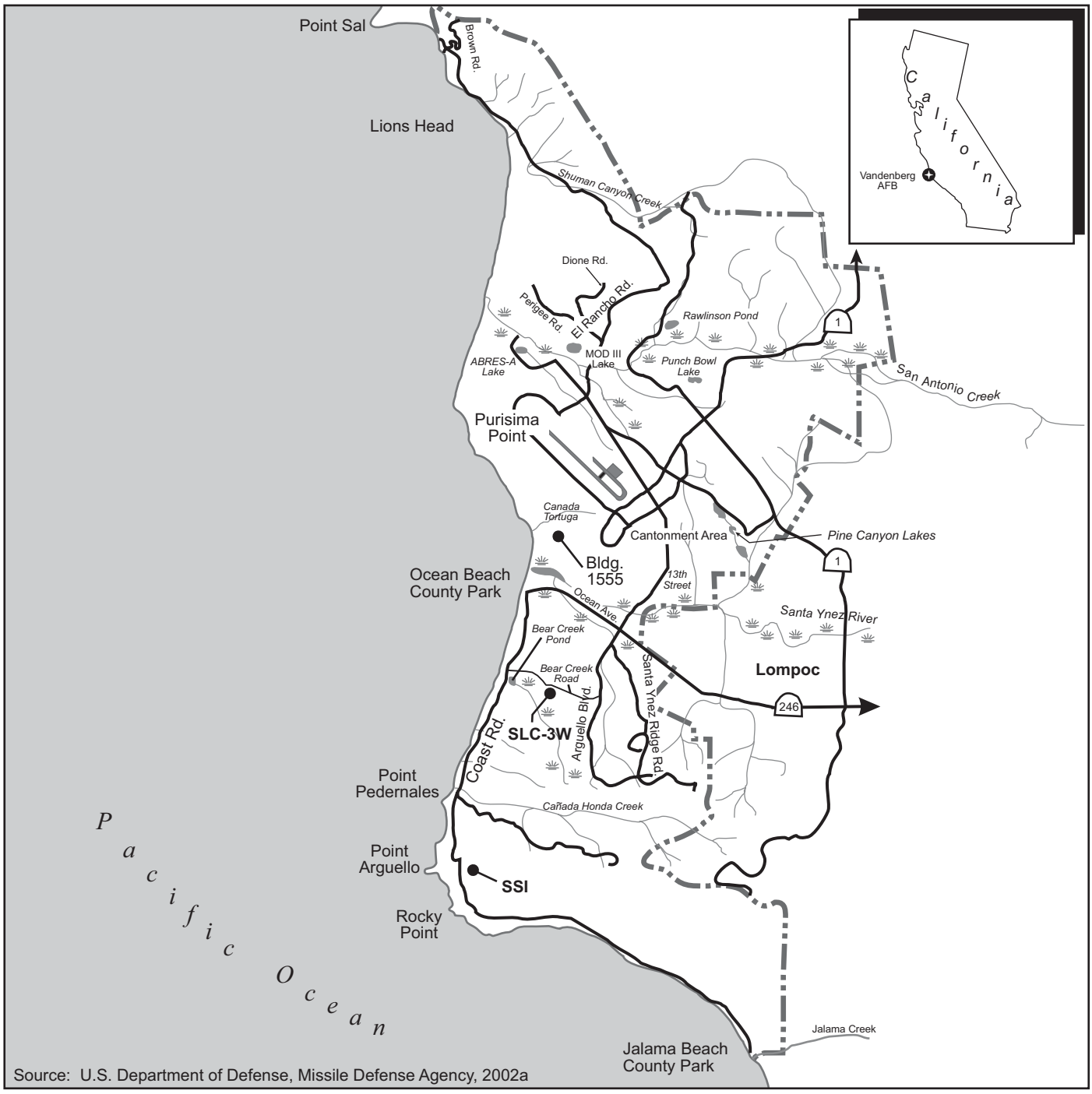
Lightning protection poles would be installed as necessary and would be outfitted with anti-perching materials in coordination with the Naval Base Ventura County environmental division.

2.1.4.3 Vandenberg Air Force Base

Target launch of the LFTS may occur from the southern portion of Vandenberg AFB, which is located on the coast of California, 89 kilometers (55 miles) north of Santa Barbara (figure 2-20). Vandenberg AFB is one of the largest Air Force bases in the United States and occupies approximately 39,823 hectares (98,400 acres) along 56 kilometers (35 miles) of Pacific coastline within Santa Barbara County. Vandenberg AFB offers a large area of operation, a proven safety record, and the capability to perform a wide range of missile intercept testing. Notional trajectories for an interceptor launched from San Nicolas Island and a target launched from Vandenberg AFB are shown in figure 2-2. The proposed launch azimuth of the target from South Vandenberg is within the range of 168 to 220 degrees analyzed in the *Environmental Assessment for the California Spaceport*. (U.S. Department of the Air Force, 1995)

2.1.4.3.1 System Transportation to Vandenberg Air Force Base

The LFTS would be transported unfueled to the proposed launch site at Vandenberg AFB, California from storage facilities at Redstone Arsenal, Alabama. The liquid propellant (fuel, oxidizer, and initiator fuel) for the LFTS would be shipped by truck to Vandenberg AFB. All propellant would be transported in approved shipping containers in accordance with U.S. Department of Transportation (DOT) and DoD hazardous materials shipping regulations.



EXPLANATION

- Land Area
- Water Area
- Vandenberg Air Force Base Boundary
- Road
- River / Creek
- Wetlands

SLC - Space Launch Complex
SSI - Space Services Incorporated

NORTH

Scale
0 3.42 6.84 kilometers
0 2.13 4.25 miles

10-14-03 Target Launch VAFB

Vandenberg Air Force Base Proposed Target Launch and Support Sites

Vandenberg Air Force Base, California

Figure 2-20

2.1.4.3.2 Facilities and Logistics

A preferred target launch site has not been determined. Candidate sites in the southern portion of Vandenberg AFB (chosen to minimize safety issues) include the SSI site and the SLC-3W launch site. The SSI launch site is considered a separate stationary source from Vandenberg AFB, but does not maintain any air permits as existing emissions fall below 0.91 metric ton (1 ton) per year. It is anticipated that Arrow launch activities would not affect this 0.91 metric ton (1 ton) per year threshold and would not require permits.

Fueling of the target missile would occur at Building 960 on Vandenberg AFB. Due to the IRFNA oxidizer, the liquid propellants would be stored at the Hypergolic Stockpile Storage Facility on Vandenberg AFB. The IRFNA would be stored in the oxidizer section of the facility and kerosene in the fuel section. Ordnance would be stored in a shed near Building 960.

Fueling operation activities would utilize existing fueling equipment previously analyzed in the *Liquid Propellant Missile (LPM) Site Preparation and Launch EA* and would qualify for the Santa Barbara County Air Pollution Control District Rule 202 de minimis exemption. (Harding, 2003) The propellant loading portion of the system will be flushed with deionized water and alcohol; all materials and waste from flushing would be handled, stored, and disposed of in accordance with applicable Vandenberg AFB and state regulations.

Approximately 100 personnel would be at Vandenberg AFB for up to a 90-day period to perform pre-launch, launch/intercept, and post-launch operations. All personnel would be housed off-base.

Equipment associated with the LFTS proposed for launch would be the same as previously used at Vandenberg AFB. It would be transported to the launch site. The Mobile Launcher is a wheeled vehicle used to launch the missile. The Pad Equipment Shelter is a truck-mounted equipment enclosure. It would serve as the electrical interface between the Mobile Launcher and the Launch Control Van. The Pad Equipment Shelter would be used to relay signals from the missile and the Mobile Launcher and send commands to the missile and the Mobile Launcher from the Launch Control Van. Fiber optic communication cables between equipment components would be run aboveground. During launch, the unmanned Pad Equipment Shelter would be located in the launch area approximately 38 meters (125 feet) from the Mobile Launcher. The Launch Control Van is a truck-mounted equipment and personnel enclosure that houses the operations control center. It would be located at the main control building or integrated into the launch building. The Propellant Transfer System is a pumping system designed to transfer propellants from the shipping containers to the missile. This is a closed-loop system with no release to the atmosphere. The Transfer and Fueling Trailer would be used to transport the missile to and from various areas during integration and propellant loading activities, which are necessary during pre-flight build-up. The Propellant Operation and Staging Trailer would be a range-supplied vehicle or mobile trailer located in the vicinity of hazardous operations during the staging and launch activities that houses personal protective, emergency response, and spill response equipment. Concrete containment would be provided around the fueling area if required.

Missile and payload integration would occur at the fueling area. Injection of starter fluid would occur prior to launch initiation at the launch site. Existing launch pads would be used with no improvements necessary. An auxiliary power unit with a 30-kW generator would be used to raise and lower the transportation erector launch equipment. No new or modified ground site support such as optic sites or boresights are required and no administration office is required.

Approximately 100 personnel would be at Vandenberg AFB for up to a 90-day period to perform pre-launch, launch/intercept, and post-launch operations. All personnel would be housed off-base.

2.1.4.3.3 Facility Modifications

No facility modifications are planned at this time. Facility modifications or installation of utilities, if they become necessary, would be formally coordinated with and approved by the Vandenberg AFB Environmental Management Office prior to any activity proceeding.

2.1.4.4 Open Ocean Launches

Air- or sea-launched targets would be used in flight test scenarios involving San Nicolas Island and the Point Mugu Sea Range. These target launches would occur in zones that have been verified clear of air and sea traffic by range safety personnel. Notional trajectories for an interceptor launched from San Nicolas Island and an air or sea launch target from the northwest are shown in figures 2-1, 2-2, and 2-3.

2.1.4.4.1 Air-Launched Targets

System Transportation to Open Ocean Launch Site

The air-launched targets would be flown by C-17 or similar aircraft from Yuma Proving Ground or Point Mugu for release in the flight test area.

Facilities and Logistics

Existing ordnance storage facilities at Yuma Proving Ground and Point Mugu would be used to store the target missile before loading on the aircraft.

Facility Modifications

No facility modifications are planned at this time. Facility modifications or installation of utilities, if they become necessary, would be formally coordinated with and approved by Yuma Proving Ground or Point Mugu prior to any activity proceeding.

2.1.4.4.2 Sea-Launched Targets

System Transportation to Open Ocean Launch Site

The LFTS would be transported unfueled to the Concord Naval Weapons Station, California from storage facilities at Redstone Arsenal, Alabama. The liquid propellant (fuel, oxidizer, and initiator fuel) for the LFTS would be shipped by truck to the ordnance facility at Concord, California. All propellant would be transported in approved shipping containers in accordance with U.S. DOT and DoD hazardous materials shipping regulations. Fueling of the LFTS would occur on the MLP while docked at Concord. If fueling of a back-up missile is required, it would be conducted while at sea.

Facilities and Logistics

There would be no storage prior to loading on the MLP. In the event of a delay, existing ordnance storage facilities at Concord Naval Weapons Station would be used to store the liquid propellant and the LFTS before loading on the MLP.

Facility Modifications

No facility modifications are planned at this time.

2.2 NO-ACTION ALTERNATIVE

Under the No-action Alternative, the MDA testing of the ASIP would not proceed with integrated flight testing of the AWS as described in the Proposed Action. Commitments to Israel to cooperatively develop an effective Israeli TMD capability would not be fulfilled, and the United States would not realize any benefits to its own TMD test program from participation in the ASIP.

2.3 ALTERNATIVES CONSIDERED BUT NOT CARRIED FORWARD

During preliminary planning and siting for the ASIP, a number of candidate test ranges were examined, in addition to the Point Mugu Sea Range. All of the candidate test ranges were analyzed for various operational and technical considerations including safety, range availability, instrumentation, operational cost, and logistical support. The other ranges considered included the following:

- Eglin AFB, Florida
- Wallops Flight Facility, Virginia
- Kodiak Launch Complex, Alaska
- Pacific Missile Range Facility (PMRF), Hawaii
- White Sands Missile Range, New Mexico
- RTS, Republic of the Marshall Islands
- Vandenberg AFB (as interceptor launch location)

Eglin AFB and Wallops Flight Facility failed to meet the testing scenario and safety exclusionary criteria. Both ranges lack target ground launch capabilities to support the required LFTS at the appropriate flight distance. The installations also exist in close proximity to civilian populated areas and/or wildlife refuges such that it is not possible to establish a launch site that has sufficient area to support the required ground hazard area.

Kodiak Launch Complex failed to meet the testing scenario criterion for the same reason as Eglin AFB and Wallops Flight Facility. Kodiak Launch Complex also failed to meet the range availability criterion because the AWS is not designed to operate in the severe weather conditions found on Kodiak Island for much of the year and the site does not have the necessary range assets to support an AWS launch.

The PMRF failed to meet the testing scenario and safety exclusionary criteria. PMRF lacks target ground launch capabilities to support the required LFTS at the appropriate flight range. Safety analysis conducted by PMRF safety personnel confirmed that PMRF could not in fact

meet the safety exclusion criteria. The Arrow launch destruct debris area is too large for the ground hazard area at the proposed launch site.

The White Sands Missile Range failed to meet the testing scenario and safety exclusionary criteria. The only trajectory possible for an LFTS launch caused the LFTS to impact in the northern third of the Range. The intercept geometry proved to be both unacceptable from an AWS test perspective and unsafe to conduct, as lethal debris could not be contained on the range.

The RTS failed to meet the range availability and safety exclusionary criteria. Other programs scheduled at RTS coincide with the ASIP test schedule for Caravan 1 and place potential restrictions on AWS test preparation and integration activities. The Arrow launch destruct debris area is also too large for the numerous exclusionary perimeters or keep-out zones around inhabited atolls within the Marshall Islands.

Based upon review of initial data provided by the Israel Missile Defense Organization for the Arrow missile, 30th Space Wing (30 SW) identified critical items of the Arrow FTS architecture that were determined to be unacceptable to requirements mandated by VAFB. In addition specific items did not meet Eastern and Western Range 127-1 Range Safety Requirements and/or RCC 319 regulations. These critical items were cited as cause for redesign of the Arrow FTS architecture to be both compliant and compatible with the Western Range Command Destruct equipment. These finding were determined as being significant within themselves as to not warrant further or complete analysis of the Arrow FTS compliance evaluations.

Combined with findings obtained during concurrent Flight Safety technical discussions, specifically related to the Ranges flight safety models capability to support higher velocity and dynamically maneuverable vehicles, and additional concerns identified from internal flight safety analyses given specific launcher emplacements locations, VAFB safety was determined as having unacceptable risk to the ASIP program schedule and did not meet siting exclusionary criteria of “safety” set by the program for a AWS being deployed on a contingency basis. Therefore, Vandenberg AFB was eliminated from further consideration as the interceptor launch location.

At the conclusion of the evaluation, only the Point Mugu Sea Range remained a potential candidate adequate to satisfy the ASIP test program requirements.

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3.0
AFFECTED ENVIRONMENT

3.0 AFFECTED ENVIRONMENT

This chapter describes the environmental characteristics that may be affected by the Proposed and Alternative Actions. The information provided serves as a baseline from which to identify and evaluate environmental changes resulting from flight testing the AWS in the Pacific region. To provide a baseline point of reference for understanding any potential impacts, the affected environment is briefly described; any components of greater concern are described in greater detail.

Available reference materials, including EAs, EISs, and base master plans, were reviewed. To fill data gaps (questions that could not be answered from the literature) and to verify and update available information, installation and facility personnel; federal, state, and local regulatory agencies; and private individuals were contacted.

Environmental Resources

Thirteen broad areas of environmental consideration were originally considered to provide a context for understanding the potential effects of the Proposed and Alternative Actions 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, water resources, and environmental justice. The resource areas were analyzed as applicable for each proposed location or activity. This EA summarizes as appropriate the analyses of existing related environmental documentation.

3.1 SAN NICOLAS ISLAND

3.1.1 AIR QUALITY—SAN NICOLAS ISLAND

Air quality in a given location is described by the concentrations of various pollutants in the atmosphere, expressed in units of parts per million (ppm) or micrograms per cubic meter ($\mu g/m^3$). Pollutant concentration is determined by the type and amount of pollutants emitted into the atmosphere; the physical characteristics, including size and topography of the affected air basin; and meteorological conditions related to prevailing climate. The significance of a pollutant concentration is determined by comparison with National Ambient Air Quality Standards (NAAQS) and state ambient air quality standards (AAQS) that establish limits on the maximum allowable concentrations of seven pollutants (carbon monoxide, lead, oxides of nitrogen, ozone, particulate matter with a diameter less than or equal to 10 micrometers [PM-10], particulate matter with a diameter less than or equal to 2.5 micrometers [PM-2.5], and sulfur dioxide) to protect public health and welfare.

According to the U.S. Environmental Protection Agency (EPA) guidelines, an area with air quality better than the NAAQS is designated as being in attainment; areas with worse air quality are classified as nonattainment areas. A nonattainment designation is given to a region if the primary NAAQS for any criteria pollutant is exceeded at any point in the region for more than 3 days during a 3-year period. Pollutants in an area may be designated as unclassified when there is insufficient data for the EPA to determine attainment status.

California has established AAQS. Emissions of air pollutants from operations in California are limited to the more restrictive standard (federal or state). Table 3-1 compares NAAQS and California AAQS.

Table 3-1: California and Federal Air Quality Standards

		National Standards	California Standards
Ozone	8-hr average	0.08 ppm	None
	1-hr average	0.12 ppm	0.09 ppm
Carbon Monoxide	8-hr average	9.0 ppm	9.0 ppm
	1-hr average	35.0 ppm	20.0 ppm
Nitrogen Dioxide	annual average	0.053 ppm	None
	1-hr average	None	0.25 ppm
Sulfur Dioxide	annual average	0.03 ppm	None
	24-hr average	0.14 ppm	0.04 ppm
	3-hr average	0.5 ppm	None
	1-hr average	None	0.25 ppm
Lead	calendar quarter	1.5	None
	annual average	None	1.5
PM-10	annual average	50	30
	24-hr average	150	50
PM-2.5	annual average	15	None
	24-hr average	65	None

Source: Ventura County Air Pollution Control District, 2003
PM-2.5/10 = Particulate matter with a diameter less than or equal to 2.5 micrometers/10 micrometers

Region of Influence

The region of influence (ROI) for air quality analysis would be the air basin surrounding the areas in which the proposed activities would occur. As San Nicolas Island itself is a relatively small area, the entire island is in the ROI.

Affected Environment

Climate

San Nicolas Island is located within Ventura County, which is in the South Central Coast Air Basin. This area experiences a mild Mediterranean climate typical of southern California. Annual precipitation averages approximately 20 centimeters (8 inches) on San Nicolas. The average mean monthly temperature on land is 15˚ Celsius (C) (59˚ Fahrenheit [F]). Prevailing winds tend to come from the northwest at an average speed of 24 kilometers (13 miles) per hour. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a)

Regional Air Quality

According to the EPA, air quality on San Nicolas Island is considered to be in attainment or unclassified. As there are no major emission sources and a strong northwesterly wind on San Nicolas Island, the likelihood of ambient air quality being affected by pollutants is very low. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a)

Existing Emission Sources

Stationary sources found on San Nicolas Island include a power plant, a gasoline refueling station and underground storage tank, small boilers, several internal combustion engines, and various adhesive and sealant operations. All non-exempt emitting sources on San Nicolas Island are permitted under Title V Permit #01207. (Schwartz, 2003b) Mobile sources of emissions consist of aircraft and target operations, as well as combustion engines from a limited number of military vehicles on the island. Table 3-2 lists the baseline emissions for San Nicolas Island.

Table 3-2: Baseline Emissions at San Nicolas

Carbon Monoxide metric tons (tons) per year	**Oxides of Nitrogen** metric tons (tons) per year	**Reactive Organic Compounds/Hydrogen Chloride** metric tons (tons) per year	**Sulfur Dioxide** metric tons (tons) per year	**PM-10** metric tons (tons) per year
30.77 (33.92)	137.6 (151.75)	10.39 (11.45)	4.69 (5.17)	10.49 (11.56)

Source: U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a
PM-10 = Particulate matter with an aerodynamic diameter less than or equal to 10 micrometers

3.1.2 AIRSPACE—SAN NICOLAS ISLAND

Airspace, or that space which lies above a nation and comes under its jurisdiction, is generally viewed as being unlimited. However, it is a finite resource that can be defined vertically and horizontally, as well as temporally, when describing its use for aviation purposes. The time dimension is a very important factor in airspace management and air traffic control. Under the *Federal Aviation Act of 1958*, as amended (42 U.S. Code [USC] 1301 *et seq.*), the FAA is charged with the safe and efficient use of our nation's airspace and has established certain criteria and limits to its use. Certain types of uses include restricted use airspace, warning areas, and control area extensions (CAEs).

Regulations governing visual flight that enable the pilot to fly with visual reference to the ground are called visual flight rules (VFR). Instrument routes are flown exclusively using instrument flight rules (IFR) without visual references to the ground.

Restricted use airspaces are used by military testing or flight training and are not usually accessed by civilian or commercial aircraft.

Warning areas are designated areas within international airspaces exclusively located over coastal waters of the United States and its territories for military activities. However, international agreements do not provide for prohibition or restriction of flight in international airspaces, although military flight operations and activities may be of a hazardous nature. A

CAE flight corridor through a warning area may be opened or closed at the request of a user in coordination with the FAA.

Region of Influence

The ROI for airspace includes the airspace above San Nicolas Island within Restricted Areas R-2535A and R-2535B (figure 3-1).

Affected Environment

San Nicolas Island is located approximately 88 kilometers (55 miles) south of Point Mugu, and 128 kilometers (79 miles) southwest of Los Angeles International Airport. It is contained exclusively within Restricted Areas R-2535A and R-2535B, managed by Point Mugu Sea Range. The restricted areas extend from surface (sea level) to 3,048 meters (10,000 feet). The restricted areas lie within but are excluded from Warning Area W-289, which goes from the surface to an unlimited altitude. The facility, its activities, and its airspace are integral to the Point Mugu Sea Range. (U.S. Army Space and Strategic Defense Command, 1994)

3.1.3 BIOLOGICAL RESOURCES—SAN NICOLAS ISLAND

Native or naturalized vegetation, wildlife, and the habitats in which they occur are collectively referred to as biological resources. Existing information on plant and animal species and habitat types in the vicinity of the proposed sites was reviewed, with special emphasis on the presence of any species listed as threatened or endangered by federal or state agencies, to assess their sensitivity to the effects of the Proposed Action. For the purpose of discussion, biological resources have been divided into the areas of vegetation, wildlife, threatened and endangered species, and environmentally sensitive habitat.

Region of Influence

The ROI includes areas on and in the vicinity of San Nicolas Island that may potentially be affected by site preparation and launches of the AWS.

Affected Environment

Vegetation

San Nicolas Island has 12 vegetation communities. The dominant form of vegetation is scrub vegetation. Vegetation from five scrub communities covers approximately 55 percent of the island. Vernal pool and riparian habitat are forms of freshwater aquatic vegetation found on the island. Dunes (coastal and inland) are located along the coastline. A small amount of coastal marsh is present. Twenty-six percent of the island is barren and does not support vegetation. The remainder of the vegetation is composed of native and non-native grasslands and developed areas. The western portion of San Nicolas is composed mainly of coastal scrub, inland dunes, and barren areas. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a)

EXPLANATION

- Land
- Water
- Ocean Area Region of Influence
- Launch Site Region of Influence
- Restricted Airspace
- Airports
- Port Hueneme

Scale
0 16.9 33.8 kilometers
0 10.5 21 miles
NORTH

10-14-03 Port Hueneme Airspace

Arrow System Improvement Program Airspace Region of Influence

Figure 3-1

San Nicolas Island buckwheat (*Eriogonum grande var. timorum*), a state endangered species, and leafy malacothrix (*Malacothrix foliosa ssp. polycephala*) are endemic only to San Nicolas Island. San Nicolas Island buckwheat is found in coastal bluff scrub on the east and southeastern slopes of the island. Leafy malacothrix occurs in coastal scrub habitat. Trask's milk-vetch (*Astragalus traskiae*), a state rare species, is found in coastal bluff scrub and has been identified in several areas of San Nicolas, including the ROI. The state threatened beach spectacle pod (*Dithyrea maritima*) is located in coastal dune habitat on the northwest coast of San Nicolas Island. (California Department of Fish and Game, 2003; California Native Plant Society, 2003; U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a)

Additional plant species in the ROI include sticky sand verbena, silver lupine, silver lotus, island morning glory, and iceplant (found in beaches and dune habitat). Slender wild oats, foxtail, brome species, bur-clover, Australian saltbush, purple needlegrass, lupine, and coreopsis are found in grasslands. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a) The U.S. Navy maintains a Native Plant Nursery on San Nicolas Island to provide native plants for activities such as erosion control, landscaping, and habitat improvement and to help ensure endemic plants are protected from introduced species. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002b) Several programs are in place on San Nicolas Island to control nuisance and exotic species that could negatively impact natural resources. All contractor materials and equipment are inspected and cleaned to prevent introduction of plant species. Non-native plants are removed by selective chemical application or manually. (Defense Environmental Network & Information eXchange, 2003)

Wildlife

Breeding habitat for several seabirds such as the western gull, Brandt's cormorant, and black oystercatcher occurs on San Nicolas Island. San Nicolas Island has a large breeding colony of western gulls along the northwestern coastline. Brandt's cormorants, which breed from March through August, nest along the western end of the island. Brandt's cormorant and western gull rookeries are closed year-round and monitored weekly to determine breeding and nesting success (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002b). Storm-petrels and black storm-petrels forage adjacent to San Nicolas Island. Common mainland birds such as the rock wren, house sparrow, European starling, and western meadowlark also occur in the ROI. Mockingbirds and house finches are common in the developed areas of the Island. The island horned lark is a common resident of grassland habitat. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a)

The state threatened San Nicolas Island fox (*Urocyon littoralis dickeyi*) can be found in all habitats on the island.

The Magnuson-Stevens Fishery Conservation and Management Act requires that federal agencies consult with the National Marine Fisheries Service on activities that could harm Essential Fish Habitat areas. Essential Fish Habitat includes those waters and substrate (sediment, hard bottom) necessary to the complete life cycle of fish, from spawning to maturity. The east-west boundary for coastal pelagic species (Pacific sardine and mackerel, northern anchovy, jack mackerel, and squid), groundfish (including species of rockfish, shark, and cod), and highly migratory fish (tunas, marlin, and swordfish) includes all marine and estuary waters from the coast of California to the limits of the Exclusive Economic Zone (the 322-kilometer

[200-mile] limit) where the United States has exclusive authority over fishing management. (Pacific Fishery Management Council, 2002)

Common and/or abundant fish species off the coast of San Nicolas Island include, smelt, kelp bass, señorita, blacksmith, sargo, opaleye, surfperch, California sheephead, kelpfish, rockfish, and sculpin. Most of the fish are schooling species. Two of these resident schooling species (señorita and blacksmith) account for 90 percent of those present. The major commercially harvested species are the Pacific bonito, sardine, mackerel, jack mackerel, California sheephead, and rockfish. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a)

The waters in the ROI surrounding San Nicolas Island support several species of pinnipeds (seals and sea lions) and whales. Approximately 75 percent of the sea lions and seals that inhabit southern California spend some portion of time in the northern Channel Islands. Three pinniped species currently breed on San Nicolas Island; harbor seals, northern elephant seals, and California sea lions. The second-largest population of northern elephant seals in southern California occurs on San Nicolas Island. Northern elephant seals haul out on land twice a year, once to breed and pup and then to molt. Harbor seals frequently haul out on land throughout the year. California sea lions have recently occupied new areas on the island and now occur along most of the southern coastline. The recently delisted gray whale passes near San Nicolas Island mainly during its southbound migration in late autumn and winter. The minke whale was recently observed, but further than 5.6 kilometers (3 nautical miles) off the coast. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a)

Threatened and Endangered Species

Federally threatened and endangered species are listed in table 3-3. No federally listed plant species have been identified on San Nicolas Island. No threatened or endangered fish species have been identified in the waters surrounding San Nicolas Island. The federally threatened island night lizard (*Xantusia riversiana*) is found exclusively in the Channel Islands, including San Nicolas Island. It is commonly located in areas of vegetation that provide cover. U.S. Navy personnel plant preferred vegetation cover on barren or restoration areas adjacent to currently used habitat to assist in expanding habitat for this lizard species (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002b).

The federally threatened western snowy plover (*Charadrius alexandrinus nivosus*) nests and forages year round on the beaches and intertidal zone of the island. Nesting beaches are closed during the breeding season (March through September) and are monitored to determine plover usage, and operations are modified accordingly (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002b; Sacramento Fish and Wildlife Office, 2003). The federally and state endangered California brown pelican (*Pelecanus occidentalis californicus*) feeds along the coastline, and roosts in several small locations within the ROI. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a)

Table 3-3: Listed Species Known or Expected to Occur on or in the Vicinity of San Nicolas Island

Scientific Name	Common Name	Status	
		State	Federal
Reptiles			
Chelonia mydas	Green sea turtle	--	T
Dermochelys coriacea	Leatherback sea turtle	--	E
Urocyon littoralis dickeyi	Island night lizard	--	T
Birds			
Charadrius alexandrinus nivosus	Western snowy plover	CSC	T
Pelecanus occidentalis californicus	California brown pelican	E	E
Mammals			
*Enhydra lutris nereis**	Southern sea otter	T	T
Arctocephalus townsendi	Guadalupe fur seal	T	T
Balaenoptera musculus	Blue whale	--	E
Balaenoptera physalus	Fin whale	--	E
Megaptera novaeangliae	Humpback whale	--	E

Source: U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a; California Department of Fish and Game, 2003.

NOTES:

CSC = California Species of Concern
E = Endangered
T = Threatened

*Experimental Population

An experimental population of federally threatened southern sea otters (*Enhydra lutris nereis*) can be found throughout the year in the kelp beds at the west end of San Nicolas Island and in smaller numbers off the north side of the island. Although the translocation project of 1987 to 1990 appears to have failed, the remaining population of approximately 24 individuals has been relatively stable. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a; Schwartz, 2003b) A small number of federally threatened Guadalupe fur seals (*Arctocephalus townsendi*) have been observed recently on San Nicolas Island (National Oceanic and Atmospheric Administration, National Marine Fisheries Service, 2003; U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a).

Small numbers of sea turtles may occur in the nearshore waters off San Nicolas Island. Leatherback sea turtles (*Dermochelys coriacea*) and green sea turtles (*Chelonia mydas*) may forage in the kelp beds off western San Nicolas, but there are no known sea turtle nesting beaches on the island. The waters surrounding San Nicolas Island support several species of listed whales. The federally endangered blue whale (*Balaenoptera musculus*) occasionally occurs within 5.6 kilometers (3 nautical miles) of San Nicolas Island and is common in summer beyond 5.6 kilometers (3 nautical miles) west of the island. Federally endangered Humpback whales (*Megaptera novaeangliae*) and fin whales (*Balaenoptera physalus)* have also been seen within 5.6 kilometers (3 nautical miles) of San Nicolas Island. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a; Schwartz, 2003b)

Environmentally Sensitive Habitat

Wetlands. Wetlands occur on the Sand Spit, Twin Rivers, Cattail Canyon, and Tule Creek. (Schwartz, 2003b)

Critical Habitat. Several beaches on San Nicolas Island (figure 3-2) have been designated as critical habitat for the western snowy plover (Federal Register, 1999). During the western snowy plover breeding season the U.S. Navy closes several beaches on San Nicolas Island (U.S. Department of the Interior, U.S. Geological Survey, 2000).

3.1.4 CULTURAL RESOURCES—SAN NICOLAS ISLAND

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

Numerous laws and regulations require that possible effects to cultural resources be considered during the planning and execution of federal undertakings. These laws and regulations stipulate a process of compliance, define the responsibilities of the federal agency proposing the action, and prescribe the relationship among other involved agencies (e.g., State Historic Preservation Officer, the Advisory Council on Historic Preservation). In addition to NEPA, the primary laws that pertain to the treatment of cultural resources during environmental analysis are the National Historic Preservation Act (16 USC 470 *et seq.* [especially Sections 106 and 110]), the Archaeological Resources Protection Act of 1979 (16 USC 470aa-470mm), the Antiquities Act of 1906 (16 USC 431), and the Native American Graves Protection and Repatriation Act (25 USC 3001 *et seq.*).

Region of Influence

In general, the ROI for cultural resources encompasses areas requiring ground disturbance (e.g., areas of new facility or utility construction) and all buildings or structures requiring modification, renovation, demolition, or abandonment. At San Nicolas Island this includes the locations for the mobile launcher, the FCR, the FCC, and LCC.

EXPLANATION

- Water
- Land
- Brown Pelican Day Feeding Area
- Snowy Plover Nesting Area
- Western Gull Nesting Area
- Brandt's Cormorant Nesting Area
- Brown Pelican Day Roosting Area

NAVFAC - Naval Facility

Scale

NORTH

0 1,081 2,162 meters

0 3,547 7,094 feet

10-14-03 San Nicolas Birds

Special Interest Bird Species of San Nicolas Island

San Nicolas Island, California

Figure 3-2

Affected Environment

Archaeological Resources

The prehistory of San Nicolas Island extends into the past for more than 8,500 years. Abundant archaeological resources on the island are associated with the Nicoleño Indians. Little is known of this American Indian culture, believed to be of Shoshonean origin, as few efforts were made to document the culture while the Nicoleño inhabited San Nicolas Island.

The entire island has been surveyed for areas of archaeological sensitivity, and over 500 sites have been recorded. Site types identified include lithic scatters, cobble outcrops, shell middens, and camp sites. Several sites have been determined eligible for listing in the National Register.

Historic Resources and Structures

The history of San Nicolas Island dates to the earliest visits by the old world explorers. It is possible that Juan Rodriquez Cabrillo first spotted San Nicolas Island during the exploration in 1543. In 1811, Kodiak Indians landed on San Nicolas Island for the purpose of hunting sea otters. Within years, the Nicoleño population was decimated. The remaining Nicoleño Indians were removed by Captain Isaac Williams in 1835 at the request of the Spanish Mission authorities. Historic archaeological sites on San Nicolas Island include fish camps and early military sites.

San Nicolas Island was acquired by the U.S. Navy in 1933 and withdrawn from public domain. The original airfield on San Nicolas Island was built by the U.S. Navy in 1939. The entirety of San Nicolas Island has been surveyed for the presence of historic properties. This survey resulted in the identification of one Cold War structure that is eligible for the National Register of Historic Places, N138-Original Surveillance Radar. All other structures were determined to be ineligible for the National Register at this time. (Schwartz, 2003b)

Traditional Resources

Traditional American Indian resources have not been identified. No traditional sites associated with any other cultural group (e.g., Chinese, African American) have been identified.

Paleontological Resources

Bound on the east by the Salton Sea, the Peninsular Range extends westward to the Pacific coastline and then continues under the sea, reappearing as Catalina, San Clemente, Santa Barbara, and San Nicolas islands. The types of paleontological resources which occur on San Nicolas Island include several species of Eocene foraminifera and Plieotocene mollusks, both of which have proven useful for interpretation of paleoenvironments. Pleistocene vertebrate fossils include bird, sea lion, and seal. (U.S. Army Space and Strategic Defense Command, 1994)

3.1.5 GEOLOGY AND SOILS—SAN NICOLAS ISLAND

Geology and soils are those earth resources that may be affected by the proposed ASIP. The resource is described in terms of landforms, geology and soil conditions as they could contribute to erosion, depletion of mineral or energy resources and soil contamination resulting from proposed construction and launch activities. The potential for geologic hazards is also described as related to each location's geologic setting. A geologic hazard is a naturally occurring or man-induced geologic condition that presents a risk or a potential danger to life and property. Such hazards could include phenomena such as landslides, flooding, ground subsidence, faulting, earthquakes, and tsunamis.

Region of Influence

The ROI is anticipated to be the proposed locations described in section 2.1.4.1 and shown on figure 2-17 that may be subject to vegetation cutting, soil compaction, and other site work in order to support Arrow Launcher Area facilities, CCA equipment, and support facilities, as well as soil areas within the LHA that might be subject to contamination from launch exhaust emissions and/or potential contamination from unburned fuel in the event of a terminated launch.

Affected Environment

Geology

San Nicolas Island is the outermost island of the southern Channel Islands in the Peninsular Range geomorphic province. It lies on the Santa Rosa-Cortez Ridge, one of several northwest-trending ridges which characterize the region (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a). The island is composed of a series of Middle to Late Eocene marine sedimentary rocks called the San Nicolas formation, which consists of interbedded sandstone, shale, mudstone and siltstone, with minor amounts of conglomerate (U.S. Army Space and Strategic Defense Command, 1994). All the units have been folded into a broad anticline (downward facing fold). The axis of the fold runs parallel to the length of the island, plunges slightly southeast, and is offset by pre-Quaternary faults.

Pleistocene-age marine and nonmarine terrace deposits and Holocene-age sand dunes overlie the older formations. The lower coastal plain area of the island is covered with cobble-gravel, silt, and sand up to 23 meters (75 feet) in thickness. Other sediments of Recent age include alluvium, composed of clays, silts, sands and cobbles, with a thickness of up to 46 meters (150 feet) (U.S. Army Space and Strategic Defense Command, 1994).

Mineral Resources

The geologic and structural setting of San Nicolas Island and vicinity is suitable for trapping accumulations of oil and gas; however, the Eocene and Cretaceous rocks underlying the island are not likely to contain commercial quantities (Vedder and Norris, 1963; U.S. Army Space and Strategic Defense Command, 1994). Significant quantities of other mineral resources have not been identified (U.S. Army Space and Strategic Defense Command, 1994).

Soils

San Nicolas Island soils consist of sandy loams, loams, and clays. Most soils have a moderate to high potential for both wind and water erosion. The U.S. Department of Agriculture, Soil Conservation Service, has not identified any of the soils on San Nicolas Island as prime farmlands (U.S. Army Space and Strategic Defense Command, 1994).

Geologic Hazards

Studies have shown that San Nicolas Island is moving to the northwest at a rate of approximately 0.5 centimeter (0.2 inch) per year. This movement is likely due to the San Andreas Fault. Faults on- and offshore of the California mainland could generate mild to major vibrations on the island during earthquakes. The island is divided by numerous faults and although they have not been active for the last 10,000 years, they are still considered potentially active. If an earthquake were to occur, it is possible that surface ruptures would occur. San Nicolas is located within the Uniform Building Code Seismic Risk Zone 4.

The high sea cliffs along the shoreline of San Nicolas Island are subject to landslides during extreme high tides. Several of these landslides have occurred along the northern side of the island while smaller landslides have occurred on the remaining sides. (U.S. Department of Defense, Missile Defense Agency, 2003b)

3.1.6 HAZARDOUS MATERIALS AND WASTE—SAN NICOLAS ISLAND

Several regulatory agencies (e.g., the EPA, the Occupational Safety and Health Administration [OSHA], and the DOT) have differing definitions of a "hazardous material" as applied to a specific situation. Of these definitions, the broadest and most applicable is the definition specified by the DOT for regulation of the transportation of these materials. As defined by the DOT in 49 CFR 171.8, a hazardous material 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.

Solid waste materials are defined in 40 CFR 261.2 and Title 22 of the California Code of Regulations as any discarded material of any form (i.e., abandoned, recycled, or "inherently waste-like") that is not specifically excluded from the regulatory definition. This waste can include materials that are liquid, solid, semi-solid or gaseous (but contained). 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.

Hazardous wastes at San Nicolas Island are regulated by the Resource Conservation and Recovery Act (RCRA) (Title 40 CFR 260-280) and the California Environmental Protection Agency Department of Toxic Substances Control. These regulations require that hazardous wastes be handled, stored, transported, disposed of, or recycled.

In 1991, the State of California developed a state Environmental Protection Agency called Cal/EPA. This agency regulates air, water, pesticides, integrated wastes, toxic substances, and environmental health hazard assessments. Although the federal regulations still are enforced

through Title 22 of the California Code of Regulations, California has developed far more stringent environmental regulations than has been promulgated federally.

Region of Influence

The ROI for potential impacts related to hazardous materials/hazardous waste at San Nicolas Island would be limited to those areas to be used for pre-launch preparation, launch activities, and post-launch activities.

The ROI also includes those areas that may potentially be affected by the use of the FCR, fueling areas, support and maintenance operations, and waste storage and disposal.

Affected Environment

Hazardous Materials Management

The various missions performed at San Nicolas Island require the use of a wide variety of hazardous material types and quantities. These materials, the usage of which must conform with federal, DoD, and U.S. Navy hazardous materials management requirements, fall into two basic use categories: materials used in facility maintenance activities and materials used in facility user test operations. To the extent possible, maintenance of equipment and weapon systems is performed at Point Mugu instead of San Nicolas Island.

Hazardous materials used in base infrastructure support activities include various cleaning solvents (chlorinated and non-chlorinated), paints, cleaning fluids, oils, hydraulic fuel, motor fuels, and other petroleum products. These materials are transported to San Nicolas Island by barge or aircraft. Minimal quantities of maintenance support materials are ordered and stored. Hazardous materials are stored in a designated hazardous materials storage location until issued to the using organization. The largest quantity of hazardous material stored is in the form of fuels, primarily jet fuel and unleaded gasoline. The unleaded gasoline is primarily used by ground vehicles. In baseline year 1995, 1,857,823 liters (490,785 gallons) of jet fuel and 200,637 liters (53,000 gallons) of unleaded gasoline were transported to San Nicolas Island. Various other hazardous materials such as oils and hydraulic fuels are also used to support maintenance of aircraft and vehicles.

Users of hazardous materials provide storage in accordance with established procedures applicable to individual operations. The use of hazardous materials is subject to ongoing inspection by the Point Mugu Environmental Materials Management Division (EMMD).

Hazardous Waste Management

San Nicolas Island manages approximately 29,813 kilograms (65,689 pounds) of hazardous waste annually (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a). Most of the hazardous material brought to San Nicolas Island is used up in operational processes. Any remainder is collected as hazardous waste. Hazardous waste generated at San Nicolas Island is initially collected at the point of generation by the using organization. Each generator must properly containerize, label, and store this waste.

Once waste containers are full, or once accumulation time exceeds 1 month, the waste is transported to the less-than-90-day accumulation area on the island. From this accumulation

area, the waste is shipped by barge to Port Hueneme. After arrival at Port Hueneme, the waste is transported by a licensed hazardous waste hauler to an approved hazardous waste treatment, storage, and disposal (TSD) facility. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a; U.S. Department of Defense, Missile Defense Agency, 2003a) In 2000, 16,693 kilograms (36,802 pounds) of hazardous waste was shipped from San Nicolas Island. (Schwartz, 2003b)

3.1.7 HEALTH AND SAFETY—SAN NICOLAS ISLAND

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, structures, plants, and wildlife.

Region of Influence

The ROI for potential impact related to health and safety includes AWS transportation routes, the immediate work areas associated with pre-launch missile storage and handling, the launch site, and the flight corridor. The ROI includes offshore areas adjacent to the island. The population of concern would predominantly consist of the personnel directly involved with AWS program operations. The ROI for general public safety includes the flight corridor.

The ROI for health and safety includes those areas that may potentially be affected by the proposed deployment and use of the FCR on San Nicolas Island. The ROI for health and safety is based on the area where effects to human exposure, navigation and communication facilities/equipment (military and nonmilitary), fuels and any existing electromagnetic radiation (EMR) at San Nicolas Island may occur by the use of an L-band radar. The ROI for EMR human health effects includes an area up to 91.4 meters (300 feet) from the radar pad. The ROI for certain electronic equipment and civilian aircraft includes an area up to 19 kilometers (11.8 miles) from the radar pad. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a)

The ROI for general public safety also includes the flight corridor.

Affected Environment

The U.S. Navy takes every reasonable precaution during the planning and execution of operations, training exercises, and test and development activities to prevent injury to human life or property. In addition to explosive, physical impact, and EMR hazards, potential hazards from chemical contamination, ionizing and non-ionizing radiation, radioactive materials, and lasers are studied by Point Mugu. (U.S. Department of Defense, Missile Defense Agency, 2003a)

Range Safety

The Range Safety Office is the principal advisor and coordinator on all aspects of safety procedures concerning flight, explosives, toxic and radiation hazards related to weapons, targets/interceptors, and other unmanned vehicles launched for programs conducted on the range. Safety policy, procedures, and guidance are covered in Point Mugu *Sea Range Safety Handbook,* Naval Air Warfare Center Weapons Division Instruction (NAWCWPNSINST) 5100.2, dated 9 July 1993. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a) The safety policy of Point Mugu Sea Range is to observe every reasonable precaution in the planning and execution of all operations which occur on the Point Mugu Sea Range and San Nicolas Island to prevent injury to people and damage to property. Although the Commander of Point Mugu Sea Range has the ultimate responsibility for range safety, the authority for execution of these safety programs is delegated to the Sea Range Safety Officer in the Range Safety Office.

Missile Flight Analysis

San Nicolas is used for the ongoing test and evaluation of various missiles. Missiles that have been launched within Point Mugu Sea Range and at San Nicolas include Vandals and SLAM (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a). To eliminate unacceptable or unnecessary risks, missile flight safety analysis is conducted in accordance with NAWCWPNSINST 5100.2 for all in-service weapon systems as well as for systems undergoing tests and evaluation. Flight analysis takes into account potential hazards from chemical contamination, ionizing and non-ionizing radiation, radioactive materials, and lasers. This includes Explosive Safety Reviews of missile performance capabilities and limitations, of hazards inherent in missile operations and destruct systems, and of the electronic characteristics of missiles and instrumentation. The Explosive Safety Review also requires that ordnance transportation, handling and storage are conducted in accordance with existing/approved Point Mugu Sea Range safety standards and procedures. (Explosive Safety Review Criteria for San Nicolas Island) The flight analysis also includes computation and review of missile trajectories, launch azimuths, and hazard area dimensions, review and approval of destruct systems proposals.

Preparation of Range Safety Approvals, Range Safety Operational Plans, and Detailed Test Plans are required for all weapon systems using the Range, including San Nicolas Island. A Range Safety Approval/Range Safety Operational Plan must be prepared for each distinctly different program involving missile flight. It is suspended or canceled if there is a violation of safety criteria. The Range Safety Officer is required to review these plans and approvals on a periodic basis and publish a listing of those that are current and valid. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a)

Ground Safety

Preceding operations that may involve ground impact of objects within the range, an evaluation is made to ensure that populated areas, critical range assets, and civilian property susceptible to damage are outside potential impacts limits. In addition, proposed trajectories are analyzed and a permissible flight corridor is established. A missile that strays outside its corridor is considered to be malfunctioning and to constitute an imminent safety hazard.

The general surface hazard/safety areas for missiles fired from San Nicolas are the surveillance area, the launch area exclusion zone, and the terminal area exclusion zone.

Surveillance Area. The surveillance area is the largest of the three general missile safety areas. This area includes the entire areas within the launch area exclusion zone and the terminal area exclusion zone. The surveillance area provides an additional safety buffer outside the other range areas/patterns. The surveillance area is based on the containment area of all potentially hazardous debris resulting from vehicle breakup along the nominal flight trajectory.

San Nicolas uses Range Commanders Council (RCC) 321-02, *Common Risk Criteria for National Test Range*s. RCC 321-02 sets requirements for minimally acceptable risk criteria to occupational and non-occupational personnel, test facilities, and non-military assets during range operations.

Ships are permitted within surveillance area based on RCC 321-02 risk criteria. The non-mission participant personnel threshold limits for the Probability of Impact (POI) for an individual ship is $1x10^{-6}$. The Expectation of Casualty (EC) for an individual and the Collective Expectation of Casualty (ECC) are $1X10^{-7}$ and $3X10^{-5}$, respectively. The PI, EC, and ECC for mission essential surface craft and personnel are $1X10^{-5}$, $3X10^{-6}$, and $3X10^{-4}$, respectively. (Range Safety Approval, 2001)

Launch Area Exclusion Zone. The launch area exclusion zone is a subset of the surveillance area. It is the maximum surface area that could be endangered by a missile if it does not follow the prescribed flight path. Each pattern shows the maximum down-range and cross-range distance the missile could travel during flight. The patterns are specific to each missile and vary by altitude at launch. The launch area exclusion zone is based on the assumption that the missile is unguided at launch. All mission essential personnel within the launch area exclusion zone must be located in block shelters during launches.

Terminal Area Exclusion Zone. The terminal area exclusion zone is the area that is exposed to the potential impact of falling pieces of a missile or a target as a result of an intercept. Therefore, the missile debris pattern for a given test is a smaller subset of the launch area exclusion zone and is located within its boundaries. The size of the debris pattern is dependent on the altitude, angle, and speed of an intercept. Typically, the higher the intercept altitude, the larger the debris pattern. The size of the pieces resulting from an intercept also influences the size of the debris pattern. Smaller pieces of debris generally disperse further than larger pieces.

Most missiles used on the range, including San Nicolas, are equipped with an FTS. Even if an FTS is used to destroy a missile in flight, the debris pattern is contained within the larger safety hazard pattern. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a)

Electromagnetic Radiation

Instrumentation at San Nicolas includes four metric radars, three small and three large telemetry antennas with a receive/transmit station, a frequency monitoring station, a Multilateral Operations Control System with two Ground Interrogation Stations, and three Ground Reference Stations, photo-optical tracking instrumentation, range communications capabilities, microwave transmission facilities, missile launching stands and bunkers, three surveillance radars, meteorological measurement systems, target control facilities, and a marine environment test site.

Operation of power utility lines and the Naval instrumentation, equipment, and facilities at San Nicolas Island generate EMR. EMR is created as a result of the flow of electricity within a system, producing an electromagnetic field. The EMR is expressed in milliwatts per square centimeter (mW/cm^2). The safety threshold for EMR depends on the frequency of the source of EMR. The lower the frequency of the EMR source, the lower the acceptable power density threshold before any endangerment to human health occurs. Likewise, the higher the frequency of the EMR source, the higher the acceptable power density threshold before any endangerment to human health occurs. An EMR hazard exists when transmitting equipment generates electromagnetic fields that induce currents or voltages great enough to trigger electro-explosive devices in ordnance, cause harmful effects to people or wildlife, or create sparks which ignite flammable substances in the area. Those hazards are reduced or eliminated by establishing minimum distances from EMR sources for personnel (HERP), ordnance (HERO), and fuel (HERF).

Various munitions and targets are stored and maintained at San Nicolas Island that are susceptible to the effects of EMR. These include missile warheads, rocket motors, high explosives, and other similar type ordnances that are used in testing or training activities occurring on San Nicolas and the Sea Range. Munitions arrive on the island either by surface ship or by air transport. ESQD arcs for the safety of personnel and equipment have been established around munitions storage and assembly areas. Figure 3-3 indicates HERP and HERO arcs. HERF constraints are considered to be negligible and are not depicted. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a)

Explosive Safety Quantity Distance Arcs

ESQD arcs are defined by Naval Sea Systems Command Operating Procedure 5, Volume 1 (NAVSEA OP 5[1]), *Ammunition and Explosives Ashore: Safety Regulations for Handling, Storing, Production, Renovation and Shipping,* 1995, and are used to establish the minimum safe distance between ordnance storage/disposal facilities (often referred to as magazines) and inhabitable buildings. The type and amount of ordnance material that can be stored in a magazine is determined by the DoD Explosive Safety Board. To ensure safety, personnel movements are restricted in areas surrounding a magazine or group of magazines.

Regional Safety

Access to San Nicolas Island is strictly controlled and limited to pre-approved military personnel or non-military personnel conducting scientific studies. A scheduled contract aircraft shuttle operates between Point Mugu and San Nicolas.

The range safety program establishes procedures and approval authorities to ensure that safety hazards patterns and impact areas are kept clear of non-mission participating aircraft and ships. This is done by establishing restricted areas and warning areas (restricted areas are located over land or territorial waters of the United States; warning areas are located over non-territorial waters of the United States), publishing NOTAMS and NOTMARs, and maintaining close coordination with agencies controlling aircraft and surface traffic. There are three surface restricted areas located around San Nicolas Island and two airspace restricted areas over San Nicolas. Hazardous airspace is defined as the volume extending from the earth's surface to unlimited altitude above the Surveillance Area. (Range Safety Approval, 2001) Section 3.1.2 discusses airspace. Naval security personnel secure on-land restricted access zones prior to

Source: Department of the Navy, Naval Air Warfare Center Weapons Division 2002

EXPLANATION

- Water
- Land
- Roads
- Hazards of Electromagnetic Radiation to Personnel (HERP)
- Hazards of Electromagnetic Radiation to Ordnance (HERO)
- Radars

Scale
0 1 2 kilometers
0 0.625 1.25 miles
NORTH

10-14-03 Nicolas HERP-HERO

Electromagnetic Radiation Hazard Areas

San Nicolas Island, California

Figure 3-3

and during launch activities at the west end of the Island to prevent unauthorized personnel and non-participants from entering the area. Roads into Warning Zone 2 are blocked during launches, and personnel in Warning Zone 2 are required to be in protected block shelters during launches. No personnel are allowed in Warning Zone 1 during missile or target launches or during missile impacts at the SLAM target. In addition, clearance zones are cleared of all non-participating fishing and recreational vessels prior to launch.

Point Mugu Sea Range has an extensive surveillance system to implement real-time safety clearance procedures before initiation of any operation on the sea range. This system includes the use of land-, sea-, and air-based radar in addition to aircraft surveillance of the range which is necessary to ensure that the public remains clear of designated operational areas where they could be subjected to hazardous conditions. The range uses specially modified P-3 aircraft, the NP-3D, which provides extended Point Mugu Sea Range surveillance. A review of past Range Safety Office records shows that accidents involving the public on Point Mugu Sea Range have never occurred. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a)

The U.S. Navy notifies commercial, civilian, and other military air and sea vessels 24-hours in advance of military testing and training operations. NOTAMs provides appropriate information to the FAA and its Air Traffic Control agencies to route traffic around these warning areas and restricted areas when they are active. Although a NOTAM does not preclude uncontrolled air traffic from entering a warning area even when the area is active, DoD Directive 4540.1, *Use of Airspace by U.S. Military Aircraft and Firings Over the High Seas*, provides guidance for operating within warning areas: non-participating aircraft are identified by radar, and contact with these aircraft is made by radio; if aircraft remain in a clearance area, even after being requested to leave, Point Mugu Sea Range will delay, cancel, or move a test to a clear area.

Similar procedures exist for notification of the commercial shipping and recreational boating communities of potentially hazardous activities on Point Mugu Sea Range. These notifications are made through NOTMARs and daily VHF-FM Marine Radio (Channel 16) broadcasts. Point Mugu Sea Range has established procedures to ensure that non-participating surface vessels are not exposed to undue risk. The surveillance aircraft survey designated clearance areas to ensure that surface vessels are not present. Any vessels, if present, are warned that they are in an area of an impending hazardous activity and are requested to leave the area. Contact with vessels is made by marine band FM radio; however, loud speakers can be used if the boat is not radio-equipped.

3.1.8 INFRASTRUCTURE—SAN NICOLAS ISLAND

Infrastructure refers to the system of public works (basic facilities, services, and installations) required for the functioning of a country, state, region, or organization, and typically includes handling of and systems for potable (drinkable) water, wastewater (sewage and/or septic systems), solid waste, energy (typically electrical), as well as the transportation modalities (roads, bridges, etc.). These may or may not include both public and private systems.

Region of Influence

The ROI for infrastructure includes areas on and in the vicinity of San Nicolas Island that may potentially be affected by site preparation and launches of the AWS.

Affected Environment

Energy

Although there is no commercial power available on San Nicolas Island, electrical power is available via on-island diesel generators. Power is distributed around the island by way of three 4,160-volt feeders. A 37,854-liter (10,000-gallon) JP-5 jet fuel tank is located adjacent to the generator plant (U.S. Air Force, 1997). Currently, San Nicolas Island has the capability to produce approximately 3,750 kW of electrical power capacity from its own generators (Schwartz, 2003a). There is some degree of capacity to support additional personnel, but only on a limited basis. As of 1997, peak demand was less than 1,100 kW (U.S. Air Force, 1997). San Nicolas Island also has a fuel pier available for barge-supported refueling operations.

Water

Numerous freshwater wells and catchments installed at various locations on the island are the primary sources of potable water. In addition, two reverse-osmosis desalination units, each with a capacity of 2,271 liters (600 gallons) per hour, were installed in 1990. A new desalination plant is currently under construction (Stone, 2003). Generally, water from wells, catchments, and the reverse-osmosis plant is pumped to local storage tanks, then to large main tanks, and from the main tanks to facilities throughout the island. The current storage tank capacity is approximately 3.8 million liters (1 million gallons) (Schwartz, 2003a). Daily water consumption varies, but recent figures indicate peak demand is 94,635 liters (25,000 gallons) daily (Schwartz, 2003b). Although fresh water can be shipped into San Nicolas Island via barge or water tanker, such methods are cost prohibitive and rarely used.

Wastewater

The island sewage system is composed of 1,430 linear meters (4,700 linear feet) of underground sewer lines, septic tanks, and oxidation ponds. Two septic tanks and leach fields dispose of the wastewater generated by facilities located at the airfield, and 36 septic tanks and leach fields serve the facilities in outlying areas. The wastewater-treatment facility consists of three concrete-lined aeration ponds, a chlorination well, a concrete-lined conic surcharge pond, and aeration-pumping and spraying equipment. This sewage plant is designed for 151,461 liters (40,000 gallons) per day and currently handles only about 11,356 (3,000 gallons) per day (Schwartz, 2003a), or 7.5 percent of its capacity.

Solid Waste

Island solid waste is barged off-island to Port Hueneme and then transferred to a municipal landfill (Stone, 2003). In place is an Indefinite Delivery/Indefinite Quantity contract providing a set number of holding bins for solid waste, yet allowing for more bins on an as-needed basis. Some 203 metric tons (200 tons) of solid waste were shipped off-island in 2002; over half was recycled. (Schwartz, 2003a)

Aviation Transportation

Located near the southeastern edge of San Nicolas Island's central mesa, the 3,050-meter (10,000-foot) runway, with ground-controlled approach facilities, accommodates supersonic target aircraft and planes from the mainland during operations (Military Exits, 2002), and is capable of accommodating medium-sized cargo aircraft (C-130). The landing area is composed of concrete and asphalt and is 61 meters (200 feet) wide. Nearly all personnel working on the

island commute via contract commercial airline from Point Mugu. On an average day, there are approximately seven arrivals and departures from this airfield (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a).

Ground Transportation

On-Site. Approximately 50 kilometers (30 miles) of paved and a number of improved unpaved roads are on the island. Monroe Drive, Beach Road, Jackson Highway, Shannon Road, and Tufts Road are the primary named roadways (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a). Average daily traffic runs from 25 to 30 vehicles, with as many as 100 on-island vehicles at any particular time (U.S. Air Force, 1997).

Water Transportation

At San Nicolas Island, the U.S. Navy utilizes barges for cargo shipping, as well as the transport of aviation fuel, motor gasoline, and diesel oil. Depending on program activity, the barges transport materials to the island roughly on a biweekly schedule (U.S. Air Force, 1997). Barges are brought in close to the beach on the southeast side of the island (the "Barge Landing area"). Beach Road accesses this area (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a).

Due to its distance from the mainland, the area around San Nicolas Island is predominately used by Naval vessels, commercial fishing boats, and sport fishing boats (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a).

3.1.9 LAND USE—SAN NICOLAS ISLAND

Land use is described as the human use of land resources for various purposes, including economic production, natural resources protection, or institutional uses. Land uses are frequently regulated by management plans, policies, ordinances, and regulations that determine the types of uses that are allowable or protect specially designated or environmentally sensitive uses. Potential issues typically stem from encroachment of one land use or activity on another or an incompatibility between adjacent land uses that leads to encroachment.

Region of Influence

The ROI for land use includes the entire island of San Nicolas.

Affected Environment

Owned and operated by the U.S. Navy, San Nicolas Island is approximately 102 kilometers (55 nautical miles) southeast of Point Mugu, California and 204 kilometers (127 miles) due west of Oceanside, California. As the outermost island of the Channel Islands of Southern California, San Nicolas Island is approximately 14 kilometers (9 miles long), is an average of 5.6 kilometers (3.5 miles) in width, and covers an area of approximately 58 square kilometers (22 square miles) (U.S. Department of the Air Force, 1991). Because of its isolated environment, shoreline characteristics and instrumentation, San Nicolas Island is ideal for conducting essential Sea Range testing and training exercises (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a; Global Security.org, 2003a).

Development occupies a very small portion of available land on the island. The pattern of land use is dispersed, largely as a result of the types of operations taking place and specific siting requirements of the various facilities. The majority of San Nicolas Island's facilities are located on the central plateau. However, the west end of the island provides a secured area for launching facilities. There are 10 land use categories on San Nicolas Island, including airfield support, test and evaluation, ordnance, operations, public works, community support, administration, supply/storage utilities, and open space/environmentally constrained land (U.S. Department of the Air Force, 1991).

While its near shore coastal waters are a popular destination for both commercial and recreational fishing and coast diving, its remote location and restricted access limits the general public's visits to the island. Civilian access to San Nicolas is granted for approved military related and research purposes (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a). Popular recreational opportunities on San Nicolas Island available for stationed personnel include fishing, wildlife and scenic viewing, and general beach activities. (U.S. Department of the Air Force, 1997)

All federal development projects in a coastal zone and all federal activities which could affect a coastal zone must be as consistent as practicable with the Coastal Zone Management Program as authorized by the Coastal Zone Management Act of 1972. In California, the Federal Consistency Unit of the California Coastal Commission implements the Coastal Zone Management Act as it applies to federal activities, development projects, permits and licenses, and support to state and local governments.

3.1.10 NOISE—SAN NICOLAS ISLAND

Noise is usually described as unwanted sound. Characteristics of sound include amplitude, frequency, and duration. Sound can vary over an extremely large range of amplitudes. The decibel (dB) is the accepted standard unit for the measurement of the amplitude of sound because it accounts for the large variations in amplitude and reflects the way people perceive changes in sound amplitude. Sound pressure levels are easily measured, but the variability is subjective and physical response to sound complicates the analysis of its impact on people. People judge the relative magnitude of sound sensation by subjective terms such as "loudness" or "noisiness."

Sound also varies with frequency and pitch. When describing sound and its effect on a human population, weighted sound levels, measured in A-weighted decibels (dBA), are typically used to account for the response of the human ear. The term "A-weighted" refers to a filtering of the sound signal to emphasize frequencies in the middle of the audible spectrum and to de-emphasize low and high frequencies in a manner corresponding to the way the human ear perceives sound. The American National Standards Institute established this filtering network. The A-weighted noise level has been found to correlate well with people's judgments of noisiness of different sounds and has been used for many years as a measure of community noise.

Noise is usually defined as sound that is undesirable because it interferes with speech communication and hearing, is intense enough to damage hearing, or is otherwise annoying. Noise levels often change with time; therefore, to compare levels over different time periods, several descriptors have been developed that take into account this time varying nature. These descriptors are used to assess and correlate the various effects of noise on humans and animals, including land-use compatibility, sleep interference, annoyance, hearing loss, speech interference, and startle effects.

The primary environmental noise descriptor used in environmental noise assessments is the A-weighted Day-Night Equivalent Sound Level (which is abbreviated DNL and symbolized as L_{dn}). The DNL was developed to evaluate the total daily community noise environment. The DNL is the average A-weighted acoustical energy during a 24-hour period, with 10 dBA added to all signals recorded within the hours of 10:00 p.m. and 7:00 a.m. This 10 dBA is a penalty that accounts for the extra sensitivity people have to noise during typical sleeping hours.

Almost all federal agencies having non-occupational noise regulations use DNL as their principal noise descriptor for community assessments.

Region of Influence

Under federal OSHA regulations in 29 CFR 1910.95, employers are required to monitor employees who have exposure to an 8-hour time-weighted average of 85 dBA. Therefore, the ROI for noise analysis at San Nicolas Island is defined as the area within the Maximum Sound Level (L_{max}) 85-dB contours generated by proposed project activities.

Affected Environment

During periods of no U.S. Navy testing operations and launches at San Nicolas Island, the background noise level is low. The background noise stems primarily from wind and wave action and varies according to the wind speed and wave size.

Noise levels produced during testing operations and launches exceed background noise levels around the San Nicolas Island airfield and launch sites. The San Nicolas Island airfield serves as a primary staging area for remote controlled flights conducted by aircraft. Commuter type aircraft use the airfield several times daily, transporting personnel to and from Point Mugu. No year-round human residents occupy the areas near the airfield.

Various types of missiles and targets are launched from San Nicolas Island. Launch of these missiles and targets produce less frequent but more intense sources of noise than airfield operations. The largest target currently launched at the island is the Vandal missile. Sound measurements were conducted for Vandal target missile launches from San Nicolas Island for the National Marine Fisheries Service as part of an Incidental Harassment Authorization. Table 3-4 lists the results of these measurements.

Table 3-4: Measured Noise Levels (A-weighted)

Distance from launch pad (meters [feet])	Duration of noise (seconds)	Peak (decibels)
30.5 (100)	0.82	141
1,609 (5,280)	0.25	133
2,446.2 (8,025.6)	6.64	77
2,591.0 (8,500.8)	4.74	84
2,880.7 (9,451.2	8.49	74
3,299.2 (10,824)	3.59	82
3,444.0 (11,299.2)	3.63	85
3,878.5 (12,724)	1.21	80

Source: National Marine Fisheries Service, 2003

3.1.11 WATER RESOURCES—SAN NICOLAS ISLAND

Potentially affected water resources include freshwater surface and groundwater resources and marine waters in the region of influence described in the next section. Potential changes in the availability of water supplies as a result of project water use requirements also are addressed. As required by Executive Order 11988, *Floodplain Management*, potential effects to floodplains were considered; however, none of the proposed facilities in any of the action alternatives would be constructed in a floodplain and further analysis of such issues is not warranted. Potentially affected wetland resources are described under Biological Resources.

Water quality and the consumption and diversion of water are regulated by a number of federal and state agencies. The EPA has the primary authority for implementing and enforcing the Clean Water Act (after 1977, the Clean Water Act became the common name of the 1972 Federal Water Pollution Control Act). The EPA, along with state agencies to which the EPA has delegated some of its authority, issues permits under the Clean Water Act to maintain and restore the quality of our nation's water resources. The Clean Water Act requires permits for activities that result in the discharge of pollutants to water resources or the placement of fill material in waters of the United States.

Stormwater Pollution Prevention Plans are typically prepared and permitted under the National Pollutant Discharge Elimination System to ensure construction activities do not lead to unacceptable levels of erosion and water pollution. A permit would also be required by the National Pollution Discharge Elimination System in the event that 0.4 hectare (1 acre) or more of land would be disturbed. The Safe Drinking Water Act of 1974 (42 USC 300f *et seq.*), and its 1986 and 1996 amendments, provides the EPA with the authority to regulate the quality of the nation's drinking water supplies, including surface water and groundwater sources. The EPA has delegated some of its authority for enforcement to all of the states, with the exception of Wyoming and the District of Columbia. The appropriation of water, including diversions, consumption of potable water, and other uses are usually regulated by the same state agencies that regulate water quality.

The California State Water Resources Control Board and its local Central Coast Regional Water Quality Control Board have the authority to help regulate water quality at San Nicolas Island, Point Mugu, and Vandenberg AFB.

Region of Influence

The water resource ROI includes those surface water bodies (streams, lakes, and saltwater-influenced lagoons), drainage areas, and groundwater resources that may be affected by the project's construction or operations. Major water bodies and wetlands on San Nicolas Island include Tule Creek, Twin Rivers, and Sand Spit. The Arrow interceptor could also affect the Pacific Ocean in areas below target interception points or in other areas between San Nicolas and the target point if the interceptors do not reach their target.

Affected Environment

Surface Water and Groundwater Resources

The topography on San Nicolas Island is formed by runoff of surface water to the ocean. A drainage divide is located along the top of a southern ridge (figure 3-4). Intermittent streams drain surface water from the sides of the cliff into the ocean through steep canyons. The surface water on the northern portion of the island drains from steep-walled channels in the upland areas and then spreads out as it reaches the ocean.

The island does not have any long-standing lakes or ponds. There is, however, a persistent stream known as Tule Creek that flows from the highest point of the island to the northeastern shore. The stream is maintained by perched groundwater and fed by natural springs. The springs are intermittent and flow during most of the year except during periods of drought. The intermittent surface water is not used as a potable water source but it does maintain the groundwater supply. Wetlands exist in the Sand Spit, Twin Rivers, and Tule Creek and are discussed further in section 3.1.3.

The consolidated marine sedimentary rocks of the island provide little storage capacity for recoverable amounts of potable groundwater. On average, the island receives approximately 20 centimeters (8 inches) of precipitation per year and surface water is the only source of groundwater recharge. Groundwater is found primarily on the western side of the island within the upper parts of the weathered surficial deposits and windblown sand deposits. The groundwater flows typically toward the northwest to the water-bearing areas (figure 3-4). The southern part of the island does not have fresh-water springs or seeps and surface water that permeates the marine terraces becomes salty from mixing with the brackish groundwater. There are shallow wells on the northwest side of the island that can provide 11,350 to 19,000 liters (3,000 to 5,000 gallons) per day; however, during drought years the wells can be overused. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a; U.S. Air Force, 1997)

Water Quality

Potable water sources on San Nicolas Island are affected primarily by salinity. The highest quality groundwater is usually found nearest to the recharge areas. Potable water for the island is supplied by groundwater mixed with desalinized ocean water from two reverse osmosis units. (U.S. Air Force, 1997) The island also maintains a sewage-treatment plant that discharges up to 11,356 liters (3,000 gallons) per day of treated effluent to percolation–evaporation ponds, which are not located near the potable water sources. (Schwartz, 2003b)

Source: Department of the Navy, Naval Air Warfare Center Weapons Division 2002

EXPLANATION

- Water
- Land
- Streams
- Drainage
- Springs
- Drainage Divide
- Water Flow

Scale
0 1,081 2,162 meters
0 3,547 7,094 feet

NORTH

10-14-03 San Nicolas Hydro

Hydrology of San Nicolas Island

San Nicolas Island, California

Figure 3-4

Water Use

Potable water for the island is supplied by a variety of sources including groundwater mixed with desalinized ocean water from two reverse osmosis units, four wells, three springs, and imported water from the mainland that is only used during emergencies (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a).

3.2 POINT MUGU

3.2.1 AIR QUALITY—POINT MUGU

Section 3.1 provides a general description of air quality.

Region of Influence

For air quality analysis at Point Mugu, the ROI would include the air shed surrounding the various sites to be utilized, including the CCA, FCR, and FCC.

Affected Environment

Climate

Point Mugu is located within Ventura County and the South Central Coast Air Basin. Temperatures are moderate with average summer highs of 21˚C (70˚F) and average daily winter lows of 4˚C (40˚F). The average annual rainfall averages 27 centimeters (10.5 inches) along the coast. Prevailing winds come from the west/northwest during the day at about 11 to 19 kilometers (7 to 12 miles) per hour, while evening winds stem from the east.

Regional Air Quality

The Ventura County Air Pollution Control District is in charge of ensuring compliance with air pollution control district rules and regulations, applicable provisions of the *California Health and Safety Code*, and EPA regulations. Ventura County is classified as nonattainment for California AAQS of ozone and PM-10, and severe nonattainment for the federal ozone standard. A lack of available data for visibility-reducing particles, hydrogen sulfide, and vinyl chloride has resulted in an "unclassified" attainment status for these three air contaminants for the state AAQS. The county is designated as an attainment area for other federal and state AAQS.

Existing Emission Sources

Emission sources at Point Mugu include mobile sources such as aircraft operations, motor vehicles use, missile and target launches, and various stationary sources. Stationary sources include aircraft engine test cells, stationary engines used for generators and compressors, fuel storage and handling facilities, boilers, and gasoline stations. Table 3-5 lists the baseline emissions for Point Mugu.

Table 3-5: Baseline Emissions at Point Mugu

Carbon Monoxide metric tons (tons) per year	**Oxides of Nitrogen** metric tons (tons) per year	**Reactive Organic Compounds/Hydrogen Chloride** metric tons (tons) per year	**Sulfur Dioxide** metric tons (tons) per year	**PM-10** metric tons (tons) per year
610.43 (672.89)	154.63 (170.45)	107.13 (118.09)	12.03 (13.26)	111.88 (123.33)

Source: U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a
PM-10 = Particulate matter with an aerodynamic diameter less than or equal to 10 micrometers

3.2.2 AIRSPACE—POINT MUGU

Section 3.1.2 provides a general description of airspace.

Region of Influence

The ROI for airspace includes the Restricted Area R-2519 above Point Mugu that is potentially affected by the launch of target missiles and operation of support facilities associated with the Proposed Action (figure 3-5).

Affected Environment

The airspace above Point Mugu is located within the Restricted Area R-2519, which extends from a flight level of 6,096 meters (20,000 feet) to an infinite altitude (U.S. Department of Defense, Missile Defense Agency, 2003b). The Point Mugu Air Traffic Service (ATS) operates the Radar Air Traffic Control and control tower at the Point Mugu airfield. Delegated control from the Los Angeles air route traffic control center (ARTCC) allows Point Mugu ATS to direct all civilian and military aircraft traffic within its designated airspace. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a)

3.2.3 BIOLOGICAL RESOURCES—POINT MUGU

Section 3.1.3 includes a general definition of biological resources.

Region of Influence

The ROI includes areas on and in the vicinity of Point Mugu that may potentially be affected by site preparation and operation of AWS support equipment, such as the CCA, FCR, and FCC. No permanent facility construction would be required.

Affected Environment

Vegetation

Relatively few plant species are located on Point Mugu, which is located within the Southern California Bight. The majority of these plant species are associated with Mugu Lagoon, a 1,010-hectare (2,500-acre) coastal salt marsh. Salt marsh vegetation consists of pickleweed, sea lavender, alkali heath, jaumea, saltwort, arrowgrass, and sea blite. Cattails and bulrushes are found in brackish marshes on Point Mugu. Disturbed areas on Point Mugu are dominated by non-native annual and perennial broadleafed species. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a)

EXPLANATION

- Land
- Water
- Airspace Warning Areas
- Control Area Extensions

Point Mugu Sea Range Airspace Warning Areas and Control Area Extensions

Point Mugu, California

Figure 3-5

NORTH

Scale

0 44.25 88.5 kilometers

0 27.5 55 miles

10-14-03 San Nicolas Warning

Wildlife

The Pismo clam and the bean clam are common along the beaches of Point Mugu. Amphibians and reptiles occur in upland areas on Point Mugu. Mammals such as the coyote, gray fox, mule deer, and striped skunk also inhabit upland areas of Point Mugu. Large numbers of birds use Point Mugu during the spring migration. Transient species include the white-faced ibis, which is a common winter visitor. The state endangered Belding's savannah sparrow (*Passerculus sandwichensis beldingi*) nests and feeds at Point Mugu, where its breeding population is monitored every 5 to 6 years (Defense Environmental Network & Information eXchange, 2003; U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a)

Forty-three species of fish have been identified in the Mugu Lagoon. The most common fish species in the Lagoon are arrow goby, topsmelt, staghorn sculpin, and shiner surfperch. California halibut are present in the lagoon year round. The shiner surfperch, topsmelt, California killfish, staghorn sculpin, and starry flounder are some fish that may use the lagoon as a nursery. Two of the most common commercial fish species are the Pacific sardine and Pacific mackerel. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a)

Threatened and Endangered Species

Federally threatened and endangered species on or in the vicinity of Point Mugu are listed in table 3-6. The federal and state endangered salt marsh bird's-beak (*Cordylanthus maritimus* ssp. *maritimus*) is located primarily in coastal salt marsh habitat. It has been observed annually in the upper reaches of the Mugu Lagoon western marsh. The main populations occur west and east of Runway 03. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a)

The federal and state endangered California brown pelican, light-footed clapper rail (*Rallus longirostris levipes*), and California least tern (*Sterna antillarum browni*); the federally threatened western snowy plover; and the recently delisted peregrine falcon (*Falco peregrinus anatum*) have all been identified on Point Mugu. Populations of these birds on the installation are currently monitored (Defense Environmental Network & Information eXchange, 2003). The California brown pelican is a regular inhabitant of the Mugu Lagoon. The lagoon provides roosting, foraging, and staging habitat. The light-footed clapper rail uses the salt marsh habitat on Point Mugu for nesting and foraging. The California least tern forages in shallow open water and breeds in sandy beach areas adjacent to the Mugu Lagoon. The western snowy plover nests on sandy beaches and mudflats adjacent to the lagoon. The number of snowy plover nests has been increasing, while the number of adults present has been somewhat stable (Ruane, 2003). Critical habitat for the western snowy plover is discussed below. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a)

The waters offshore of Point Mugu support several species of listed whales, such as the blue whale, fin whale, and humpback whale. The southern sea otter may also be found in the water between Point Mugu and San Nicolas Island.

Only three species of sea turtles are likely to be commonly found in Point Mugu's Sea Range: juvenile loggerhead (*Caretta caretta*), leatherback, and green. A small number of these sea turtles could be encountered in Point Mugu's nearshore waters, especially in the summer. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a)

Table 3-6: Listed Species Known or Expected to Occur on or in the Vicinity of Point Mugu

Scientific Name	Common Name	Status	
		State	Federal
Plants			
Cordylanthus maritimus ssp. *maritimus*	Salt marsh bird's beak	E	E
Reptiles			
Caretta caretta	Loggerhead sea turtle	--	T
Chelonia mydas	Green sea turtle	--	T
Dermochelys coriacea	Leatherback sea turtle	--	E
Birds			
Charadrius alexandrinus nivosus	Western snowy plover	CSC	T
Pelecanus occidentalis californicus	California brown pelican	E	E
Rallus longirostris levipes	Light-footed clapper rail	E	E
Sterna antillarum browni	California least tern	E	E
Mammals			
Enhydra lutris nereis	Southern sea otter	T	T
Balaenoptera musculus	Blue whale	--	E
Balaenoptera physalus	Fin whale	--	E
Megaptera novaeangliae	Humpback whale	--	E

Source: U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a; California Department of Fish and Game, 2003.

NOTES:

CSC = California Species of Concern
E = Endangered
T = Threatened

Environmentally Sensitive Habitat

Wetlands. Point Mugu is composed of 1,817 hectares (4,490 acres) on the coast of southern California. Approximately 56 percent of the installation is jurisdictional wetlands. Mugu Lagoon is one of the highest quality wetlands remaining in California and the largest functional wetland in southern California. It is part of approximately 1,010 hectares (2,500 acres) of wetlands that have been designated as a significant ecological resource according to criteria established by the Clean Water Act. It is one of the main stopping locations on the Pacific Flyway and supports a large concentration of migrating water and shore birds (Defense Environmental Network & Information eXchange, 2003; National Oceanic and Atmospheric Administration, Channel Islands National Marine Sanctuary, 2003).

Critical Habitat. The U.S. Fish and Wildlife Service published a final rule designating 28 areas along the Pacific Coast as critical habitat for the western snowy plover. The coastline of Point Mugu is included in this critical habitat designation. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a) The majority of beaches at Point Mugu are closed year round to protect snowy plovers and California least terns from disturbance (U.S. Department of the Interior, U.S. Geological Survey, 2000).

3.2.4 CULTURAL RESOURCES—POINT MUGU

Region of Influence

In general, the ROI for cultural resources encompasses areas requiring ground disturbance (e.g., areas of new facility or utility construction) and all buildings or structures requiring modification, renovation, demolition, or abandonment. At Point Mugu this includes the Alpha Complex, the Nike Zeus site, and administrative and equipment storage space.

Affected Environment

Prehistoric and Historic Archaeological Resources

There have been two known villages (Mu'wu and Simo'mo), one midden site on the station, and a midden site found outside the main station boundary at Point Mugu, which indicates that Mugu Lagoon may have been the location of a prehistoric settlement.

Historic Buildings and Structures

Several inventories and National Register evaluations have been conducted for Point Mugu. Many of these studies evaluated the World War II and Cold War era properties and also the historical properties of the Spanish occupation through World War II. Eleven buildings have been determined eligible for listing in the National Register of Historic Places (Schwartz, 2003b).

Native Populations/Traditional Resources

An investigation has identified some direct lineal descendants of the Mu'wu village site. Therefore, Point Mugu discusses projects appropriately with the recognized tribes and/or descendants in compliance with the Native American Graves Protection and Repatriation Act and as a part of the Point Mugu Historic and Archaeological Resources Protection Plan.

Paleontological Resources

There have been no paleontological resources recorded at Point Mugu, and none are anticipated to be located there due to the geologic history of the area. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a)

3.2.5 GEOLOGY AND SOILS—POINT MUGU

Region of Influence

The ROI is anticipated to be the soil of areas described in section 2.1.4.2 and shown on figure 2-19 that may be subject to additional clearing, compaction, and site work in order to support the emplacement of administration, radar, and radar support and calibration facilities and equipment.

Affected Environment

Geology

Point Mugu is located at the edge of the Oxnard Plain, which is traversed by the Santa Clara River and by the Calleguas Creek. The Oxnard Plain is composed largely of floodplain and

marine sedimentary deposits. Unconsolidated sediments underlie the base to an estimated depth of 460 meters (1,500 feet). Topographically, Point Mugu is characterized by extremely low relief, with an average slope of approximately 1 meter per 500 meters (1 foot per 500 feet) (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a).

Soils

Soils at Point Mugu generally consist of artificial fill, coastal beach sands, tidal flats, and the loamy sands and silty clay loams that are typical of the Oxnard Plain. The fill is primarily dredge material from the lagoon and is presumed to have similar properties. The erosion potential of most soils is slight, except for coastal beaches (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a).

Geologic Hazards

There are four named faults in the vicinity of Point Mugu: the Bailey, Sycamore Canyon, Boney Mountain, and Malibu Coast faults. Additionally, there are several scattered unnamed, smaller faults in the offshore area. The Bailey, Boney Mountain, and Sycamore Canyon faults are classified as potentially active (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a). The segment of the Malibu Coast fault nearest the base is also considered potentially active. The Bailey and Sycamore Canyon faults possibly cut through the base, although their precise locations can only be inferred due to the prevalence of recent sediments. Of the four faults, the Malibu fault is probably the most significant in terms of size and activity. The fault trends east-west with a fault zone as wide as 0.3 mile (0.5 kilometer). It is believed to have caused the 1973 Point Mugu earthquake (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a).

The primary seismic threat to the base is ground shaking from a related earthquake. This is particularly true east of Calleguas Creek and Mugu Lagoon where evidence of liquefaction was noted following the 1973 Point Mugu earthquake. Other base soils would be likely susceptible to liquefaction, especially given the high ground water table (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a). Thus far, Point Mugu has not experienced damage due to landsliding, surface displacement or rupture, or tsunamis (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a).

3.2.6 HAZARDOUS MATERIALS AND WASTE—POINT MUGU

Section 3.1.6 includes a general description of hazardous materials and hazardous waste.

Region of Influence

The ROI for hazardous materials/hazardous waste at Point Mugu includes fueling, support and maintenance operations, and waste storage and disposal areas. The ROI also includes those areas that may potentially be affected by use of the FCR.

Affected Environment

Hazardous Materials Management

Point Mugu has a Hazardous Waste Management Plan (HWMP), dated October 1997, which provides guidance and direction for use, storage, and compliance activities for hazardous materials and wastes. The plan contains sections on the following areas:

- Specific responsibilities for functional areas
- A summary of applicable federal/state laws and regulations and DoD policies
- Requirements for hazardous waste generators
- Storage, transportation, and disposal requirements
- Personnel training requirements
- Reporting and record keeping
- Contingency and Emergency Plans
- Emergency Planning and Community Right-to-Know Act
- Explosive ordnance derived wastes
- Hazardous waste inventories and site specific maps

The HWMP is a comprehensive compilation of procedures and requirements that are mandated by law, directive, or regulation. Compliance with the HWMP ensures safe and efficient control, use, transport, and disposal of hazardous waste.

To the extent possible, maintenance of equipment and weapon systems is performed at Point Mugu instead of San Nicolas Island to avoid the transport of hazardous materials on the Point Mugu Sea Range. The various missions performed at Point Mugu require the use of a wide variety of hazardous material types and quantities. These materials, whose usage must conform with federal, DoD, and U.S. Navy hazardous materials management requirements, fall into two basic use categories: materials used in facility maintenance activities and materials used in facility user test operations.

Hazardous materials used in infrastructure support activities include various cleaning solvents (chlorinated and non-chlorinated), paints, cleaning fluids, oils, hydraulic fuel, motor fuels, and other petroleum products. The majority of hazardous materials used at Point Mugu are stored by EMMD in the Hazardous Material Minimization Center.

Fuel products compose the greatest amount of hazardous materials on base. Each year, Point Mugu has from 3,028,329 to 4,163,953 liters (800,000 to 1,100,000 gallons) of JP-8 fuel, up to 189,271 liters (50,000 gallons) of unleaded gasoline, up to 196,841 liters (52,000 gallons) of aviation gas, and up to 90,850 liters (24,000 gallons) of diesel. The largest volume of hazardous materials transported over the Point Mugu Sea Range from Point Mugu to San Nicolas Island is in the form of aviation jet fuel and unleaded gasoline.

Hazardous Waste Management

Hazardous wastes generated at Point Mugu consist primarily of contaminated jet fuel, waste rags, paint, solvent, spill residues and absorbent materials, corrosion prevention compound in aerosol cans, ethylene glycol, batteries, antifreeze, photo processing waste materials, waste cleaning compounds, and debris material. Point Mugu generated 374,667 kilograms (826,000 pounds) of hazardous waste in 1996.

There are approximately 41 satellite accumulation areas and three less-than-90-day accumulation areas at the installation. Hazardous waste is collected at the satellite accumulation areas and transported to a less-than-90-day accumulation area. Hazardous waste is removed from the less-than-90-day accumulation area and transported by a licensed hazardous waste hauler to an approved hazardous waste TSD facility.

Waste fuels, oils, and hydraulic fluids are temporarily stored in aboveground storage tanks at the fuel farm. A licensed contractor periodically drains the contents of the tanks and recycles the fluids, as appropriate.

3.2.7 HEALTH AND SAFETY—POINT MUGU

Section 3.1.7 includes a general description of health and safety.

Region of Influence

The ROI for potential impact related to health and safety includes AWS transportation routes, fuel storage and handling, and hazardous materials and missile components/support equipment locations. The population of concern would predominantly consist of the personnel directly involved with AWS program operations.

The ROI for health and safety includes those areas that may potentially be affected by the proposed split deployment and use of the FCR at Point Mugu. The ROI for health and safety is based on the area where effects to human exposure, navigation and communication facilities/equipment (military and nonmilitary), fuels and any existing EMR at Point Mugu may occur by the use of an L-band radar. The ROI for EMR human health effects includes an area up to 91.4 meters (300 feet) from the radar pad. The ROI for certain electronic equipment and civilian aircraft includes an area up to 19 kilometers (11.8 miles) from the radar pad. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a)

Affected Environment

Safety policy, procedures, and guidance are covered in the Point Mugu *Sea Range Safety Handbook,* NAWCWPNSINST 5100.2, dated 9 July 1993. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a) The safety policy of Point Mugu Sea Range is to observe every reasonable precaution in the planning and execution of all operations which occur on the Point Mugu Sea Range and San Nicolas Island to prevent injury to people and damage to property. Although the Commander of Point Mugu Sea Range has the ultimate responsibility for range safety, the authority for execution of these safety programs is delegated to the Sea Range Safety Officer in the Range Safety Office.

Except for special events, public access to Point Mugu is controlled for security reasons and to safeguard against potential hazards associated with military operations on the base. Potential hazards include EMR, ordnance storage and loading, aircraft operations, and missile and target launches. A security fence surrounds Point Mugu. Foot and vehicular traffic enter the installation through four guarded gates. Point Mugu is surrounded by an agricultural buffer zone to the northeast and northwest, thus reducing population density in the areas immediately outside its boundaries. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a)

Electromagnetic Radiation

The U.S. Navy operates a variety of equipment and facilities, including radar, communication facilities, and power utility lines at Point Mugu that generate EMR. The potential hazards associated with the operation of this equipment are similar to those discussed in section 3.2.7.1. Figure 3-6 shows the HERP and HERO arcs at Point Mugu. HERF constraints are considered to be negligible and are not depicted. The HERO arcs are large enough to extend beyond base boundaries. However, these arcs only affect ordnance on-base, and strict EMR control procedures are used when HERO-susceptible ordnance is transported or present in the open.

Explosive Safety Quantity Distance Arcs

The potential hazards associated with ESQDs at Point Mugu are similar to those described in section 3.1.7.

Figure 3-7 indicates ESQD arcs at Point Mugu associated with ordnance storage facilities, most of which are in the western portion of the base. A small ordnance magazine complex is located at the south of South 1 Avenue. Two other ordnance magazines, Structures 344 and 347, are located on the north side of 11th Street, west of Point Mugu Road. Structure 344 is a small arms/pyrotechnic magazine for the Point Mugu Intermediate Maintenance Activity Avionics Armament Division. Structure 347 is a VX-9 ready magazine.

3.2.8 INFRASTRUCTURE—POINT MUGU

Section 3.1.8 includes a general definition of infrastructure.

Region of Influence

The ROI includes areas on and in the vicinity of Point Mugu that may potentially be affected by site preparation and operation of AWS support equipment, such as the CCA, FCR, and FCC. No permanent facility construction would be required.

Affected Environment

Energy

Southern California Edison Company provides Point Mugu with electricity via a system with a 44,000-kW capacity. Three on-base switching systems, with production capacities of 16.5 kilovolts (kV) each, distribute power though an established system comprising substations each operating at 3,750 kV. Normal demand amounts to some 8,000 kW or 18.2 percent of total capacity, with peaks (particularly in summer) of 13,000 kW, or 29.5 percent. The Edison

Source: Department of the Navy, Naval Air Warfare Center Weapons Division 2002

EXPLANATION

- Water
- Land
- Point Mugu Main Base
- Hazards of Electromagnetic Radiation to Ordnance (HERO)
- Hazards of Electromagnetic Radiation to Personnel (HERP)

HERO and HERP Arcs

Point Mugu, California

Figure 3-6

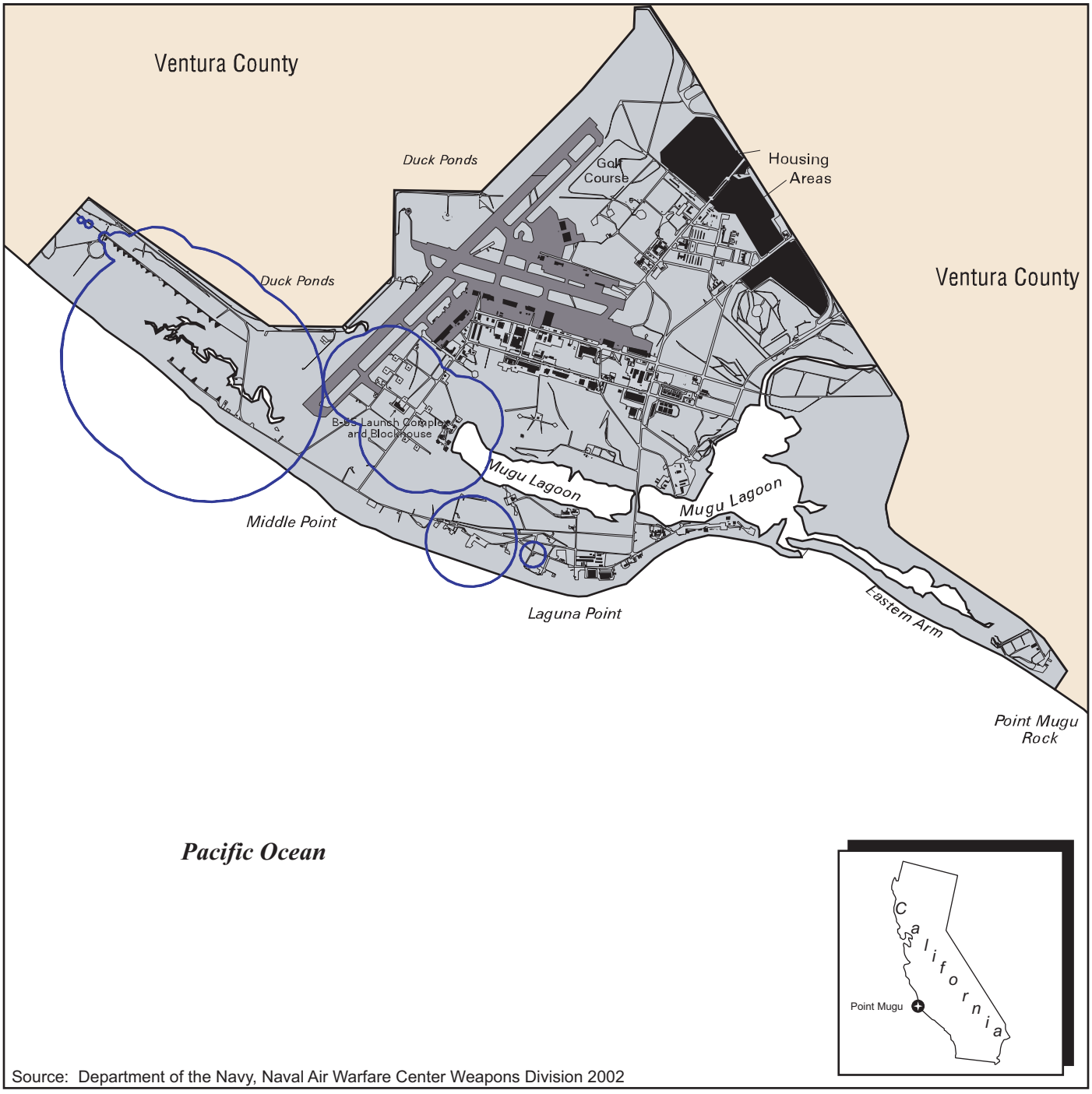
NORTH

Scale

0 0.8 1.6 kilometers

0 0.5 1 miles

10-14-03 HERP HERO Pt Mugu



Source: Department of the Navy, Naval Air Warfare Center Weapons Division 2002

EXPLANATION

- Water
- Land
- Point Mugu Main Base
- Explosive Safety Quantity Distance (ESQD)

ESQD Arcs

Point Mugu, California

Figure 3-7

NORTH

Scale

0 643.5 1,287 meters

0 2,112 4,224 feet

10-14-03 ESQD Pt Mugu

Company has indicated that it would be able to provide an additional 4.5 million kW with no infrastructure-related costs being passed on to the U.S. Navy, allowing for readily available future expansion. (Defense Energy Support Center, undated; U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a)

Water

The primary source of potable water is the United Water Conservation District in Port Hueneme, which also sells its water to Point Mugu. The base supplements this with on-base wells that tap into local aquifers. The base distribution plant is equipped with softening/chlorinating capabilities and two surge-protection tanks with capacities of 190,000 liters (50,000 gallons) and 760,000 liters (200,000 gallons), respectively. The potable water system supplies the entirety of the base, including the tenant Channel Islands Air National Guard Base facilities and Laguna Beach facilities. The existing system has a capacity of 22.0 million liters (5.8 million gallons) per day, and an average demand of 6.1 million liters (1.6 million gallons) per day. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a)

Wastewater

Wastewater is transported to the base's primary treatment facility (Imhof tank) via a system composed of 26 pump and lift stations. After initial treatment here, effluent is pumped to the City of Oxnard's sewage treatment plant for final treatment and discharge. The currently configured capacity of the on-base system is 15.2 million liters (4 million gallons) per day, with a load of about 1.8 million liters (480,000 gallons) per day, or only an approximate 12 percent of total capacity. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a)

Solid Waste

Solid waste from Point Mugu is collected by a private contractor and taken to an off-base transfer station in Oxnard before being delivered to the 65-hectare (161-acre) Toland Road Landfill, some 24 kilometers (15 miles) from base. Operated by the Ventura Regional Sanitation District, it is expected that this landfill will operate for another 30 years at the present rate of waste generation. The remaining capacity is 4 million cubic meters (30 million cubic yards), with the Point Mugu generation level at approximately 16 metric tons (18 tons) per day (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a).

Aviation Transportation

The Point Mugu airfield supports an annual total of approximately 45,933 aircraft operations. There were 5,300 civilian aircraft operations from the airfield in fiscal year 1995; military operations totaled 19,866. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a)

Point Mugu is located within airspace controlled by the Los Angeles ARTCC; however, the ARTCC has delegated control of all aircraft into and out of Point Mugu to the Point Mugu Air Traffic Services. Routes for aircraft with IFR clearance run north and south along the coast and do not enter the Sea Range. There are corridors for aircraft to cross the Sea Range while under FAA control; these are regionally significant in that they allow traffic to approach or leave the Los Angeles area enroute to Hawaii or other transpacific destinations.

Two nearby civilian airports, Oxnard Airport (11 kilometers [7 miles] northwest) and Camarillo Airport (10 kilometers [6 miles] to the north) accommodate scheduled air carrier and general aviation traffic (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a).

Ground Transportation

Regional. Major roadways in the Point Mugu vicinity include the Pacific Coast Highway (California State Route 1), which forms the northeastern boundary of the base, and the Ventura Freeway (U.S. Highway 101), which is located 10 kilometers (6 miles) north of the base and is a major regional north-south route in the California Highway System.

Local. Major roadways which run from Ventura Freeway to Point Mugu are Rice Avenue, Wood Road, Las Posas Road, and Lewis Road. Direct access to the base is from a frontage road along the Pacific Coast Highway primarily at Gates 2 and 3.

On-Site. The base has four entrances: Gates 1, 2, 3, and 5. The majority of traffic (52 percent) accesses the base via the Pacific Coast Highway from the north; another 36 percent utilizes Las Posas Road, which runs northwards to Camarillo. Gates 2 and 3 accommodate about 50 and 45 percent, respectively, of Point Mugu entry and exit traffic. Point Mugu has over 80 kilometers (50 miles) of paved roads, with primary on-base roadways including North Mugu Road, Main Road, Laguna Road, 11th and 13th Streets, and Beach Road. Existing on-base roadways are adequate to cover current and projected traffic loads (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a). There is no public transportation to or on-base at Point Mugu. (Military Exits, 2002) Except for a few areas, there is sufficient parking on base.

Water Transportation

A large amount of ocean traffic occurs through the Point Mugu Sea Range and includes both large and small vessels. The Sea Range boundaries encompass major sea lanes and approaches for ships to ports in Southern California. Some 7,000 vessel movements through the Sea Range have been estimated for a 1-year period (fiscal year 1995). Those were commercial ships; Naval vessel events totaled 799 (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a).

These shipping routes cross Point Mugu Sea Range through the Santa Barbara Channel (between the mainland coast and the northern Channel Islands) and through an area south of the Channel Islands. These shipping channels are major marine transit areas for vessels traveling to and from areas northward along the coat of westward toward Hawaii and Asia. The areas around the northern Channel Islands provide extensive opportunities for recreational fishing and boating. The types of U.S. Navy vessels on Point Mugu Sea Range are highly variable, ranging from small work boats used for nearshore work to major Navy combatants such as aircraft carriers.

3.2.9 LAND USE—POINT MUGU

Section 3.1.9 provides a general description of land use.

Region of Influence

The ROI for the land use generally includes the Ventura County region within and adjacent to the boundaries of Point Mugu that are potentially affected by the launch of target missiles and operation of support facilities associated with the Proposed Action.

Affected Environment

Point Mugu, which is located on the coast in Ventura County California, approximately 105 kilometers (65 miles) northwest of Los Angeles, provides support facilities, and instrumentation for the Naval Air Warfare Center (Global Security.org, 2003b). The majority of the surrounding area adjacent to the base is unincorporated and under the jurisdiction of Ventura County. The closest communities of Oxnard, approximately 10 kilometers (6 miles) to the northwest, and Camarillo, approximately 13 kilometers (8 miles) to the northeast, are separated from the base by substantial agricultural, recreational, and open space areas that create a wide buffer zone of compatible land uses between adjacent lands. In general, areas adjacent to the northern and eastern boundaries of Point Mugu are zoned for agricultural use. Located to the east and northeast of the base are the Santa Monica Mountains National Recreational Area and Point Mugu State Park, designated as recreational and open space land use. The base is bordered to the south and west by the Santa Barbara Channel of the Pacific Ocean. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a)

Of Point Mugu's 1,817 hectares (4,490 acres), approximately 805 hectares (1,990 acres) have been developed; the remainder exists largely in a natural state. Undeveloped land primarily consists of wetlands, beach dunes, and grassland. Both natural and operational restrictions necessitate Point Mugu's overall land use to be dominated by vast areas of open space. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a)

There are 10 land use categories on Point Mugu, including Aircraft Operations, Aircraft Maintenance, Base Support, Test and Evaluation, Administration, Community Support, Housing, Training, Ordnance, and Open Space. Of the developed land, approximately 360 hectares (890 acres) are use for training, administration, and operations; 97 hectares (240 acres) are used for military housing and recreation. In addition, 18 hectares (44 acres) atop Laguna Peak, located just within the Santa Monica Mountains National Recreational Area western boundary, are owned by Point Mugu for the operation of instrumentation and communications. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a)

Point Mugu recreational facilities are open to active duty personnel, retired personnel, reserve personnel, DoD employees, and base contractors. On-base recreational facilities include a library, baseball fields, physical education building, bike track, park, picnic pavilion, swimming pool, theater, community center, bowling center, golf course, and restaurants. In addition, a beach area and recreational vehicle park are located on the coast near Point Mugu Lagoon.

All federal development projects in a coastal zone and all federal activities which could directly affect a coastal zone must be as consistent as practicable with the Coastal Zone Management

Program as authorized by the Coastal Zone Management Act of 1972, as amended (16 USC 1451 *et seq.*). The Coastal Zone Management Programs are administered at the federal level by the Coastal Programs Division within the National Oceanic and Atmospheric Administration Administration's Office of Ocean and Coastal Resource Management. Although this boundary can vary according marine habit areas, recreation areas, or urban areas, the coastal zone at Point Mugu extends approximately 914 meters (3,000 feet) inland.

3.2.10 NOISE—POINT MUGU

Section 3.1.10 includes a general description of noise.

Region of Influence

Under federal OSHA regulations in 29 CFR 1910.95, employers are required to monitor employees who have exposure to an 8-hour time-weighted average of 85 dBA. Therefore, the ROI for noise analysis at Point Mugu is defined as the area within the L_{max} 85-dB contours generated by proposed project activities.

Affected Environment

Point Mugu is surrounded by lands designated generally as residential, commercial, industrial, community services, open space, agriculture, and undeveloped. These surrounding areas are subject to noise from civilian and military operations, automobile traffic, and construction activities. Aircraft noise tends to be dominant in areas immediately adjacent to airfields and beneath primary flight corridors. At Point Mugu, noise levels from flight operations exceeding ambient background noise typically only occur beneath main approach and departure corridors.

3.2.11 SOCIOECONOMICS—POINT MUGU

Socioeconomics is defined as the basic attributes and resources associated with the human environment, in particular population and economic activity. Socioeconomic resources consist of several primary elements including population, employment, and income. Other aspects often described may include housing and employment characteristics, and an overview of the local economy.

Region of Influence

The ROI for socioeconomics is defined as the communities and areas surrounding Point Mugu. Primary areas of analysis will concern the larger more populous communities including the cities of Port Hueneme, Oxnard, Camarillo, and wider Ventura County area.

Affected Environment

The main base of Point Mugu is located in southern Ventura County, California. The base and the surrounding area have been well developed. Surrounding communities include Port Hueneme and Oxnard to the northwest and Camarillo to the north.

Population and Housing

The total population of Ventura County increased from 669,016 persons in 1990 to 753,197 persons as of 2000 (12.6 percent) (U.S. Census Bureau, 2003a, f). Of the communities

adjacent to Point Mugu, Oxnard had the largest population of 170,358 while Camarillo had 57,139 and Port Hueneme had 21,845 in 2000 (U.S. Census Bureau, 2003c, d, e).

As of 2000, there were approximately 251,712 housing units within Ventura County (U.S. Census Bureau, 2003f). Of these, there were 45,166 in Oxnard; 21,085 in Camarillo; and 7,908 in Port Hueneme (U.S. Census Bureau, 2003c, d, e).

In addition, the U.S. Census Bureau reported that vacancy rates of rental housing within Ventura County averaged 0.8 percent during 2000 (U.S. Census Bureau, 2003f). This was marginally lower than the average vacancy rates of 1.5 percent for the city of Port Hueneme (U.S. Census Bureau, 2003e). While vacancy rates within Camarillo and Oxnard, at 0.5 percent and 0.8 percent respectively, more closely resembled the county average levels (U.S. Census Bureau, 2003 c, d).

Housing is not typically available on San Nicolas Island and therefore a population is not maintained. Personnel are flown in daily from the mainland.

Income and Employment

The U.S. Census Bureau reported that, as of 2000, the per capita income in Ventura County was $24,600, higher (8.3 percent) than the average per capita income of the state, at $22,711 (U.S. Census Bureau, 2003b, f). As of 1999, the median household income in Ventura County, at $59,666, was higher (25.8 percent) than that of the state, at $47,443 (U.S. Census Bureau, 2003b, f). Table 3-7 shows the number of individuals employed within the main sectors of the economy of Ventura County. Manufacturing, retail, and service industries dominate the profile, employing approximately 60 percent of the workforce within the county (U.S. Census Bureau, 2003f).

Table 3-7: Employment by Sector, Ventura County, 2000

Employment Sector	Employees	Percent
Agriculture, forestry, fishing and hunting, and mining	14,265	4.1
Construction	21,946	6.3
Manufacturing	48,154	13.8
Wholesale trade	13,811	4.0
Retail trade	38,539	11.1
Transportation and warehousing, and utilities	11,385	3.3
Information	14,639	4.2
Finance, insurance, real estate, and rental and leasing	28,328	8.1
Professional, scientific, management, administrative, and waste management services	38,476	11.0
Educational, health and social services	59,820	17.2
Arts, entertainment, recreation, accommodation and food services	23,669	6.8
Other services (except public administration)	16,377	4.7
Public administration	18,929	5.4

Source: U.S. Census Bureau, 2003f

San Nicolas Island is primarily an extension of Point Mugu and is owned and operated by the U.S. Navy. Point Mugu employs approximately 1,700 civilians, 280 on-site contractors, and 200 active duty personnel. (U.S. Department of the Navy, 2003)

3.2.12 WATER RESOURCES—POINT MUGU

Section 3.1.11 provides a general overview of water resources and the related federal regulatory framework.

Region of Influence

The water resource ROI includes those surface water bodies (streams, lakes, and saltwater-influenced lagoons), drainage areas, and groundwater resources that may be affected by the project's construction or operations. Major water bodies and wetlands at Point Mugu primarily include Mugu Lagoon and Calleguas Creek.

Affected Environment

Surface Water and Groundwater Resources

Point Mugu is located on the coastal plain adjacent to the Pacific Ocean and the Mugu Lagoon. The average rainfall for the station is approximately 27 centimeters (10.5 inches) per year.

Primarily, the water resources found at Point Mugu are influenced by the Mugu Lagoon. The lagoon is the largest surface water feature found on Point Mugu and is the largest estuarine lagoon in southern California. The lagoon encompasses 142 hectares (350 acres) of water and tidal flats and runs along the coast for 5.6 kilometers (3.5 miles) and is never wider than 1.0 kilometer (0.6 mile). The lagoon is part of approximately 1,010 hectares (2,500 acres) of wetlands that have been designated as a significant ecological resource according to criteria established by the Clean Water Act, as discussed in section 3.2.3.

Calleguas Creek is the main stream that drains Point Mugu. The creek originates in the Santa Susana Mountains and flows for approximately 60 kilometers (37 miles) into the Pacific Ocean at Point Mugu. Runoff from the creek includes treated sewage effluent and potentially pesticides. Tributaries to Calleguas Creek include Conejo Creek and Revolon Slough. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a)

Water Quality

Due to increased development of the upstream watershed, the quantity and quality of freshwater that is discharged into Mugu Lagoon have been affected. Agricultural development and urbanization have increased runoff into Calleguas Creek so that the flow is almost continuous. Urban area paving and stream channelization have caused severe stream bed erosion in some areas. Due to water quality deterioration, state and local agencies have implemented regulatory programs to identify the source of the deterioration.

Water Supply

The main source of potable water at Point Mugu is the United Water Conservation District in Port Hueneme, which sells water to the base. On-base wells that draw from local aquifers also supplement water supply. An on-base distribution facility is equipped with softening and

chlorination capabilities. This system supplies all of Point Mugu, including the tenant Channel Islands Air National Guard Base facilities and the Laguna Peak facilities. The existing system has a capacity of 22 million liters (5.8 million gallons) per day. The average daily demand is approximately 6.1 million liters (1.6 million gallons) per day. Typically, potable water is not a limiting issue with activities at Point Mugu. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a)

3.3 VANDENBERG AIR FORCE BASE

3.3.1 AIR QUALITY—VANDENBERG AIR FORCE BASE

Section 3.1.1 includes a general description of air quality.

Region of Influence

The ROI for launch site preparation is a circular area with a radius of only several hundred feet centered on the site of activity. The ROI for missile launches is the air shed surrounding Vandenberg AFB.

Affected Environment

Climate

The coastal area of Vandenberg AFB experiences moderate seasonal and daily variation in temperature and humidity. Temperatures are mild, ranging from 4˚C to 24˚C (39˚F to 75˚F). The rainy season extends from November to April. The average annual precipitation is 33 centimeters (13 inches).

Regional Air Quality

Vandenberg AFB is located within the South Central Coast Air Basin, which includes San Luis Obispo, Santa Barbara, and Ventura Counties. Vandenberg AFB is located within northern Santa Barbara County. Santa Barbara County has recently met the federal standard for ozone and has been redesignated by the EPA as being in attainment. The county is in attainment for all other federal air quality standards and all state standards except ozone and PM-10.

The Santa Barbara County Air Pollution Control District administers regulations for non-vehicular air pollution sources and is required to monitor air pollution levels to ensure federal and state AAQS are met or to develop a plan to meet them (Air Force Center for Environmental Excellence, 1999). The California Resources Board and local air pollution control districts such as Santa Barbara County Air Pollution Control District operate more than 200 air monitoring stations in California. An air monitoring station is located on the southern portion of Vandenberg AFB.

Existing Emission Sources

Previous Vandenberg AFB emission inventories have determined that missile launch emissions, which are considered non-stationary sources, produced less than 1 percent of the total PM-10 and 2.3 percent of total carbon monoxide. Since 1991, all new stationary sources and

modifications to existing stationary sources at Vandenberg AFB have employed best available current technology and offset emissions at a 1.2 to 1.0 ratio. Table 3-8 lists emissions from Vandenberg and Santa Barbara County. (U.S. Department of the Air Force, 2000)

Table 3-8: Vandenberg AFB and Santa Barbara County Emissions

	Volatile Organic Compounds metric tons (tons) per year	**Oxides of Nitrogen** metric tons (tons) per year	**Carbon Monoxide** metric tons (tons) per year	**Sulfur Dioxide** metric tons (tons) per year	**PM-10** metric tons (tons) per year
Estimated 2001 Emissions from Vandenberg AFB	4.5 (5.0)	17.8 (19.6)	47 (51.8)	1.0 (1.1)	58.6 (64.6)
1999 Santa Barbara County Annual Emission Inventory	40,606.4 (44,760.9)	17,860.0 (19,687.3)	93,114.0 (102,640.4)	1,445.7 (1,593.6)	8,253.0 (9,097.4)

Source: U.S. Department of the Air Force, 2000, Santa Barbara County Air Pollution Control District, 2001
PM-10 = Particulate matter with an aerodynamic diameter less than or equal to 10 micrometers

3.3.2 AIRSPACE—VANDENBERG AIR FORCE BASE

Section 3.1.2 provides a general description of airspace.

Region of Influence

The airspace ROI for Vandenberg AFB is defined as the area that could be affected by the ASIP activities, which includes the complex of restricted airspace and warning areas above and adjacent to Vandenberg AFB (figures 3-1 and 3-6).

Affected Environment

Vandenberg AFB, located approximately 148 kilometers (92 miles) west-northwest of Point Mugu, is considered a potential target launch location. The Vandenberg AFB airspace includes the Restricted Areas R-2516 and R2517 extending from the surface (sea level) to an infinite altitude; Restricted Areas R-2534A and R-2534B, extending from the surface (sea level) to 3,048 meters (10,000 feet); and numerous individual warning areas off the coast of southern California (figure 3-1). (U.S. Department of Defense, Missile Defense Agency, 2003b) Two potential launch locations (SS1, SLC-3W) are located in Restricted Area R-2517. Positioned south of Vandenberg AFB, Restricted Areas R-2534A and R-2534B are activated only when a launch is made to the southeast. LFTS launches to the south to support AWS interceptors from San Nicolas would require activation of both restricted areas. Approximately 15 launches per year, on average, are conducted from Vandenberg AFB. (U.S. Department of the Air Force, 1997)

3.3.3 BIOLOGICAL RESOURCES—VANDENBERG AIR FORCE BASE

Section 3.1.3 includes a general description of biological resources.

Region of Influence

The ROI includes areas on and in the vicinity of Vandenberg AFB that may potentially be affected by pre-launch and launch of the LFTS. No facility modifications are planned at this time.

Affected Environment

Vegetation

Since Vandenberg AFB occupies a transition zone between the semi-desert conditions of southern California and the cool, moist conditions of the north, many plant species and communities reach their northern or southern distributional limits in the area. A wide variety of vegetation types is supported on base, including Bishop pine forest, chaparral, coastal dune scrub, sage scrub, and salt marsh, freshwater marsh, grassland, oak woodland, tanbark oak forest, riparian woodland, and seasonal wetlands. The installation occupies one of the state's six remaining coastal dune systems. Extensive central foredunes and coastal dune scrub are located south of the Santa Ynez River on South Vandenberg. (U.S. Department of the Air Force, 1997; Vandenberg Air Force Base, 1997)

SLC-3W is located within the dune area, south of the Santa Ynez River and bordered by grassland. Vegetation in the vicinity of SLC-3W includes coastal sage scrub, grassland, riparian woodland, chaparral, and disturbed areas. Dominant plant species in the coastal sage scrub habitat include California sagebrush, coyote brush, poison oak, and mock heather. Brome, veldtgrass, wild oats, and fescue are the dominant species in grassland habitat. The riparian woodland area adjacent to SLC-3W is dominated by willows with a dense understory composed of twinberry, blackberry, stinging nettle, and poison oak. Burton Mesa chaparral near the site is composed primarily of dense shrubs such as Santa Cruz Island Oak and manzanita. The SLC-3W site is a disturbed area composed mainly of veldtgrass, black mustard, filaree, hottentot fig, and California goosefoot. Populations of the state threatened surf thistle (*Cirsium rhothophilium*) have been found in foredune and sandy bluff areas at the mouth of the Santa Ynez River and south of the river to Point Arguello. (U.S. Department of the Air Force, 1998; Vandenberg Air Force Base, 1997)

Vegetation in the vicinity of SSI includes central coastal sage scrub, chaparral, grassland, riparian wetlands, non-native woodlands, and disturbed (ruderal) areas. The non-native woodlands are composed mainly of eucalyptus. Ruderal vegetation in the area consists mainly of introduced grasses such as brome, veldtgrass, wild oats, and fescue. North facing slopes in the vicinity of SSI are dominated by plants such as monkeyflower, coyote bush, California sagebrush, Indian paintbrush, and dudleya. (U.S. Department of the Air Force, 1998; Vandenberg Air Force Base, 1997)

Wildlife

Southern Vandenberg AFB is less developed than the northern areas and thus more conducive to wildlife diversity. The Western fence lizard, garter snake, pocket gopher, California ground squirrel, and deer mouse are typical examples of smaller wildlife species found on base. Also common are crows, brush rabbits, badgers, and mule deer. Two special status species, the

California horned lizard and the silvery legless lizard, are found on southern Vandenberg AFB. The pelagic cormorant, western gull, black oystercatcher, pigeon guillemot, rhinoceros auklet, and Brandt's cormorant are seabirds that nest on rocky headlands of Vandenberg AFB, such as Point Arguello. The bald eagle occurs within the ROI only rarely. Western burrowing owls, a special status species, have occasionally been sighted, but only in winter or during migrations. The mouth of the Santa Ynez River provides hunting for the American peregrine falcon. Hunting peregrines have also been observed in the nearby SSI area. (U.S. Department of the Air Force, 1997; Vandenberg Air Force Base, 1997)

Common fish in the Santa Ynez River include bass, fathead minnow, introduced arroyo chub, and gambusia. The somewhat brackish lagoon supports starry flounder and Pacific staghorn sculpin. (U.S. Department of the Air Force, 1997) Essential Fish Habitat is described above in section 3.1.3, San Nicolas Island. Fishing regulations are enforced by Vandenberg AFB security police game wardens.

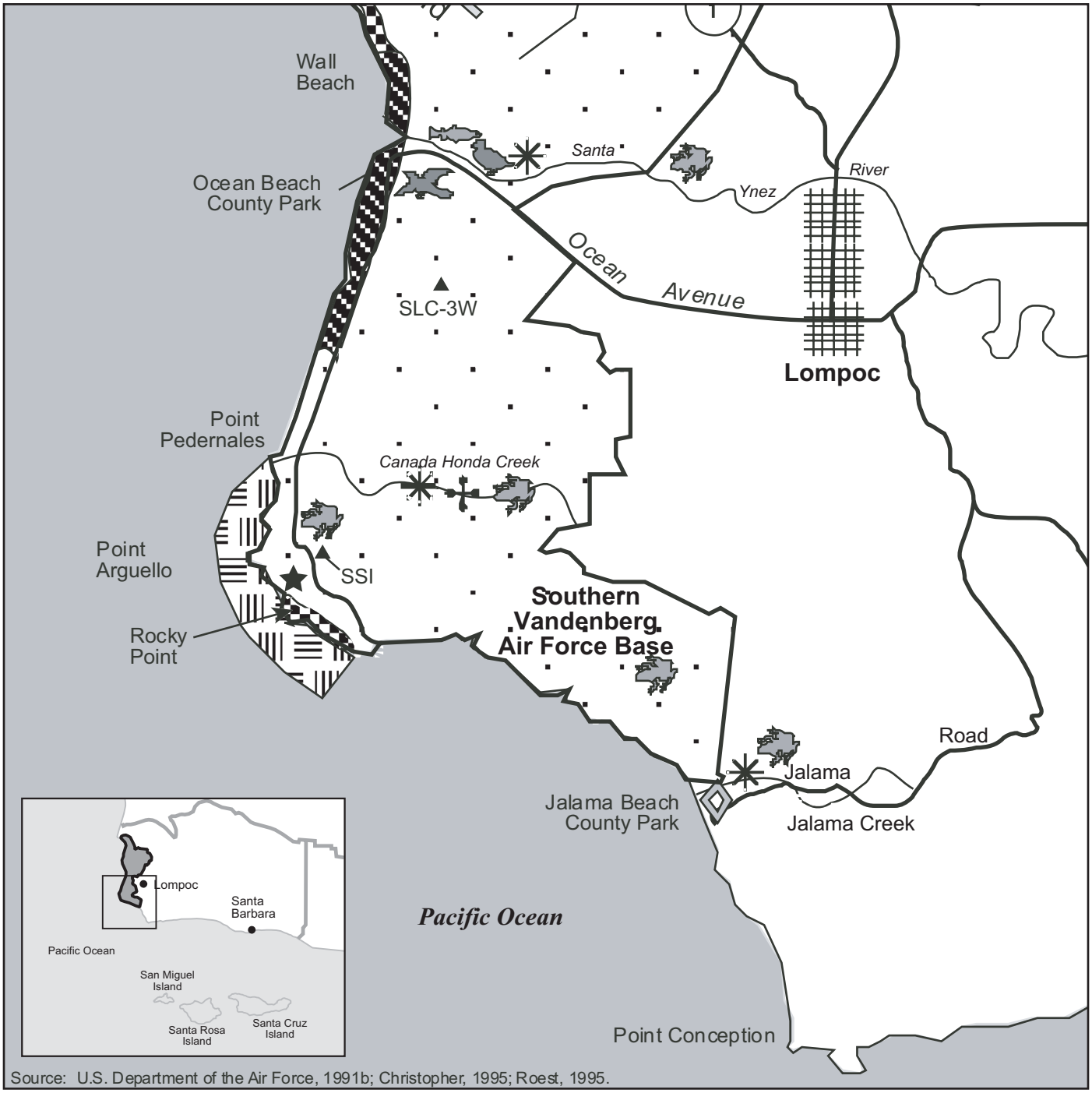
Individuals and small groups of gray whales are frequently seen inshore during spring and fall. along the southern coast of Vandenberg AFB during migration to the Bering Sea (Vandenberg Air Force Base, 1997). Pinnipeds occurring within the ROI include the California sea lion, and the Pacific harbor, northern elephant, and northern fur seals. Harbor porpoises may normally be found within 24 kilometers (15 miles) of the coast, though most other cetaceans remain further offshore and at depths of approximately 183 to 1,829 meters (600 to 6,000 feet). Bottlenose, common, and Pacific white-sided dolphins and killer whales are commonly observed near Vandenberg AFB. (U.S. Department of the Air Force, 1998)

Threatened and Endangered Species

Vandenberg's diverse habitats also support a wide variety of listed species, shown in figure 3-8 and table 3-9. One isolated colony of the federal and state endangered beach layia (*Layia carnosa*), a winter annual, is located in the vicinity west of SLC-3W and northeast of SSI.

The federal and state endangered tidewater goby (*Eucyclobius newberryi*) and unarmored threespine stickleback (*Gasterosteus aculeatus williamsoni*) are found in Cañada Honda Creek, the largest drainage in South Vandenberg AFB. The federally endangered steelhead trout (*Oncorhynchus mykiss*), once an abundant breeder, still inhabits the Santa Ynez, though in considerably smaller numbers, and is considered a potential inhabitant of Cañada Honda Creek. (U.S. Department of the Air Force, 1997; Vandenberg Air Force Base, 1997)

Based on the general description of the region, the federally endangered California tiger salamander (*Ambystoma californiense*) has been suggested as a likely resident. However, to date they have not been observed on base (Federal Register, 2000a). The federal threatened California red-legged frog (*Rana aurora draytoni*) is also found in Cañada Honda Creek and the nearby SLC-6 sewage ponds. (U.S. Department of the Air Force, 1997; Vandenberg Air Force Base, 1997)



Source: U.S. Department of the Air Force, 1991b; Christopher, 1995; Roest, 1995.

EXPLANATION

- Nesting Location of California Least Tern/ Western Snowy Plover
- Haulout Location of California Sea Lion, Northern Elephant Seal, and Pacific Harbor Seal
- Marine Ecological Reserve
- Tidewater Goby
- Unarmored Threespined Stickleback
- Roosting Location of California Brown Pelican
- Launch Site

SLC - Space Launch Complex
SSI - Space Services Incorporated

- California Least Tern Foraging Areas
- California Red-legged Frog (Wide Distribution Also Includes Ponds and Vernal Pools)
- Steelhead Trout
- Southwestern Willow Flycatcher
- Snowy Plover (Winters Only)

Scale
0 4.3 8.6 kilometers
0 2.7 5.4 miles
NORTH

10-14-03 Habitat S-VAFB

Sensitive Habitat for Listed Species on Southern Vandenberg Air Force Base

Vandenberg Air Force Base, California

Figure 3-8

Table 3-9: Listed Species Known or Expected to Occur on or in the Vicinity of Vandenberg AFB

Scientific Name	Common Name	Status	
		State	Federal
Plants			
Layia carnosa	Beach layia	E	E
Fish			
Eucyclobius newberryi	Tidewater goby	CSC	E
Gasterosteus aculeatus williamsoni	Unarmored threespine stickleback	E	E
Oncorhynchus mykiss	Steelhead trout	CSC	E
Amphibians			
Ambystoma californiense	California tiger salamander	--	E
Rana aurora draytoni	California red-legged frog	CSC	T
Birds			
Brachyranphus marmoratus	Marbled murrelet	E	T
Charadrius alexandrinus nivosus	Western snowy plover	CSC	T
Empidonax trailii extimus	Southwestern willow flycatcher	E	E
Pelecanus occidentalis californicus	California brown pelican	E	E
Sterna antillarum browni	California least tern	E	E
Vireo bellii pucillus	Least Bell's vireo	E	E
Reptiles			
Chelonia mydas	Green sea turtle	--	T
Dermochelys coriacea	Leatherback sea turtle	--	E
Mammals			
Enhydra lutris nereis	Southern sea otter	--	T
Balaenoptera musculus	Blue whale	--	E
Megaptera novaeangliae	Humpback whale	--	E

Source: Vandenberg Air Force Base, 1997; California Department of Fish and Game, 2003.

NOTES:

CSC = California Species of Concern
E = Endangered
T = Threatened

Among bird species, the federal and state endangered least Bell's vireo (*Vireo bellii pucillus*) occurs within the ROI only rarely. Though typically nesting further inland, the federal threatened (and California endangered) marbled murrelet (*Brachyramphus marmoratus*) is an occasional but rare visitor that fishes in the waters off Vandenberg AFB during summer, fall, and winter. California brown pelicans occur year-round off Vandenberg AFB and roost at Point Arguello, Point Pedernales, and Rocky Point in the southern portion of the base. The California least tern has been known to forage at and establish nesting colonies near the mouth of the Santa Ynez north of SLC-3W. The SLC-3W site is also located near the nesting area of the western snowy plover, which extends approximately 2 kilometers (1.5 miles) south of the Santa Ynez lagoon.

The federal endangered southwestern willow flycatcher (*Empidonax trailii extimus*) also frequents the Santa Ynez. Previously the flycatcher's only known breeding colony in the region was documented in dense riparian woodlands along the Santa Ynez River, but outside base boundaries. The flycatcher is now known to nest along the river near the 13th Street Bridge north of the proposed LFTS sites. Other potential on-base nesting habitat is available. (U.S. Department of the Air Force, 1997; 1998)

Marine mammals that are known or expected to occur in or around the Vandenberg AFB coastline area include 29 cetacean (whale, dolphin, and porpoise) species, 6 pinniped species, and the southern sea otter. The otter is occasionally spotted off the coast of southern Vandenberg AFB feeding in offshore kelp beds. (Vandenberg Air Force Base, 1997)

Two listed pinniped inhabitants, the Guadalupe fur seal (*Arctocephalus townsendi*) and Steller sea lion (*Eumetopias jubatus*), are rare visitors at best; the latter has not been observed in the region for nearly a decade.

Environmentally Sensitive Habitat

The State of California has designated a 4.8-kilometer (3-mile) area of South Vandenberg as a marine ecological reserve, but this was not intended as a restriction against launch operations. Rather, a Memorandum of Agreement between the state and the base has been initiated that would allow access to the area for military operations and scientific research only. The Vandenberg Ecological Reserve is located off the southern end of Vandenberg AFB. (U.S. Department of the Air Force, 1997)

An arroyo willow wetland is located in a drainage downstream of a holding pond on SLC-3W. A willow scrub wetland is supported in a small drainage ditch at the foot of the retaining basin at SLC-3W. Wetlands associated with Bear Creek are adjacent to SLC-3W. (U.S. Department of the Air Force, 2000)

3.3.4 CULTURAL RESOURCES—VANDENBERG AIR FORCE BASE

Vandenberg AFB has primarily been used to develop several types of intermediate and long-range ballistic missiles and has been largely associated with the launch of military and civilian payloads since the mid-1950s. The 30 SW is currently the host command at Vandenberg AFB and controls the Western Test Range, which conducts military and civilian space and missile launch operations.

Region of Influence

In general, the ROI for cultural resources encompasses areas requiring ground disturbance (e.g., areas of new facility or utility construction) and all buildings or structures requiring modification, renovation, demolition, or abandonment. At Vandenberg AFB this includes the SSI site, the SLC-3W launch site, Building 960, and the Hypergolic Stockpile Storage Facility.

Affected Environment

Vandenberg AFB uses its *Integrated Cultural Resources Management Plan* in part to support the management of the cultural resources found at Vandenberg AFB. This document is used to

assist in the preservation of historic buildings, structures, objects, landscapes, and archaeological resources on Vandenberg AFB.

Prehistoric and Historic Archaeological Resources

Numerous archaeological surveys at Vandenberg AFB have identified approximately 2,200 prehistoric and historic cultural sites. Prehistoric sites include dense shell middens, stone tools, village sites, stone quarries, and temporary encampments. Historic artifacts include those typically used in mission establishment, ranching, and military activities. Cultural resource sites located in this area include the site of the former Rancho Guadalupe, which dates from the mission period. (U.S. Department of Defense, Missile Defense Agency, 2003a)

At least two archeological sites and one historical site are located near SSI. The SLC-3W site is within the territory historically occupied by the Purisimeño group of the Chumash (U.S. Department of the Air Force, 1997).

Historic Buildings and Structures

In 1941, the U.S. Army in support of the World War II effort acquired much of the area. Named Camp Cooke, the area served as a training area for armored and infantry units. In 1950 the base was re-activated in support of the Korean War. In 1957, the U.S. Air Force took over the northern 26,305 hectares (65,000 acres) of Camp Cooke and renamed it Cooke AFB. In 1958, the Strategic Air Command took control of the base and renamed it Vandenberg AFB.

Vandenberg AFB currently manages 110 early historic structures and 77 historic Cold War-era facilities. The latter Cold War sites have been determined eligible for listing on the National Register of Historic Places as the result of a consultation with the State Historic Preservation Officer. (U.S. Department of Defense, Missile Defense Agency, 2003a)

Several historic sites are located near SSI, including a former Coast Guard Rescue Station known as the Boathouse and another Coast Guard station at Point Arguello. They are eligible for inclusion in the National Register. (U.S. Department of the Air Force, 1997)

Native Populations/Traditional Resources

At the time of European contact, the Vandenberg AFB area was occupied by inhabitants who spoke one of the major languages of the Chumashan branch of the Hokan language family. Villages were numerous and typically consisted of domed houses, granaries, ceremonial areas, game fields, and a burial ground. Several villages were located in the area that is now northern Vandenberg AFB.

Even after the first Europeans made contact, the Chumash life and culture continued without the explorers' influence. It was not until the mid-1700s that the Spanish began to colonize the area and establish missions. In 1901, the Chumash received 30 hectares (75 acres) of reserved land from the U.S. Government, which is presently the only land held by the Chumash people. This reservation is located approximately 32 kilometers (20 miles) east of Vandenberg AFB. The base has maintained a cooperative relationship with the Chumash reservation for several years.

Vandenberg AFB manages approximately 140 Native American traditional cultural properties. Several Chumash-related traditional resources sites have been identified at Vandenberg AFB including villages and campsites, rock art panels, and burial grounds. (U.S. Department of Defense, Missile Defense Agency, 2003a)

Paleontological Resources

Fossils of both vertebrate and invertebrate animals have been found in the vicinity of Vandenberg AFB. Remnants of terrestrial upper-Pleistocene terrace deposits have been found at South Vandenberg. These deposits have great potential for fossil discovery, yielding mammoth and horse fossils approximately 45,000 years old. In addition, fish and crab remains and whalebone have been discovered. (U.S. Department of the Air Force, 1997)

3.3.5 GEOLOGY AND SOILS—VANDENBERG AIR FORCE BASE

Region of Influence

The ROI is anticipated to be the soil areas within the target LHA that might be subject to contamination from launch exhaust emissions and/or potential contamination from unburned fuel in the event of a terminated LFTS launch. No permanent construction or facility improvements are currently anticipated that would result in additional clearing or other soil disturbance.

Affected Environment

Geology

Vandenberg AFB is located in the Santa Maria Basin, which is bounded on the northeast by the San Raphael Mountains of the Southern Coast Ranges, on the south by the Santa Ynez Mountains of the Western Transverse Ranges, and on the west by the Pacific Ocean. The proposed target launch locations are situated on the southern portion of Vandenberg, primarily along the west flank of the Santa Ynez range. Major physiographic features in the vicinity of the target launch sites include Lompoc Terrace, beaches, rocky headlands, and points (U.S. Department of the Air Force, 2000).

Vandenberg AFB is underlain by marine sedimentary rocks of Late Mesozoic age and Cenozoic age. The basal unit underlying the entire area is the Franciscan Assemblage of upper Jurassic age (Dibblee, 1950). A severely folded sequence of Miocene-age Monterey Shale overlays the Jurassic rocks in the vicinity of the launch sites (Dibblee, 1988). This formation has wide distribution throughout the Santa Ynez range and is well exposed, discontinuously on upland slopes and continuously along the sea cliffs. Marine terrace deposits mantle the Monterey Shale at the SSI site (U.S. Department of the Air Force, 1995). The Quaternary Orcutt Sand, a friable wind deposited sand, underlies SLC 3-W.

Soils

The soils in the Spaceport vicinity are predominantly the Tangair Loamy Sand, which is derived from ancient sand dunes. Soils at SLC 3W are likely to be derived from older wind deposits (Dibblee, 1959).

Mineral Resources

Mineral resources identified at Vandenberg AFB includes oil and gas, sand and gravel, diatomite, and limestone, with the oil and gas having the most significant commercial value (U.S. Army Space and Strategic Defense Command, 1994). Numerous oil and gas exploration wells have been drilled on Vandenberg AFB. One field discovery was made on the San Antonio Terrace in the 1950 at Jesus Maria Field. Since 1979, four operators have drilled wells on Vandenberg AFB. Unocal and Conoco each currently operate one well; Nomeco, three wells (abandoned); and Grace, one well (abandoned). Potential for oil and gas production is discussed in a separate U.S. Air Force document (U.S. Army Space and Strategic Defense Command, 1994).

Geologic Hazards

Numerous onshore and offshore faults have been mapped within the vicinity of Vandenberg AFB; most are inactive and not capable of surface fault rupture or of generating earthquakes (U.S. Department of the Air Force, 1998). Four faults have been mapped on Vandenberg AFB: the Lion's Head, Hosgri, Santa Ynez River, and Honda (Jennings, 1994). Only the Hosgri, Santa Ynez, and Honda faults run through South Vandenberg AFB. Of the three faults on South Vandenberg AFB, only the Hosgri Fault is considered to be active (ruptured in the last 10,000 years). The location of these structural elements relative to proposed facilities is shown on figure 3-9. Although many of these faults have displayed evidence of surface rupture in the last 10,000 years, it is not expected that future earthquakes would cause surface ruptures at or directly adjacent to any of the proposed launch sites.

The secondary effects of fault rupture are earthquake ground motions, or seismicity. The Western Transverse Ranges, inclusive of the continental borderlands, have historically been in a moderately high seismic region. Since 1900, within a 32-kilometer (20-mile) radius of the project area, there have been over 90 earthquakes with magnitudes ranging from 3.0 to 7.3 (U.S. Department of the Air Force, 1998). Two earthquakes were notable, one in 1812 (M7.1), most likely epicentered in the Santa Barbara Channel, and the other in 1927 (M7.3), offshore near Point Arguello. The 1927 event may have occurred less than 32 kilometers (20 miles) west of South Vandenberg AFB.

Vandenberg AFB is located in a Seismic Zone IV, as defined by the Uniform Building Code (International Conference of Building Officials, 1991), characterized by areas likely to sustain major damage from earthquakes, and corresponds to intensities of VIII or higher on the Modified Mercalli Scale (U.S. Department of the Air Force, 1998).

3.3.6 HAZARDOUS MATERIALS AND WASTE—VANDENBERG AIR FORCE BASE

Section 3.1.6 includes a general description of hazardous materials and hazardous waste.

Region of Influence

The ROI for potential impacts related to hazardous materials/wastes would be limited to areas of south Vandenberg AFB to be used for launch activities, pre-launch site preparation, post-launch activities, and in areas where liquid propellant and ordnance would be stored and handled.

Source: U.S. Department of the Air Force, 1998b (modified); Jennings, 1994.

EXPLANATION

- Base Boundary
- 101 U.S. Highway
- 135 State Route
- Railroad
- Fault Trace
- Approximate Fault Location
- Concealed Fault

SLC - Space Launch Complex
SSI - Space Services Incorporated

Scale
0 2.9 5.8 kilometers
0 1.8 3.6 miles
NORTH

10-14-03 VAFB Faultlines

Principal Faults in Vandenberg Air Force Base Area

Vandenberg Air Force Base, California

Figure 3-9

Affected Environment

Hazardous Materials Management

Hazardous materials use at Vandenberg AFB must conform to applicable federal, state, and local laws and regulations. Hazardous materials obtained from off base suppliers are coordinated through Vandenberg AFB's Hazmart Pharmacy. A base supply contractor runs the Hazmart Pharmacy and (in accordance with U.S. Air Force Instructions) inventories all hazardous materials, whether purchased by the U.S. Air Force or its contractors. Hazardous materials are tracked using Environmental Management System software. These procedures are in accordance with the 30 SW Hazardous Materials Management Plan. (U.S. Department of Defense, Missile Defense Agency, 2002a; 2003a)

Most hazardous materials fall into two use categories: materials used in base maintenance activities, and those used in various launch operations. Numerous types of hazardous materials are used to support general maintenance operations and the various ongoing missions at Vandenberg AFB. Categories of hazardous materials used during current launch activities include petroleum, oil, and lubricants, volatile organic compounds, corrosives, refrigerants, adhesives, sealants, epoxies, and propellants. (U.S. Department of Defense, Missile Defense Agency, 2002a; 2003a)

Spills of hazardous materials are covered under the Hazardous Materials Emergency Response Plan. This plan ensures that adequate and appropriate guidance, policies, and protocols regarding hazardous material incidents and associated emergency response are available to all installation personnel. (U.S. Department of Defense, Missile Defense Agency, 2002a; 2003a)

Hazardous Waste Management

The Vandenberg AFB HWMP (dated April 2002) describes procedures for packaging, handling, transporting, and disposing of hazardous waste. Hazardous wastes generated during Vandenberg AFB activities are initially collected at the point of generation and, if not reused or recycled, transported to the collection-accumulation point managed by the base Environmental Flight. Here waste is containerized and segregated by type. Following initial containerization, waste may remain at the collection-accumulation point for up to 90 days, at which point all hazardous waste must be transported to an approved off-site TSD facility. (U.S. Department of Defense, Missile Defense Agency, 2002a; 2003a)

Liquid Propellants and Other Toxic Fuels

Existing procedures ensure safe handling of liquid propellants and other toxic materials. Current operations include storage and handling of ground-based interceptor and exoatmospheric kill vehicle propellants. (U.S. Department of Defense, Missile Defense Agency, 2002a; 2003a)

3.3.7 HEALTH AND SAFETY—VANDENBERG AIR FORCE BASE

Section 3.1.7 includes a general description of health and safety.

Region of Influence

The ROI for potential impact related to public health and safety includes any areas affected by transport of missile components/propellants, the flight corridor, and areas immediately bordering the southern portion of Vandenberg AFB that may be affected by LHAs.

The ROI for potential impact related to the health and safety of workers includes the areas immediately associated with the transportation of missile components/propellants as well as the work areas immediately associated with prelaunch storage and handling of missile components/propellants and missile launch. The population of concern would predominantly consist of contractor, military, and government civilian personnel directly associated with the ASIP.

Affected Environment

Range Safety

Vandenberg AFB is involved in the ongoing test and evaluation of various missiles and space launch vehicles, with safe procedural practices as a primary objective. To accomplish this, an aggressive safety evaluation and control system has been implemented, based on more than 40 years experience in test and evaluation. Missiles that have been launched from South Vandenberg include sounding rockets, Scout, Titan II/III/IV, Atlas, Minuteman II derivatives, and Athena (Castor-120). (Peppers, 2003a; McCombs, 2003)

Proposed on-base program operations must receive prior approval, accomplished by the user through presentation of the program to 30 SW/SE. All safety analyses, standard operating procedures, and other safety documentation applicable to those operations affecting Vandenberg AFB, or the Sea Range Area and its controlled range space, must be provided, along with an overview of mission objectives, support requirements, and schedule. The 30 SW/SE evaluates this information, ensuring that all Sea Range Area safety requirements are met.

To provide protection for mission-essential personnel, all launch activities require the establishment of an LHA for each test flight mission. The LHA provides a designated area from which personnel are cleared based upon potential hazards from any missile debris that may result from launch or near-launch mishaps. The LHA, or surface danger zone, includes adequate area to contain the impact of an errant missile and associated debris. The 30 SW/SE would review all support personnel locations to ensure that risk levels are within acceptable limits. Essential personnel would also have proper breathing apparatus, in the event of on-pad or early flight termination. The LHA does not encompass all areas wherein secondary effects, such as fire risk, may occur. Adherence to the Vandenberg wildland fuels management plan aids in preventing large wildfires. As a result, the probability of a program-related wildfire is considered to be remote. Emergency fire-fighting personnel are on standby status for all launch activities. In addition, due to the base's ongoing ballistic missile launch activities, agreements have been developed with local county agencies to provide accident response resources as

needed, and to establish the authority for a coordinated accident response. (U.S. Department of Defense, Missile Defense Agency, 2002a)

Evacuation for a platform is required for Vandenberg AFB operations when either of the following conditions exists: the statistical collective estimated casualty risk equals or exceeds $300x10^{-6}$, or the platform lies within the hazard area. Sheltering of a platform is required when any of the following conditions exists: the platform lies within the launch vehicle three-sigma performance envelope; direct overflight of the platform by the launch vehicle; the platform lies within the caution area; a launch hazard zone is predicted to overlay the platform; or the probability of impact risk exceeds $10x10^{-6}$.

Vandenberg AFB possesses significant emergency response capabilities that include its own Fire Department, Disaster Control Group, and Security Police Force, in addition to contracted support for handling accidental releases of regulated, hypergolic propellants and other hazardous substances. The Readiness Flight manages the overall base emergency response program and is responsible for developing and updating the Vandenberg AFB Hazardous Material Emergency Response Plan. Additionally, the Readiness Flight chairs the Hazardous Materials Planning Team, ensures that follow-on elements of the Disaster Control Group are assembled as required by the On-Scene Commander in the event of a release response, and maintains training certificates for spill response team members. (U.S. Department of the Air Force, 1999)

According to the Santa Barbara County Integrated Hazardous Materials Management System Operation Agreement, the base Fire Department approves and maintains the Business Plan and hazardous material inventories prescribed by the California Health and Safety Code, which are developed by organizations assigned to or doing business on the base. This information can be retrieved electronically in the event of an emergency. Additionally, the base Fire Department conducts onsite facility inspections, as required, to identify potentially hazardous conditions that could lead to an accidental release. The Vandenberg AFB Fire Department is advised of all operations involving the transfer of hypergolic propellants on the base. During launch operations, Fire Department response elements are pre-positioned to expedite response in the event of an anomaly. (U.S. Department of the Air Force, 1999)

A NOTMAR and a NOTAM are published and circulated in accordance with established procedures to provide warning to mariners and pilots (including recreational users of the range space and controlled sea areas) concerning any potential impact areas that should be avoided. (U.S. Department of the Air Force, 1997; U.S. Department of Defense, Missile Defense Agency, 2002a; 2003a)

Radar and visual sweeps of hazard areas are accomplished immediately before operations to ensure evacuation of non-critical personnel. (U.S. Department of the Air Force, 1997; U.S. Department of Defense, Missile Defense Agency, 2002a; U.S. Department of Defense, Missile Defense Agency, 2003a)

Before missile flight operations, the performance of all target missiles is evaluated by 30 SW/SE to determine whether an FTS is warranted; if so, its use must be in accordance with Eastern and Western Range 127-1, *Range Safety Requirements*.

In addition, proposed trajectories are analyzed and a permissible flight corridor is established. Analysis is similar to that described in section 3.1.7. A missile that strays outside its corridor is considered to be malfunctioning and constitutes an imminent safety hazard.

Launch scenarios are planned to ensure debris will not fall within a 4.8-kilometer (3-mile) distance of the California coast (U.S. Department of the Air Force, 1997). Any debris falling on Vandenberg AFB land is handled in accordance with Vandenberg emergency response plans, based upon the 2000 *North American Emergency Response Guidebook* (U.S. Department of the Air Force, 1997).

Management of Risks Due to Rocket Propellant and Motor Exhaust Constituents

Exposures. The exposure criteria used in Range Safety Programs are used to fulfill toxic hazard and risk management requirements and policies. The objective of these programs is to maximize range operability without compromising public and worker safety. The Headquarters Air Force Space Command Surgeon General has recommended exposure criteria for some of the current solid- and liquid-rocket propellants and their combustion by-products. HQQAFSPC/SG also recommended use of a risk-management based approach for developing toxic launch commit criteria consistent with current human toxic exposure criteria and coordinated with Local Emergency Planning Committees and local agencies, as needed. In an effort to comply with this recommendation, the Range Safety offices developed a toxic risk management based approach designed to maintain an exposure criteria less than or equal to $30x10^{-6}$ with an individual risk of $1x10^{-6}$ over the varying population densities. This approach takes into account probability of catastrophic failure, concentration, direction, dwell time, and emergency preparedness procedures. This risk level presents no greater risk to the general public for launch and flight of launch vehicles and payloads than that imposed by overflight of conventional aircraft. (U.S. Department of Defense, Missile Defense Agency, 2003a)

Vandenberg AFB has safety procedures in place to protect the public and sensitive receptors from potential toxic emissions.

The Range has a three-tiered, three-zone deterministic approach plus a probabilistic approach to protecting against harmful toxic exposures of missile propellants/combustion products (exhaust). The Range implements safety measures that are designed to protect mission essential and nonmission essential persons. Before launch, the Rocket Exhaust Effluent Diffusion Model is used to locate toxic zones.

There are three zones for assessing an individual's proximity to toxic combustion products, including those that could result from a launch failure. Zone 1 is an area where airborne concentrations of any toxic product are equal to or exceed Tier 1 levels but are less than Tier 2 levels. Zone 2 is an area where airborne concentrations of any toxic product are equal to or exceed Tier 2 levels but are less than Tier 3 levels. Zone 3 is an area where airborne concentrations of any toxic product range from a low defined by Tier 3 to an unknown high. Table 3-10 describes the Tier levels.

Table 3-10: HQ AFSPC/SG-Recommended and Endorsed Exposure Criteria for Constituents in Rocket Propellant or Motor Exhaust

	Tier 1[1]	Tier 2[2]	Tier 3[3]
HCl[6]	2 ppm (60 min)[4] 10 ppm[5]	10 ppm[5]	50 ppm[5]
N_2H_4[7]	NR	2 ppm (60 min)[4]	40 ppm[5]
UDMH[7]	NR	5 ppm[5]	25 ppm[5]
A-50[7]	NR	5 ppm[5]	25 ppm[5]
MMH[7]	NR	0.52 ppm (60 min)[4]	25 ppm[5]
NO_2[6]	0.2 ppm (60 min)[4] 2 ppm[5]	2 ppm (60 min)[4] 4 ppm[5]	20 ppm (30 min)[4]
HNO_3[6]	0.3 ppm[5]	2.5 ppm (60 min)[4] 4 ppm[5]	25 ppm (30 min)[4]

Source: U.S. Air Force Occupational and Health and Safety Standard 48-8, Executive Order 12856 and Environmental Protection Agency, Federal Emergency Management Agency, and U.S. Department of Transportation, 1987

NOTES:

[1] Tier 1 – This exposure level and above is defined as the discomfort or mild-effect level. There is little risk to the average person. This exposure poses no hazard to normal and healthy individuals. Sensitive individuals (i.e., asthmatics and bronchitics) may experience some adverse effects, which are reversible. Tier 1 represents exposure guidelines for sensitive members of the general public (off-base) who may involuntarily and unknowingly be exposed. Recommended action, if this tier is exceeded, is similar to a Stage 3 air pollution alert: Notify the public of the release through an advertised announcement particular to an event or a published annual notice that sensitive populations should be advised that there is a possibility of exposure to the effluent and advise of mitigating precautions.

[2] Tier 2 – This exposure level and above is defined as the disability or serious-effect level. All effects are reversible. There are no serious impacts on personnel's ability to complete the mission identified. There is some risk to an average individual. Military and employees voluntarily accept exposure up to Tier 2 concentrations. The consent implies knowledge of the exposure concentrations and the consequences of possible exposure. Tier 2 represents personnel who have knowledge of the event and understand the possibility and consequences of possible exposure (on-base personnel). Personnel are advised to seek immediate protection (shelter in place) or evacuate for concentrations exceeding the Tier 2 limit.

[3] Tier 3 – This exposure level and above is defined as a life-threatening-effect level. Irreversible harm may occur with possible impact on a person's ability to complete the mission. Personnel in an area (event personnel) where Tier 3 exposure may occur have given informed consent and are trained regarding the possible life-threatening situations. Exposures up to Tier 3 concentrations permit an individual to seek shelter or don respiratory protection. Concentrations predicted in excess of Tier 3 concentrations require immediate evacuation to prevent exposure.

[4] Time-weighted average exposure concentration. The time period indicated in parentheses is the time over which the concentration measurements will be measured and averaged.

[5] Ceiling limit. A peak concentration that must not be exceeded during the exposure period.

[6] Exposure criteria recommended by HQ AFSPC/SG.

[7] Exposure criteria recommended by AL/OE and endorsed by HQ AFSPC/SG.

A-50 = Aerozine-50 (50 percent by weight unsymmetrical dimethylhydrazine and anhydrous hydrazine)
HCl = hydrochloric acid
HNO_3 = nitric acid
HQ AFSPC/SG = Headquarters Air Force Space Command/Surgeon General
min = minutes
MMH = monomethyl hydrazine
NR = no recommendation
N_2H_4 = anhydrous hydrazine
NO_2 = nitrogen dioxide
ppm = parts per million
UDMH = unsymmetrical dimethylhydrazine

Before launch, the Rocket Exhaust Effluent Diffusion Model is run to ensure that any mission essential persons within a Zone 2 (having predicted hydrogen chloride concentrations exceeding the Tier 2 level are aware of being in a Zone 2, have personnel protection equipment, and have a pre-determined route of departure. If mission essential personnel do not meet these requirements, then they are relocated out of the zone. Any non-mission essential people on-base are also moved, if feasible. If they cannot be moved, or if they are off-base and not subject to being moved, then their locations and exposure are taken into account in the risk assessment procedure. (U.S. Department of Defense, Missile Defense Agency, 2003a)

The Range toxic risk-assessment-based recommendation to launch or not to launch is based on the results of the Launch Area Toxic Risk Analysis program (i.e., risk assessment program) that evaluates the risk to people, regardless of whether they are mission essential or non-mission essential. Among other criteria in determining whether to launch, this program accounts for whether people are sheltered or unsheltered; whether they are healthy or sensitive individuals; and the probability of a catastrophic launch failure. (U.S. Department of Defense, Missile Defense Agency, 2003a)

Regional Safety

Regionally, Santa Barbara County prepared a Hazardous Material Response Plan that is used for countywide disaster response. Cities and communities in the county are required to have their own emergency response plans that were incorporated by the county into a comprehensive Multihazard Functional Plan, which specifies actions to be taken in case of a local disaster. Vandenberg AFB plays a prime role in regional emergency planning because of the potential for Vandenberg AFB operations to affect off-base areas (U.S. Department of the Air Force, 1997)

The City of Lompoc and Vandenberg AFB have entered into a mutual aid agreement, which allows emergency units from either Lompoc or Vandenberg AFB to provide each other with assistance in the event of an emergency. A "hotline" exists between the city of Lompoc and Vandenberg AFB in order to immediately notify the city in case of a major accident on the base. In the event of an emergency involving a launch mishap in Lompoc, Vandenberg AFB assumes control and could set up a national defense area if protected material were involved in the accident. (U.S. Department of Defense, Missile Defense Agency, 2003a)

In the event of a launch vehicle impacting other areas outside Vandenberg AFB, the On-Scene Disaster Control Group from Vandenberg AFB responds to the accident upon request of the county. County agencies would be used to help in the evacuation and possible fire control for such an incident. Military personnel assume responsibility for disaster control in the immediate impact area. (U.S. Department of Defense, Missile Defense Agency, 2003a)

Impact debris corridors have been established off the Santa Barbara County coast between Point Sal and Point Conception. These corridors were established to meet security requirements and reduce the hazard to persons and property during a launch-related activity. Impact debris corridors are established through the designation of debris impact areas for each specific launch as discussed in range safety procedures. These corridors are plotted for all launches. (U.S. Department of Defense, Missile Defense Agency, 2003a)

Zone closures are announced daily over various radio frequencies and posted in harbors along the coast. The 30 SW Flight Analysis notifies the 30 Range Squadron of areas that are hazardous to aircraft (i.e., impact debris corridors) for all normally jettisoned and impacting stages by 30 working days before launch. The 30 SW Range Squadron notifies the FAA, Los Angeles Center, or Oakland Center, so that the information can be disseminated through a NOTAM. Restricted airspace areas are active and controlled according to Eastern and Western Range 127-1 Range Safety Requirements, Safety Operating Instructions, 30 SW regulations, and FAA directives and regulations. Control of air traffic in FAA-designated areas around the launch head are maintained and coordinated between the Aeronautical Control Officer and FAA to ensure that aircraft shall not be endangered by launches. The Air Route Surveillance Radar surveys the restricted airspace beginning 15 minutes before the scheduled launch time and until the launch is complete. (U.S. Department of Defense, Missile Defense Agency, 2003a)

The 30 SW also ensures that a NOTMAR within the impact debris corridor is disseminated beginning 30 working days before launch. Information regarding impact debris corridors is distributed to surface vessels when the 30 SW sends written notification of impact debris corridors to be published weekly in the U.S. Coast Guard Long Beach Broadcast to Mariners.

Broadcasts by U.S. Coast Guard Long Beach provide the latest available hazard information to offshore surface vessels. The 30 SW has developed procedures related to evacuating or sheltering personnel on offshore oil rigs during launch operations. These procedures pertain to offshore platforms located west of 120 degrees 15 minutes longitude. The 30 SW Chief of Safety notifies 30 Range Squadron of future launches, and 30 Range Squadron notifies the Minerals Management Service, Department of the Interior, to notify oil rig personnel of a future launch. Oil rig operators are notified to shelter or evacuate personnel according to the Rocket Exhaust Effluent Diffusion Model of toxic vapor plumes and potential impact of launch debris. (U.S. Department of Defense, Missile Defense Agency, 2003a)

Jalama Beach County Park may be closed on the day of a launch from South Vandenberg depending on the launch azimuth.

Base flight safety requires that there be no overflight of civilian property on the coastline, and that there be no overflight of any of the Channel Islands, except San Miguel Island. Although direct overflight of the beaches does not occur, there is the possibility of debris from a launch anomaly impacting the beaches. Vandenberg AFB, the Santa Barbara County Parks Department, the Santa Barbara County Sheriff, and the California Highway Patrol have agreed to close parks upon request during launches affecting the beaches in order to protect park visitors. (U.S. Department of Defense, Missile Defense Agency, 2003a)

3.3.8 INFRASTRUCTURE—VANDENBERG AIR FORCE BASE

Section 3.1.8 includes a general definition of infrastructure.

Region of Influence

The ROI includes areas on and in the vicinity of Vandenberg AFB that may potentially be affected by project activities, including areas in southern Vandenberg such as the SSI site and the SLC-3W launch site.

Affected Environment

Energy

Electricity for Vandenberg AFB is supplied by Duke Energy-North America through its Morro Bay Power Plant; power relays to the base's main substation and is then distributed through the base distribution system. Diesel-powered generators are also used to support technical facilities. In 1995, the base consumed approximately 452 megawatt hours per day (U.S. Department of the Air Force, 1998).

Water

The ROI for water supply and distribution consists of Lompoc and Santa Maria valleys. Water supplies in these areas are provided by wells located in the Santa Ynez, San Antonio Creek Valley, and Santa Maria watersheds. In 1997, Vandenberg AFB was connected to the California Department of Water Resource's State Water Project for supplemental water supply; Vandenberg's drinking water now comes from two sources, surface water purchased via this project (comprising the majority of water used on base) and groundwater via a wellfield on the San Antonio Aquifer. Wellfield groundwater is used to supplement the supply when base demand is relatively high, or when State Project Water is unavailable during routine maintenance activities. (Rohr, 2002)

The supply from the San Antonio Creek Valley wells is 7,003 liters (1,850 gallons) per minute each day. From the State, the daily maximum is 20,820 liters (5,500 gallons) per minute. (Rush, 2002) Figures for 2001 indicate usage was 908,000 liters (240,000 gallons) produced from the wells and 4.69 billion liters (1.24 billion gallons) drawn from the State Project waters (Rush, 2002).

Wastewater

Domestic wastewater from the main cantonment is conveyed to and treated at the City of Lompoc's publicly operated Regional Wastewater Treatment Plant. Vandenberg AFB has a permit (No. 1-004) from the City of Lompoc restricting the types and quantities of industrial wastewater allowed. This permit also specifies that the average daily flow shall not exceed 4.9 million liters (1.3 million gallons) per day, nor shall peak wet weather flow exceed 13 million liters (3.4 million gallons) per day. Domestic wastewater from facilities in both North and South Base is conveyed and treated by onsite wastewater treatment systems; in most cases, septic tank systems are used. The base also has two extended aeration units serving the South Base cantonment area and the Vandenberg Tracking Station.

Figures for 1996 indicated the Lompoc Regional Wastewater Treatment Plant had a capacity of 18.9 million liters (5 million gallons) per day; Vandenberg AFB contributed approximately 4.88 million (1.29 million gallons) per day to the plant (U.S. Department of the Air Force, 1998). These levels are consistent with current levels of use (Rush, 2002).

Solid Waste

Santa Barbara County maintains the Class III Vandenberg AFB on-base landfill, four off-base landfills, three transfer stations, and a proposed Materials Recovery Facility. Of these, Vandenberg AFB primarily uses its own landfill located on the northern part of the base. (U.S. Department of the Air Force, 1998) The landfill, a 70-hectare (172-acre) waste management

facility, is located in the northern part of the base and managed by the Red River Service Corporation Management Joint Venture. The landfill operates pursuant to Waste Discharge Requirements order No. 94-26, issued on 3 June 1994, and Solid Waste Facility Permit #42-AA-0012, issued on 10 January 2000. This permit authorizes disposal of 363 metric tons (400 tons) per operating day of solid waste. Since 1990, an average of 122 metric tons (134 tons) has been generated per day; 53.2 metric tons (58.6 tons) per day were buried in the landfill; 68.4 metric tons (75.4 tons) were diverted. The average quantity of waste generated for the first three quarters of 1999 was 172.4 metric tons (190 tons) per operating day; an average of 36.7 metric tons (40.5 tons) per day was buried in the landfill. Launch complexes and their ancillary facilities are the primary sources of industrial waste generated on southern Vandenberg AFB.

On occasion, the base uses the Lompoc and Tajiguas landfills (U.S. Department of the Air Force, 1998). The Tajiguas Landfill, approximately 70.8 kilometers (44 miles) from the Vandenberg AFB Main Gate, is operated and managed by Santa Barbara County. It is permitted to accept up to 1,361 metric tons (1,500 tons) per day. This landfill accepts imported solid waste in addition to the regular incoming waste. However, upon obtaining local, state, and federal permits required by law, the Santa Barbara Board of County Supervisors will proceed with the expansion of the landfill by 6.3 million cubic meters (8.2 million cubic yards), thus increasing its capacity by 15 years and allowing it to accept an additional 4.4 million metric tons (4.9 million tons) of waste, starting in 2006 (University of California, Santa Barbara, Center for Control Engineering and Computation, 2002).

Aviation Transportation

There are four airports within the surrounding area of Vandenberg AFB. These include Santa Barbara Municipal, Santa Ynez, Lompoc, and Santa Maria Public airports. Vandenberg AFB also maintains its own runway, which is capable of handling large aircraft (U.S. Department of Defense, Missile Defense Agency, 2002a).

Ground Transportation

Regional. Vandenberg AFB is accessible by U.S. 101, which connects the base with San Francisco to the north and Santa Barbara to the south. State Route 1, State Route 135, and State Route 246 provide access to the base from U.S. 101.

Local. The majority of the workers and other related support services providers for Vandenberg AFB reside within the unincorporated areas of Santa Barbara County and in the cities of Lompoc, Santa Maria, Guadalupe, Buellton, Solvang, and Santa Barbara. The key local roads providing access to Vandenberg AFB include State Route 1, State Route 135, Santa Lucia Canyon Road, State Route 246, U.S. 101, and Central Avenue (U.S. Department of the Air Force, 1998).

On-Site. The major roads on Vandenberg AFB that provide access to the project sites are Coast Road, Bear Creek Road, 13th Street, and Ocean Avenue (figure 2-20). Coast Road is a two-lane undivided roadway providing access to SLC-6. Coast Road connects to Bear Creek Road, north of SLC-6. Bear Creek Road is a two-lane arterial that provides access to the launch site location SLC-3W. Bear Creek Road is accessible through 13th Street from the north or Ocean Avenue from the east. The Solvang Gate, Santa Maria Gate, and El Rancho Gate are connected to 13th Street, a two-lane arterial that runs north south on the base. Ocean Avenue is an east-west road that bisects Vandenberg AFB and connects with Bear Creek and Coast

roads. The Solvang and South Vandenberg AFB gates are located just north and south, respectively, of Ocean Avenue (U.S. Department of the Air Force, 1998).

Railway Transportation

The ROI for railways includes the Southern Pacific, Santa Maria Valley, and the Ventura County Railroad companies, which provide services to the cities of Santa Maria, Lompoc, Santa Barbara, San Luis Obispo, and Ventura. Three branch lines connect Vandenberg AFB to the Southern Pacific Railroad main line. Approximately four passenger trains and eight freight trains pass through Vandenberg AFB daily. The railroad tracks pass between the Pacific Ocean and the launch facilities and must be overflown during launches; however, trains themselves are never overflown during launches due to the potential risk to travelers and property (U.S. Department of the Air Force, 1998). An electronic surveillance system, posted railroad schedules, and close coordination, including radio communication, between train engineers and Vandenberg AFB launch personnel are used to minimize the possibility of a train being overflown.

3.3.9 LAND USE—VANDENBERG AIR FORCE BASE

Section 3.1.9 provides a general description of land use.

Region of Influence

The ROI for land use generally includes the Santa Barbara County region within and adjacent to the boundaries of Vandenberg AFB that could potentially be affected by the launch of target missiles and operation of support facilities associated with the Proposed Action.

Affected Environment

Vandenberg AFB, located in western Santa Barbara County in south central California, is approximately 88 kilometers (55 miles) northwest of Santa Barbara, and 225 kilometers (140 miles) northwest of Los Angeles. The base's 39,821 hectares (98,400 acres) are approximately 6 percent of the total land area of Santa Barbara County. Numerous communities are located within 16 kilometers (10 miles) of the base, but are separated by wide buffers of agricultural areas. These buffer lands are the result of efforts between the nearby cities of Lompoc and Santa Maria and Santa Barbara County functioning as local planning authorities for lands adjoining the base. (U.S. Department of the Air Force, 1997) Their general plans include the designation of compatible land uses between adjacent lands and Vandenberg AFB. Neither the county nor neighboring cities have any land use authority over Vandenberg AFB land because of its federal land status. Furthermore, Vandenberg AFB allocates its own land use and zoning regulations. (U.S. Department of the Air Force, 1998)

Vandenberg AFB is divided into northern and southern regions by the Santa Ynez River and West Ocean Avenue. Although space launch, missile test, telemetry, and tracking facilities exist for the support of various launch programs in both regions, most development on the base has occurred within the northern region; primarily consisting of administrative, industrial, and residential facilities. (U.S. Department of the Air Force, 1998)

Approximately 33 percent of the base has been disturbed, leaving the remainder in its natural state (U.S. Department of the Air Force, 1997). According to Vandenberg AFB's

Comprehensive Plan, the base has allocated the following land use areas: airfield operations and maintenance/space and missile launch, industrial, outdoor recreation, open space, airfield, and cantonment. The cantonment area includes residential, administrative, industrial, recreational, open space, airfield, and community land uses. Approximately 90 percent of the land use on Vandenberg AFB is open space, followed by industrial (approximately 6 percent) and airfield operations and maintenance/space and missile launch (approximately 2 percent). (U.S. Department of the Air Force, 1998)

Vandenberg AFB's 56 kilometers (35 miles) of undeveloped coastline exist as a fraction the 1,352-kilometer (840-mile) long California Coastal National Monument composed of small, federally owned islands, rocks, and exposed reefs. Currently, the Bureau of Land Management has begun the process to prepare a Resource Management Plan for the California Coastal National Monument (U.S. Environmental Protection Agency, 2002).

Limited public access to Vandenberg AFB's shoreline provides various opportunities for recreational activities in the vicinity. Three public access beaches that exist on or immediately adjacent to the base include Point Sal Beach State Park, Ocean Beach County Park, and Jalama Beach County Park (see figure 2-20). All provide opportunities for picnicking, surf fishing, and general beach activities (U.S. Department of the Air Force, 1998). All public access closures and evacuation agreements to all three parks, consolidated under Evacuation Agreement No. SPCVAN/1/93/0006, allow the base the right to evacuate and close the beaches days before launch (U.S. Department of the Air Force, 1997). Most park closures only occur for 3 to 4 hours. However, unstable weather conditions, or any mechanical problems, resulting in an abort launch or launch rescheduling may prolong a closure (U.S. Department of the Air Force, 1998).

Coastal Zone Management

All federal development projects in a coastal zone and all federal activities that could directly affect a coastal zone must be consistent to the maximum extent practicable with the Coastal Zone Management Program as authorized by the Coastal Zone Management Act of 1972. The Coastal Zone Management Programs are administered at the federal level by the Coastal Programs Division within the National Oceanic and Atmospheric Administration Administration's Office of Ocean and Coastal Resource Management. The area along the western coast of Vandenberg AFB is within the North Coast Planning Area. (U.S. Department of the Air Force, 1998)

3.3.10 NOISE—VANDENBERG AIR FORCE BASE

Section 3.1.10 includes a general description of noise.

Region of Influence

Under federal OSHA regulations in 29 CFR 1910.95, employers are required to monitor employees who have exposure to an 8-hour time-weighted average of 85 dBA. Therefore, the ROI for noise analysis at Vandenberg AFB is defined as the area within the L_{max} 85-dB contours generated by proposed project activities.

Affected Environment

The immediate area surrounding Vandenberg AFB is largely composed of undeveloped and rural land, with some unincorporated residential areas in the Lompoc and Santa Maria valleys and Northern Santa Barbara County. The cities of Lompoc and Santa Maria, which make up the two urban areas in the region, support a small number of localized industrial areas. Sound levels measured for the area are typically low, except for higher levels in the industrial areas and along transportation corridors. The rural areas of the Lompoc and Santa Maria valleys typically have a low overall noise level, 40 to 45 dBA. Infrequent aircraft flyovers and rocket launches from Vandenberg AFB increase noise levels for a short period of time. (U.S. Department of Defense, Missile Defense Agency, 2002a)

Noise at Vandenberg AFB is typically produced by automobile and truck traffic, aircraft landings and takeoffs, and space vehicle launches. Railroad traffic is also a significant base noise. Vandenberg AFB follows state regulations concerning noise and maintains a Community Noise Equivalent Level equivalent to 65 dBA for off-base areas. (U.S. Department of Defense, Missile Defense Agency, 2002a)

Rocket launches from Vandenberg AFB produce less frequent but more intense sources of noise in the region. Current launches include Minuteman missiles and Delta II rockets launched from the North Base and Titan and Atlas rockets from the South Base. Typical noise levels for familiar sources and Vandenberg AFB launch vehicles, such as the Minuteman, are summarized in table 3-11. (U.S. Department of Defense, Missile Defense Agency, 2002a)

Table 3-11: Typical Noise Levels of Common Sources at Vandenberg AFB

Source	Noise Level (dBA)	Comment
Sonic Boom	140	
Minuteman launch	Approx. 125	At 3 kilometers (1.8 miles)
Air raid siren	120	At 15.2 meters (50 feet) (threshold of pain)
Minuteman launch	98	At 4.2 kilometers (2.6 miles)
Airplane, 747	102.5	At 304.3 meters (1,000 feet)
Minuteman launch	80	At 12.7 kilometers (7.9 miles)
Long range airplane	80–70	Inside
Typical aircraft traffic	70	Maximum any location in flight path

Source: U.S. Department of Defense, Missile Defense Agency, 2002a
dBA = A-weighted decibels

3.3.11 SOCIOECONOMICS—VANDENBERG AIR FORCE BASE

Section 3.2.11 provides a general definition of socioeconomics.

Region of Influence

The ROI for socioeconomics is defined as the communities and areas surrounding Vandenberg AFB. Primary areas of analysis will concern the larger more populous communities including the cities of Lompoc, Santa Maria, Santa Barbara, and wider Santa Barbara County.

Affected Environment

Vandenberg AFB is in the western part of unincorporated Santa Barbara County, California. The Santa Ynez River and SR 246 divide the base into North and South Vandenberg AFB. The city of Lompoc lies to the east, the city of Santa Maria to the northeast, and the city of Guadalupe to the north. Two unincorporated communities, Vandenberg Village and Mission Hills, are north of the city of Lompoc. Also, Vandenberg AFB is considered a Census Designated Place and data regarding Vandenberg AFB from the 2000 census has been examined.

Population and Housing

The total population of Santa Barbara County increased from 369,608 persons in 1990 to 399,347 persons as of 2000 (8.04 percent). The City of Santa Barbara, with a population of 92,325 people as of 2000, was the largest city in the county and contained 23.1 percent of the county population. Of the communities adjacent to Vandenberg AFB, the city of Santa Maria, with 77,423 persons is the most populous, followed by the city of Lompoc with 41,103 people. Vandenberg AFB itself showed a larger population than the unincorporated communities immediately adjacent to the base.

As of 2000, there were an estimated 142,901 housing units within Santa Barbara County of which 37,076 housing units were located within the City of Santa Barbara and 22,847 and 13,621 units were located in Santa Maria and Lompoc respectively. As of 2000, 1,992 units were located within Vandenberg AFB and 2,366 and 1,072 units were located in the communities of Vandenberg Village and Mission Hills respectively.

In addition, the U.S. Census Bureau reported that vacancy rates of rental housing within Santa Barbara County and city averaged 2.8 percent and 2.3 percent respectively during 2000. These were marginally lower than the average vacancy rates of 4.0 percent and 3.1 percent for the cities of Santa Maria and Lompoc respectively.

Income and Employment

The U.S. Bureau of the Census reported that the per capita income in Santa Barbara County, as of 2000, was $23,059, only slightly higher (1.5 percent) than the average per capita income of the state at $22,711. Conversely, as of 2000, the median household income in Santa Barbara County, at $46,677, was slightly lower (1.6 percent) than that of the state, at $47,443. Table 3-12 shows the number of individuals employed within the main sectors of the economy of Santa Barbara County. Retail and service industries dominate the profile, employing approximately 60 percent of the workforce within the county. (U.S. Department of Defense, Missile Defense Agency, 2003a)

Santa Barbara County's economic growth has been driven by the expansion of local telecommunications, computer and software, medical devices, and electronics firms. Major employers include the University of California, Vandenberg AFB, Lockheed Martin, Vons/Williams Brothers Stores, and Raytheon Systems. (U.S. Department of Defense, Missile Defense Agency, 2003a)

Table 3-12: Employment By Sector, Santa Barbara County, 2000

Employment Sector	Employees	Percent
Agriculture, forestry and fishing and mining	12,094	6.7
Construction	10,773	6.0
Manufacturing	17,482	9.7
Transportation and public utilities	5,214	2.9
Wholesale trade	5,912	3.3
Retail trade	20,347	11.3
Finance insurance and real estate	9,755	5.4
Information	5,347	3.0
Public administration	7,647	4.2
Services	86,145	47.6
Professional, managerial, scientific, administrative	19,514	10.8
Education, health and social services	38,399	21.2

Source: U.S. Department of Defense, Missile Defense Agency, 2003a

3.3.12 WATER RESOURCES—VANDENBERG AIR FORCE BASE

Section 3.1.11 includes a brief overview of water resources and the related federal regulatory framework.

Region of Influence

The water resource ROI includes those surface water bodies (Santa Ynez River and Canada Honda Creek, see figure 3-8), drainage areas, and groundwater resources that may be affected by the project's construction or operations. These resources are within, and adjacent to, the boundaries of Vandenberg AFB. The ASIP targets could also affect the Pacific Ocean in areas below target interception points or in other areas between Vandenberg AFB and the intercept point (see section 3.4, Open Ocean).

Affected Environment

Surface Water and Groundwater Resources

Rainfall at Vandenberg AFB is relatively light, averaging from approximately 33 centimeters (13 inches) per year. Four drainages are found in the southern Vandenberg AFB region, with the major stream being the Santa Ynez River. Smaller streams include Caňada Honda, Bear, and Jalama Creeks. These streams and their smaller tributaries drain large areas, with many of the streams only having flows during or shortly after rain storms. Numerous ponds and man-made lakes are found on Vandenberg AFB (figure 2-20).

Groundwater in the southern portion of Vandenberg AFB includes a portion of the Lompoc Terrace Basin and the Lompoc Plain Basin. Smaller, isolated aquifers are found beneath alluvial fans on the base or in perched aquifers at higher elevations.

Water Quality

Some surface water quality sampling was conducted on the base by the U.S. Air Force in 1991. This sampling determined that off-base agricultural runoff has led to elevated total dissolved solids, phosphates, and nitrates (U.S. Department of the Air Force, 1998). Water quality is maintained through adherence to the 30 SW Water Quality Plan, Wastewater Management Plan, and Stormwater Pollution Prevention Plan, all updated in August 2000.

Water Use

As discussed in section 3.3.8, the Vandenberg AFB water supply primarily comes from surface water purchased from the California Department of Water Resource's State Water Project. Four wells that tap the San Antonio Creek groundwater basin are only used as a supplemental supply. (U.S. Department of Defense, Missile Defense Agency, 2003a)

3.4 OPEN OCEAN

3.4.1 AIRSPACE—OPEN OCEAN

Section 3.1.2 provides a general description of airspace.

Region of Influence

The ROI is defined as the airspace overlying the open Pacific Ocean within the Point Mugu Sea Range that could potentially be affected by the Proposed Action.

Affected Environment

Stretching from offshore San Luis Obispo County to offshore Los Angeles County the Point Mugu Sea Range consists of 93,200 square kilometers (36,000 square miles) and encompasses the northern Channel Islands and San Nicolas Island (Channel Islands National Marine Sanctuary Advisory Council, 1999). The airspace overlying the Point Mugu Sea Range includes the restricted areas previously mentioned in section 3.1.2 and eight warning areas. The majority of the airspace over the Sea Range is composed of the warning areas: W-289, W-289N, W-290, W-412, W-532, W-537, W-60, and W-61 (figure 3-6). Each warning area extends from the surface (sea level) to an unlimited altitude. All or a portion of these areas are in international airspace and active on an intermittent basis in coordination with the FAA. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a) Areas within international airspace follow the procedures of the International Civil Aviation Organization (ICAO) (U.S. Department of Defense, Missile Defense Agency, 2002c). The FAA acts as the United States agent for aeronautical information to the ICAO, and air traffic in the ROI is managed by the Los Angeles ARTCC (U.S. Department of Defense, Missile Defense Agency, 2003b).

Civilian aircraft traverse the Sea Range via the use of formal airway route structures, CAEs. Although aircraft using IFR clearances under the control of the Los Angeles ARTCC most often fly via CAEs, aircraft predominantly fly using VFRs with a see-and-avoid concept under clear visibility conditions, since most of the Sea Range is over international waters. Four CAEs exist within the Point Mugu Sea Range and one is adjacent to the range's southern boundary (figure

3-6). CAEs 1155 and 1176 are generally closed to civil traffic for operations from Vandenberg AFB. CAEs 1316 and 1318 are closed daily during daylight hours and occasionally on weekends. CAE 1177 is rarely closed. Through a Memoranda of Agreement, the Point Mugu Sea Range and the FAA stipulate the conditions under which CAEs can be closed to civil traffic and established measures to significantly minimize air traffic disruption. Under most circumstances at least one CAE must remain available for use by general aviation and commercial air carrier. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a)

Military aircraft routinely operate in international airspace over the Point Mugu Sea Range. Although every individual range area within the Sea Range experiences aircraft operations, range areas near San Nicolas Island are the most active. Aircraft taking off from Point Mugu have IFR flight clearance from the FAA Air Traffic Control Service provided by the military tower at Point Mugu. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a)

The procedures for scheduling each portion of airspace are performed in accordance with letters of agreements with the controlling FAA facility, Los Angeles ARTCC. Schedules are provided to the FAA facility as agreed between the agencies involved. Aircraft transiting the open ocean ROI on one of the low-altitude airways and/or high altitude jet routes that would be affected by flight test activities, would be notified of any necessary rerouting before departing their originating airport and would therefore be able to take on additional fuel before takeoff. Real-time airspace management involves the release of airspace to the FAA when the airspace is not in use or when extraordinary events occur that require drastic action, such as weather requiring additional airspace. (U.S. Department of Defense, Missile Defense Agency, 2002c)

The FAA Los Angeles ARTCC are responsible for air traffic flow control or management to transition air traffic. The Los Angeles ARTCC provide separation services to aircraft operating on instrument flight rules flight plans and principally during the en route phases of the flight. They also provide traffic and weather advisories to airborne aircraft. By appropriately containing hazardous military activities within the over-water warning areas or by using altitude reservation (ALTRV) procedures in the Temporary Operating Area, non-participating traffic is advised or separated accordingly. (U.S. Department of Defense, Missile Defense Agency, 2002c)

Restricted areas around San Nicolas Island and Point Mugu are the only regulated locations for activities in the Point Mugu Sea Range. Potential hazardous military operations avoid routinely traveled air and sea space. In addition, to ensure the safety of the public or any non-participants, military operation areas are monitored to prevent encroachment into hazard zones. (Channel Islands National Marine Sanctuary Advisory Council, 1999)

3.4.2 BIOLOGICAL RESOURCES—OPEN OCEAN

Marine biology of the open Pacific Ocean consists of the animal and plant life that lives in and just above the surface waters of the sea and its fringes, physical and chemical properties of the ocean, biological diversity, and the characteristics of its different ecosystems or communities.

Region of Influence

The ROI includes areas of the Point Mugu Sea Range that would be affected by noise, debris, and emissions resulting from launches of target missiles and the AWS. The Point Mugu Sea Range consists of 93,200 square kilometers (36,000 square miles) of ocean that provides diverse habitat for marine life. No coral reefs are found within the temperate waters of the sea range.

Affected Environment

Physical and Chemical Composition of the Pacific Ocean

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. Most areas of the Pacific maintain a temperature of 4˚C (39.2˚F). The shape of the California coastline south of Point Conception creates the Southern California Bight, a broad ocean embayment. The Southern California Bight is influenced by the cold water California Current flowing southward and the warm water California Countercurrent flowing northward. The frequent mixing of these currents results in varied marine life year round. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a)

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.

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 101 meters (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. Classification of the Pacific Ocean zones is based upon 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. Species common to the littoral, coastal, and offshore zones are discussed above under biological resources of the individual installations being proposed for use. This section discusses the pelagic (open ocean) zone and the benthic environment.

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. Approximately 2 percent of marine species live in the open ocean. Benthic (bottom of the sea floor) communities are made up of marine organisms, such as kelp, sea grass, clams, and other species that live on or near the sea floor. Approximately 98 percent of the species of animals and plants in the ocean live in the benthic area. Less than 1 percent of benthic species live in the deep ocean below 2,000 meters (6,562 feet).

The Point Mugu Sea Range includes two Essential Fish Habitat zones: coastal pelagic and groundfish. Both extend along the west coast of the United States from the coastline out to 320 kilometers (200 miles) offshore. Approximately 480 species of fish inhabit the Southern California Bight. Commercially harvested species include Pacific sardine, Pacific mackerel, skipjack and yellowfin tuna, rockfish, northern anchovy, thresher shark, and Dover sole. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a)

Of the 34 species of cetaceans identified in the Southern California Bight, at least 9 are found in the Point Mugu Sea Range in moderate or high numbers year round or during migration. These are the Dall's porpoise, Pacific white-sided dolphin, Risso's dolphin, bottlenose dolphin, short-beaked and long-beaked common dolphins, northern right whale dolphin, Cuvier's beaked whale, and the delisted gray whale. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a)

Six species of pinnipeds have been identified in the Point Mugu Sea Range. The four most abundant in the area are the harbor seal, northern elephant seal, California sea lion, and northern fur seal. These four also breed on land within the range. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a)

Threatened and Endangered Species

Four species of sea turtles have been identified within the Point Mugu Sea Range (table 3-13). Green and olive ridley (*Lepidochelys olivacea*) sea turtles have been observed in waters less than 50 meters (164 feet) deep. Green sea turtles are sighted year round in the Sea Range, with more numbers being encountered from July through September. Olive ridley sea turtles are present in the Sea Range but they are rarely encountered. Loggerhead and leatherback sea turtles have been observed in a wider range of depths up to 1,000 meters (3,280 feet). Juvenile loggerhead sea turtles are common in the Sea Range, with the frequency of sighting increasing from July through September. Adult loggerheads are rare. Leatherback sea turtles are commonly seen in the Sea Range during July, August, and September. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a)

Two less common pinnipeds in the Point Mugu Sea Range are the threatened Guadalupe fur seal (*Arctocephalus townsendi*) and Steller sea lion (*Eumetopias jubatus*). The Guadalupe fur seal is an occasional visitor, but no Steller sea lions have been seen since 1983. Except for the small number remaining of the translocated population of sea otters in the vicinity of San Nicolas Island, few sea otters are expected to be located within the Point Mugu Sea Range since they prefer relatively shallow waters. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a)

Table 3-13: Listed Species Known or Expected to Occur in the Point Mugu Sea Range

Scientific Name	Common Name	Status	
		State	Federal
Reptiles			
Caretta caretta	Loggerhead sea turtle	--	T
Chelonia mydas	Green sea turtle	--	T
Dermochelys coriacea	Leatherback sea turtle	--	E
Lepidochelys olivacea	Olive ridley sea turtle	--	E
Mammals			
Enhydra lutris nereis	Southern sea otter	--	T
Balaenoptera borealis	Sei whale		E
Balaenoptera musculus	Blue whale	--	E
Balaenoptera physalus	Fin whale		E
Megaptera novaeangliae	Humpback whale	--	E
Physeter macrocephalus	Sperm whale	--	E

Source: Vandenberg Air Force Base, 1997; California Department of Fish and Game, 2003.

NOTES:

E = Endangered
T = Threatened

Several cetaceans listed as threatened or endangered may also be found in Point Mugu Sea Range. These include the sei (*Balaenoptera borealis*), blue, fin, sperm (*Physeter macrocephalus*), and humpback whales. There is no estimate of stock numbers of the sei whale in California waters, but it is assumed to be small. There are about 1,600 blue whales and 1,500 fin whales in the Sea Range during summer. Approximately 3,740 to 5,000 sperm whales may be present in the Sea Range in autumn and winter. Approximately 220 feeding humpback whales are located in the Sea Range during summer. It is unlikely that the northern right whale (*Eubalaena glacialis*) would be encountered in the Sea Range. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a)

Environmentally Sensitive Habitat

Channel Islands National Marine Sanctuary. The Channel Islands National Marine Sanctuary encompasses the water within 11 kilometers (6 nautical miles) of the northern Channel Islands (San Miguel, Santa Rosa, Santa Cruz, Anacapa, and Santa Barbara Islands). It was established in 1980 to protect areas off the southern California coast that contain significant cultural and natural resources. It is located over the Continental Shelf where water is generally less than 110 meters (360 feet) deep. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a; National Oceanic and Atmospheric Administration, Channel Islands National Marine Sanctuary, 2003)

3.4.3 HAZARDOUS MATERIALS AND WASTE—OPEN OCEAN

Section 3.1.6 includes a general description of hazardous materials and hazardous waste.

Region of Influence

The ROI for hazardous materials/waste from the sea launch is limited to the MLP, where hazardous materials may be used and hazardous waste could accumulate.

Affected Environment

The Act to Prevent Pollution from Ships was amended by the Marine Plastic Pollution Research and Control Act of 1987, which implemented the provisions of Annex V of the International Convention for the Prevention of Pollution from Ships relating to garbage and plastics. Annex V and the regulations implementing it apply to all vessels, whether seagoing or not, regardless of flag, on the navigable waters of the United States and in the exclusive economic zone of the United States. It applies to U.S. flag vessels wherever they are located.

Under the regulations implementing the Act to Prevent Pollution from Ships, as amended, and the Marine Plastic Pollution Research and Control Act, the discharge of plastics, including synthetic ropes, fishing nets, plastic bags, and biodegradable plastics, into the water is prohibited. Discharge of floating dunnage, lining, and packing materials is prohibited in navigable waters and in areas offshore less than 46.3 kilometers (25 nautical miles) from the nearest land. A slurry of seawater, paper, cardboard, or food waste that is capable of passing through a screen with openings no larger than 12 millimeters (0.4 inch) in diameter may not be discharged within 5.6 kilometers (3 nautical miles) of land. Metal and glass that have been shredded and bagged so as to ensure negative buoyancy may not be discharged within 22.2 kilometers (12 nautical miles) of land (The University of North Carolina at Chapel Hill Law Library, 2003). There are some exceptions for emergencies. Under the Act to Prevent Pollution from Ships, the definition of ship includes fixed or floating platforms. There are separate garbage discharge provisions applicable to these units. For these platforms, and for any ship within 500 meters (1,640 feet) of these platforms, disposal of all types of garbage is prohibited. Additionally, all manned, oceangoing U.S. flag vessels of 12.2 meters (40 feet) or more in length engaged in commerce, and all manned fixed or floating platforms subject to the jurisdiction of the United States, are required to keep records of garbage discharges and disposals (National Oceanic and Atmospheric Administration, Coastal Services Center, 2003).

The U.S. Coast Guard serves as Vice Chair to the National Response Team that is chaired by the EPA. The National Response Center serves as the sole national point of contact for reporting all oil, chemical, radiological, biological, and etiological discharges into the environment anywhere in the United States and its territories. The National Response Team along with Regional Response Teams are the federal component of the National Response System, which responds to emergency discharges of oil and releases of chemicals. The U.S. Coast Guard Pacific Area District 11 (California) serves the Pacific Ocean ROI.

For missile flight tests using the MLP, hazardous materials and waste management is conducted in accordance with all applicable state and federal regulations as well as Point Mugu Sea Range and U.S. Navy standard operating procedures.

3.4.4 HEALTH AND SAFETY—OPEN OCEAN

Region of Influence

The ROI for health and safety issues associated with the sea launch is the LHA and flight corridor. The Pacific Ocean ROI is defined as the overwaters, as well as the areas extending from the sea surface to the ocean floor that could be potentially affected by the Proposed Action. The ROI is the Point Mugu Sea Ranges in the central north Pacific Ocean. A detailed discussion of airspace and jet routes occupying the Pacific Ocean is provided in section 3.4.1.

Affected Environment

The affected health and safety environment for the Pacific Ocean Area is described in detail within each potential range location in terms of its principal attributes, namely, range control procedures and verification of ocean area clearance procedures.

U.S. Coast Guard Pacific Area District 11 (California) serves the Pacific Ocean ROI. Warning areas are established in international airspace and waters to contain activity that may be hazardous, and to alert pilots and captains of nonparticipating vessels to the potential danger. For missile flight tests in the open ocean (mid-Pacific), Point Mugu Sea Range personnel, in coordination with Vandenberg AFB, Yuma AFB and other assets, are charged with surveillance, clearance, and real-time range safety. The Mission Flight Control Officer is solely responsible for determining range status and setting RED (no firing) and GREEN (range/area is clear and support units are ready to begin the event) range firing conditions. Point Mugu Sea Range uses RCC Standard 321-02 (*Common Risk Criteria for National Test Ranges*) to set requirements for minimally-acceptable risk criteria to occupational and non-occupational personnel, test facilities, and non-military assets during range operations. Under RCC Standard 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. (U.S. Department of Defense, Missile Defense Agency, 2002c)

Point Mugu Sea Range range safety officials ensure operational safety for missiles and other hazardous military operations. For such operations in the open ocean, dedicated warning NOTAMs and NOTMARs are published several days earlier. The range safety clearance procedures used by Point Mugu Sea Range are some of the most rigorous because of the multi-sensors used. Before an operation is allowed to proceed, the range area is verified cleared of non-participants using inputs from ship sensors, visual surveillance of the range/area from aircraft, and radar data. In addition, all activities must be in compliance with DoD Directive 4540.1 (*Use of Airspace by US Military Aircraft and Firings Over the High Seas*) which specifies procedures for conducting aircraft operations and for missile/projectile firings. (U.S. Department of Defense, Missile Defense Agency, 2002c)

3.4.5 NOISE—OPEN OCEAN

Section 3.1.10 includes a general description of noise.

Region of Influence

The ROI includes areas of the open ocean that may be affected by launch noise.

Affected Environment

Baseline or ambient noise levels on the ocean surface, not including localized noise attributed to shipping, air traffic, sonic booms and missile launches, are 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 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. It is anticipated that the loudest surface noise comes from lightning storms. Thunder, which can produce 120 to 140 dB peak sound pressure level, can occur repeatedly as a storm passes over. (U.S. Department of Defense, Missile Defense Agency, 2002c)

Common noise occurrences on the open ocean associated with human sources varies and is anticipated to be associated with ship and vessel traffic. This 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. (U.S. Department of Defense, Missile Defense Agency, 2002c)

Some of the loudest underwater sounds are most likely to originate from ships and some marine mammals. A humpback whale, for example, can produce moaning sounds up to 175 dB. Motors from a passing supertanker may generate 187 dB of low frequency sound. (U.S. Department of Defense, Missile Defense Agency, 2002c)

3.4.6 WATER RESOURCES—OPEN OCEAN

Section 3.1.11 includes a brief overview of water resources and the related federal regulatory framework.

Region of Influence

The ROI for water resources includes the open Pacific Ocean area within the Point Mugu Sea Range.

Affected Environment

Surface Water and Groundwater Resources

Point Mugu Sea Range consists of 93,200 square kilometers (36,000 square miles) of ocean encompassing the Santa Barbara Channel and the Channel Islands, including San Nicolas. The cold, temperate waters of the California Current flow from the north to meet the warmer waters of the California Countercurrent near Point Conception. This process moves waters from the southeast to the northwest, through the southern Channel Islands toward the mainland. This results in a distribution of cold water and warm water marine flora and fauna which thrive in these transition zones and overlap in distribution.

Surface water temperatures typically range from approximately 12°C (54°F) in the winter to 21°C (70°F) in the summer. Surface water temperatures are also affected by upwelling, climatic conditions, and latitude.

Chemical features associated with marine water quality consist of hydrogen ion concentration (pH), dissolved oxygen, and various nutrients. Most ions present in marine water consist of sodium, chloride, potassium, calcium, magnesium, and sulfate.

The marine environment has a high buffering capacity due in part to the dissolved elements such as carbon and hydrogen. Typically, the pH of seawater remains between 7.5 and 8.5.

Marine surface water tends to have a high dissolved oxygen level as a result of photosynthetic activity and wave mixing. The dissolved oxygen levels are usually between 5.4 and 5.9 milliliters per liter, while deeper levels are typically between 0.4 and 0.6 milliliters per liter. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a)

Water Quality

The Point Mugu Sea Range complies with the Water Quality Control Plan for Ocean Waters of California. The plan establishes beneficial uses and water quality objectives for waters of the Pacific Ocean near the California coast. The plan has established effluent quality requirements and management policies and specific waste discharge prohibitions. It also contains a prohibition against discharge of specific hazardous substances and sludge, bypass of untreated waste, and discharges that impact Areas of Special Biological Significance. Areas from Latigo Point to Mugu Lagoon and waters surrounding San Nicolas Island and Begg Rock are designated as Areas of Special Biological Significance. Temporary discharges can be permitted if they will not compromise water quality.

Most of the marine water pollution within Point Mugu Sea Range originates from municipal discharges. The distance from the mainland, the sheer volume of the ocean, and the shelves and basins where many pollutants settle ensure high water quality in the range. Increases in oil leaks, oil spills, drill mud, sediment, debris, and sludge have lead to a recent decrease in water quality.

The Clean Water Act prohibits the discharge of hazardous substances into or upon U.S. waters out to 370 kilometers (200 nautical miles). Also, shipboard waste handling procedures for commercial and U.S. Navy vessels govern the discharge of hazardous wastes as well as non-hazardous waste streams. These categories include “blackwater” (sewage); “greywater” (leftover cleaning water); oily wastes; garbage (plastics, non-plastics, and food-contaminated); hazardous wastes; and medical wastes. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a)

3.5 ENVIRONMENTAL JUSTICE

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, was issued 11 February 1994. Objectives of the Executive Order include development of federal agency implementation strategies, identification of minority and low-income populations where proposed federal actions have disproportionately high and adverse human health and environmental effects, and participation of minority and low-income populations. Although an environmental justice analysis is not mandated by NEPA, DoD has directed that NEPA will be used as the primary approach to implement the provision of the Executive Order.

The 2000 Census of Population and Housing reports numbers including both minority and poverty residents. Minority populations included in the census are identified as Black or African

American; American Indian, Eskimo or Aleut; Asian; Native Hawaiian or Pacific Islander; Hispanic or Latino; or other. Poverty status (used to define low-income status) is reported as the number of families with income below poverty level.

Region of Influence

The ROI for environmental justice includes the Census Designated Places (Ventura and Santa Barbara counties) incorporating Point Mugu and Vandenberg AFB, respectively; San Nicolas Island has no permanent non-military population and is thus excluded from Environmental Justice considerations.

Affected Environment

Based upon the 2000 Census of Population and Housing, the Ventura County Census Area has a population of 753,197; of that total, 9.2 percent were low income, and 30.1 percent were minority (U.S. Census Bureau, 2003h). The Santa Barbara Census Area has a population of 399,347. Of that total, 14.3 percent were low income and 27.3 percent were minority. (U.S. Census Bureau, 2003g)

3.6 SUPPORT LOCATIONS

3.6.1 HILL AIR FORCE BASE, UTAH

The SRALT solid booster would originate from Hill AFB, Utah. The SRALT motor would be shipped from Hill AFB to Yuma Proving Ground, Arizona via truck. These types of activities are common at Hill AFB. The *Development and Demonstration of the Long Range Air Launch System Environmental Assessment*, October 2002, and the *Environmental Assessment for the Minuteman III Propulsion Replacement Program* address these types of activities at Hill and conclude that no significant adverse impacts are expected. All standard operating procedures would be followed, including Air Force Manual 91-201 (*Explosives Safety Standard)*, DOT regulations, and applicable service regulations. Emergency guideline procedures, including those prescribed in AFI 32-4002 (Hazardous Material Emergency Planning and Response Program), are in place in the unlikely event of an accident. (U.S. Department of Defense, Missile Defense Agency, 2002c) No unusual, adverse impacts are expected during the ASIP operations. Therefore, this location is eliminated from further analysis.

3.6.2 REDSTONE ARSENAL, ALABAMA

The LFTS and the liquid propellant would be shipped from Redstone Arsenal, Alabama, either to Concord Naval Weapons Station, California, or Vandenberg AFB. The Redstone Technical Test Center is in charge of transporting liquid propellant for loading into military vans for shipment off Redstone Arsenal. Section 13.2 of *Standing Operating Procedure for Liquid Rocket Propellant Sampling* (U.S. Army Redstone Technical Test Center, Redstone Arsenal, 1999) covers the transporting of propellant on Redstone Arsenal. These types of activities are common at Redstone Arsenal. All other appropriate procedures would be followed, including DOT regulations and applicable service regulations. No unusual, adverse impacts are expected. Therefore, this location is eliminated from further analysis.

3.6.3 CONCORD NAVAL WEAPONS STATION, CALIFORNIA

Concord Naval Weapons Station, California would be the integration site for the LFTS. The missile itself and the liquid propellant would be shipped from Redstone Arsenal, Alabama, to Concord Naval Weapons Station. Once at Concord Naval Weapons Station, the LFTS would be integrated and loaded upon the MLP. Existing standard operating procedures, including DOT regulations and applicable service regulations, the *Oil and Hazardous Substance Spill Contingency Plan* (2003), and the *Hazardous Waste Management Plan*, Appendix A, to Weapon Station Seal Beach Detachment Concord Instruction 5090.B would be modified if necessary and implemented. Prior to the initiation of the action, standard operating procedures, including for health and safety, would be developed to address fueling of missiles on the MLP while docked at Concord. No unusual, adverse impacts are expected. Therefore, this location is eliminated from further analysis.

3.6.4 YUMA PROVING GROUND, ARIZONA

Yuma Proving Ground, Arizona would be the integration site for the SRALT. The air launch target motor would be shipped to Yuma via truck from Hill AFB, Utah, and the other SRALT components would arrive by various methods from various contractor locations. The SRALT would then be integrated at Yuma and then shipped via air to either Point Mugu or directly to the flight test area where it will be launched. These types of activities are common at Yuma. The *Development and Demonstration of the Long Range Air Launch System Environmental Assessment*, October 2002, and the *Final Range Wide Environmental Impact Statement*, July 2001, address these types of activities at Yuma and conclude that no significant impacts are expected. All standard operating procedures would be followed, including DOT regulations and applicable service regulations. In accordance with the Hazardous Materials Transportation Act, tests that require transport and storage of hazardous materials are coordinated with the Material Test Directorate, Range Safety, and Environmental programs prior to transport. (U.S. Army Yuma Proving Ground, 2001) No unusual, adverse impacts are expected during ASIP operations. Therefore, this location is eliminated from further analysis.

3.6.5 PORT HUENEME, CALIFORNIA

The AWS may be shipped from Haifa, Israel, to the United States via sea. If this method is selected, the first port of entry would be Port Hueneme, California, for U.S. Customs inspection. The AWS would then be sent to San Nicolas Island, California, and possibly to Point Mugu, California, depending on the deployment method selected. These types of activities are typical of operations at Port Hueneme and all standard operating procedures would be followed, including DOT regulations and applicable service regulations. No unusual, adverse impacts are expected. Therefore, this location is eliminated from further analysis.

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4.0
ENVIRONMENTAL CONSEQUENCES

4.0 ENVIRONMENTAL CONSEQUENCES

This chapter describes the potential environmental consequences of the Proposed Action and alternatives by comparing these activities with the potentially affected environmental components. Sections 4.1 through 4.4 provide discussions of the potential environmental consequences of, and possible mitigations for, these activities. The amount of detail presented in each section is proportional to the potential for impacts. Sections 4.5 through 4.14 provide discussions of the following with regard to proposed program activities: environmental effects of the No-action Alternative; adverse environmental effects that cannot be avoided; conflicts with federal, state, and local land use plans, policies, and controls for the area concerned; energy requirements and conservation potential; irreversible or irretrievable commitment of resources; relationship between short-term use of the human environment and the maintenance and enhancement of long-term productivity; natural or depletable resource requirements and conservation potential; and Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations*, and Executive Order 13045 as amended by Executive Order 13229, *Federal Actions to Address Protection of Children from Environmental Health Risks and Safety Risks*.

To assess the potential for and significance of environmental impacts from the proposed program activities, 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 the proposed activities.

To help define the affected environment and determine the significance of program-related effects, written, personal, and telephone contacts were made with applicable agencies and installation offices. Chapter 7.0 provides a list of those contacted.

Activities associated with launching the ASIP and target missiles would result in a potential for impacts similar to or less than those discussed in prior NEPA documents listed in section 1.4. The results of analysis provided in these documents are summarized as applicable in the following paragraphs for specific resource sections and incorporated by reference.

4.1 SAN NICOLAS ISLAND

4.1.1 AIR QUALITY—SAN NICOLAS ISLAND

4.1.1.1 System Transportation and Launch Preparation Activities

The impacts from system transportation and preparation activities at San Nicolas Island on air quality would be minimal. The transportation of AWS components to San Nicolas Island would be completed through either commercial sealift or airlift. This transportation would have no measurable impact on air quality and would be conducted in accordance with DOT regulations.

Preparation activities could include receiving, initial inspection, temporary storage, comprehensive inspections, transportation to launch location, mounting of the missile, and

equipment cleaning. These activities could involve the short-term emissions of volatile organic compounds or hazardous air pollutants. It is anticipated that the amounts would fall well below the minimal levels of the relevant federal and state regulations.

Fiber optic cable would be installed aboveground or underground. In the event that the cable is installed underground, additional ground would be disturbed. Emission from construction for underground installation would be primarily nitrogen oxide, carbon monoxide, and PM-10. Although no significant PM-10 emissions would be anticipated, standard dust reduction measures would be implemented, including dampening soil and covering stockpiles if necessary. Proper tuning and preventive maintenance of construction vehicles would serve to minimize exhaust emissions and maximize vehicle performance.

Permanent facility construction would not be required for any AWS components; all would utilize existing concrete pads or graded areas. Minor construction activities would be required for existing facilities. In the event that pouring of additional asphalt would be necessary at existing facilities, further air analysis would occur and operations would be subject to Ventura County Air Pollution Control District permitting requirements for a stationary source. These activities could produce negligible, short-term impacts to air quality in the immediate vicinity from construction vehicle emissions and fugitive dust. The impact to regional air quality is anticipated to be negligible.

4.1.1.2 Flight Testing and Test Mishaps

Emissions from rocket and missile launches are not considered a stationary source. The Arrow interceptor propellant consists of HTPB, ammonium perchlorate, and aluminum powder. The levels of exhaust emissions of the interceptor would be comparable to those typically produced at San Nicolas Island and within the bounds of launch vehicles previously analyzed in the Naval Air Warfare Center Weapons Division EIS. Due to the mobile nature of the missile itself, only a small portion of the launch exhaust would be emitted near the ground, and these emissions would have a minimal impact on regional air quality.

In the event of a testing mishap, including termination of the flight on the launcher/launch pad, termination of a flight shortly after liftoff, or termination of a flight after it has exited the vicinity of the launcher/launch pad, the potential resulting fire would cause localized, short-term impacts to air quality in the form of combustion by-products and potentially hazardous fumes. Provisions would be made for the availability of fire suppression, hazardous materials emergency response, and emergency medical teams during launch operations. These provisions would result in only a short-term, localized impact to regional air quality.

Electricity to the Arrow sites at San Nicolas would be supplied by two separate electrical power systems. The range power grid or a generator would be used to supply power to the administrative electrical system for the launch site. A tactical generator would be used for the AWS test operational components. Generator engines associated with ASIP are exempt from permit requirements because the equipment qualifies as Military Tactical Support Equipment under California's Portable Equipment Registration Program. The tactical generators would be registered under the program. As such, they would not be expected to impact air quality.

4.1.1.3 Post Launch Test Activities

Post-launch activities would include the dismantling and removal of all AWS equipment and assets brought to San Nicolas Island. This removal would cause a negligible, short-term impact to air quality resulting from slightly increased vehicular emissions and localized amounts of fugitive dust (PM-10).

4.1.1.4 Cumulative Impacts

No exceedances of air quality standards or health-based standards of non-criteria pollutants are anticipated. Missile launches are short-term, discrete events, thus allowing time between launches for emission products to be dispersed.

4.1.2 AIRSPACE—SAN NICOLAS ISLAND

4.1.2.1 System Transportation and Launch Preparation Activities

System transportation and launch preparation activities would involve transportation and storage of missile components and Arrow FCC and FCR support equipment to San Nicolas Island. Transportation, storage, and other minimal launch preparation activities would not restrict a clear view of runways, helipads, taxiways, or traffic patterns from the airport air traffic control tower, decrease airport capacity or efficiency, affect future VFR or IFR, or affect the usable length of an existing or planned runway. They would also not constitute an obstruction to air navigation. Therefore, no impacts to airspace would occur from transportation or launch preparation activities associated with San Nicolas Island.

4.1.2.2 Flight Testing and Test Mishaps

ASIP launches would be within Restricted Airspace R-2535 A and B, which would be closed to other operations that might interfere with the ASIP flight test. ASIP test flight impacts, compared to the Point Mugu Sea Range average of 5,000 test operations per year, are not considered significant.

Only a preflight or early flight malfunction resulting in flight termination within the ROI would have any impact on San Nicolas Island. In the event of an early flight termination, missile and/or debris recovery would follow applicable range procedures as directed by the Range Safety Officer to minimize any possible impact to regional airspace.

4.1.2.3 Post-Launch Test Activities

After the second flight test of each caravan, the AWS equipment would be dismantled and transported in the reverse manner as shipped to the United States. Such impacts to airspace would be the same as described in section 4.1.2.1. In addition, no post-launch impacts are expected to occur concerning the release of restricted airspaces and warning areas to normal non-hazardous use. Therefore, no impacts to regional airspace would be expected from post-launch activities.

4.1.2.4 Cumulative Impacts

All missile launches, missile intercepts, and lethal debris impacts would take place in existing restricted area or warning area airspaces that would be cleared of non-participating aircraft. Missile launches are short-term, discrete events, and the joint-use restricted/warning area airspace would be released to other users after each test flight. The required scheduling process for the use of airspace within restricted and warning areas would obviate the potential for cumulative impacts; therefore, cumulative impacts to airspace use are considered not significant in this scenario. The impact on the air traffic control system could be reduced by timely and responsive scheduling during low-traffic hours. The required coordination procedures with the FAA and scheduling requirements of the test range minimize any potential impacts so that no additional mitigation measures have been identified as necessary for the proposed test flights.

4.1.3 BIOLOGICAL RESOURCES—SAN NICOLAS ISLAND

The primary proposed activities that may have a potential effect on vegetation and wildlife include pre-launch activities such as launch site preparation, launch activities, and post-launch activities. Impacts that could result from launch site preparation 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, and debris impacts.

4.1.3.1 System Transportation and Launch Preparation Activities

System Transportation

As stated in chapter 2, a contracted commercial sea vessel and/or commercial aircraft would transport the AWS from Israel to San Nicolas Island. AWS components and equipment flown in would be offloaded at the airfield on San Nicolas Island and then transported by road to emplacement sites. AWS components and equipment transported by sea would arrive at the barge landing site on the island and then transported by road to emplacement sites. Transportation activities would occur on routes and/or roads currently used for similar maneuvers and would follow existing applicable regulations.

All transportation of equipment and materials such as fuels would be conducted in accordance with DOT regulations and applicable service regulations. Adherence to standard operating procedures contained in the San Nicolas Island *Spill Prevention, Control, and Countermeasures Plan* for spill prevention, containment, and control measures while transporting equipment and materials would preclude impacts to biological resources. The Environmental Planning and Management Department responds to spills over 19 liters (5 gallons) on pavement and any spill on soil or water. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a)

Mitigation and monitoring procedures set forth in the San Nicolas Island Biological Assessment associated with the Point Mugu Sea Range EIS would be implemented. One such procedure is the thorough cleaning and inspection of construction equipment, vehicles, and supplies before their shipment to San Nicolas Island to reduce the potential for the introduction of non-native species. Temporary staging areas for equipment would be sited in areas with a low density of island night lizards. No impacts to biological resources are anticipated.

Launch Preparation Activities

Vegetation

No permanent facility construction would be required for the ASIP. Minor modifications required as part of proposed ASIP activities would require little ground disturbance and resultant impact to vegetation. All AWS components and support equipment would be placed on graded and packed earth or existing concrete pads where possible. An area of approximately 0.1 hectare (0.25 acre) would require disturbance in preparation for the proposed activities, which would have a minor impact on vegetation. In the event that fiber optic cable is installed underground, additional ground disturbance would occur, potentially greater than 0.4 hectare (1 acre). It is anticipated that the additional disturbance would also have a minor impact on vegetation. Clearing for support equipment would occur near the SLAM Site or the Unnamed Orange Bunker if the Rock Crusher Site is chosen as the launch site and at the Miscellaneous Pads if the Vandal Launch Pad or the Miscellaneous Pads site is selected for interceptor launches. Additional asphalt would need to be poured at existing Rock Crusher Site N807 pad area to achieve required grade levels. State threatened plants would be avoided. Provisions for pylons would need to be added to the Vandal Launch Pad or steel matting used. The existing concrete pad at the Miscellaneous Pads or Mobile 1 site may need to be extended. Pylons would need to be sunk to a depth of several feet within the existing pad and extension or steel matting used instead of concrete pads for the FCR. Clearing and leveling around the Unnamed Bunker would be required for facility emplacement. State sensitive plant species would be avoided to the extent practicable when siting AWS components and when modifying the sites selected. There are no federally threatened or endangered plants on the island.

Wildlife

Launch preparation activities would implement procedures to minimize the potential for soil erosion and are not expected to adversely affect waterbodies, including Essential Fish Habitat. Staging areas would be sited in areas with low island night lizard densities and would be sited to avoid island night lizard habitat.

Launch preparation activities would be limited in duration, and no direct physical auditory changes are anticipated. Typically the noise at 15 meters (50 feet) from a construction site does not exceed an equivalent sound level of 90 dBA. Most of the site preparation noise and human activity would be caused by truck traffic to and from the launch site and the potential short-term use of heavy machinery. Site preparation may disturb wildlife in the immediate area. 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).

Disturbance would be restricted mainly to areas within 15 meters (50 feet) from the construction site. The increased presence of personnel would tend to cause birds and other mobile species of wildlife to temporarily evacuate areas subject to the highest level of noise. Additional similar habitat is nearby for displaced wildlife.

4.1.3.2 Flight Testing and Test Mishaps

Applicable regulatory agencies were consulted, as part of the Naval Air Warfare Center Weapons Division EIS process, on the potential impacts to biological resources.

Vegetation

Nominal flight tests are not expected to substantially affect vegetation. All applicable U.S. service and DOT safety regulations and OSHA requirements would be followed. Compliance with these regulations would minimize the potential for accidental spills, as well as provide the means for mitigating or minimizing effects to vegetation if an accident were to occur. Nominal launch activities during dry conditions could result in the deposition of very small amounts of aluminum oxide from missile exhaust. Most of the aluminum oxide would be suspended in air and dispersed over extremely large areas. Under natural conditions, the chemical is not a source of toxic aluminum; the EPA has determined that nonfibrous aluminum oxide, as found in solid rocket motor exhaust, is nontoxic (National Aeronautics and Space Administration, 1990). Rain within 2 hours of launch could cause hydrogen chloride to be deposited in small quantities. This chemical, when emitted during solid propellant missile launches for very large flight vehicles (such as the space shuttle), is known to injure plant leaves. However, the potential impact on vegetation from the proposed launch of the smaller AWS is expected to be slight. (U.S. Department of the Air Force, 1997)

Ammonium perchlorate is commonly used as an oxidizer in solid rocket motor propellants. Almost all of the solid fuel and oxidizer is burned during nominal launches. It is assumed that only a small amount of unburned propellant is left as a residue in spent solid rocket motor cases. In the event of a launch mishap, the debris generated by the destruction of the missile would contain some unburned solid propellant, including ammonium perchlorate. This ammonium perchlorate could be released to the ground or surface water from scattered pieces of burning propellant. HTPB could be biologically degraded over time. Powdered aluminum would oxidize to aluminum oxide, which is non-toxic at the prevailing pH in the adjacent surface waters. (Space and Missile Systems Center, Air Force Materiel Command, 2001; U.S. Department of the Air Force, 2000)

Fire from a test mishap could potentially adversely affect vegetation near the launch area, but such fires are extinguished quickly as a result of the implementation of standard fire prevention procedures.

Wildlife

Emissions

Nominal launch activities during dry conditions could result in the deposition of very small amounts of aluminum oxide from missile exhaust. Most of the aluminum oxide would be suspended in air and dispersed over extremely large areas; the amount deposited in surface waters would have little effect. Under natural conditions, the chemical is not a source of toxic aluminum; the EPA has determined that nonfibrous aluminum oxide, as found in solid rocket motor exhaust, is nontoxic (National Aeronautics and Space Administration, 1990).

Rain within 2 hours of launch could cause hydrogen chloride to be deposited in small quantities. This chemical, when emitted during solid propellant missile launches for very large flight vehicles (such as the space shuttle), is known to affect wildlife. However, the potential impact on vegetation and wildlife from the proposed launch of the smaller AWS is expected to be slight. The small quantities of hydrogen chloride that could potentially be deposited are not expected to injure or affect wildlife. The hydrogen chloride would cause a localized change in the pH of adjacent surface waters for only a short duration, and any alteration of the water's pH would be almost imperceptible. (U.S. Department of the Air Force, 1997)

Noise

The primary potential for impacts to wildlife would be from the noise created during the proposed missile launches. Sudden noises, such as missile launches, cause variable reactions in wildlife, frightening some bird and pinniped species, while causing little or no reaction in others.

The U.S. Navy has been granted incidental harassment authorization by the National Marine Fisheries Service for small takes of marine mammals incidental to missile launch operations from San Nicolas Island effective from 2 October 2003 through 2 October 2008. Harbor seals, California sea lions, and elephant seals rest, molt, and breed on several beach areas of San Nicolas Island. An average of 40 annual launches of Vandal missiles (or similar sized launch vehicles) from launch sites on San Nicolas Island are anticipated. A-weighted sound pressure levels associated with Vandal launches, which have been launched from San Nicolas Island, range from greater than 136 dBA at a distance of less than 370 meters (1,215 feet) from the launch pad to 123 dBA at a distance of 945 meters (3,100 feet). (Federal Register, 2003) Vandal noise levels could exceed 100 dB along the western end of San Nicolas Island. The level of noise for the AWS missile during launch and flight is expected to be similar and relatively short in duration.

Based on monitoring studies conducted for launches of Vandal target missiles from San Nicolas Island, responses of pinnipeds to noise of missile launches are highly variable due to factors such as species, age, and time of year. Northern elephant seals appear to be tolerant of acoustic disturbance. Harbor seals outside the breeding season appear to be more easily disturbed. California sea lions near the launch site have been observed fleeing from former resting positions during three Vandal launches. However, in most cases pinnipeds in the Sea Range exposed to the sounds of missile launches from San Nicolas Island did not flush into the sea. The U.S. Navy assumes that Level B harassment, as evidenced by some pinnipeds leaving haulout areas and fleeing along the beach, will occur on occasion upon exposure to sound exposure levels of 100 dBA or higher for California sea lions, and northern elephant seals and 90 dBA for Pacific harbor seals. Recorded observations of pinniped responses to Vandal launches have not shown injury, deaths, or extended disturbance. The National Marine Fisheries Service concurs with the Navy's determination that the effects of planned target launches will have no more than a negligible impact on pinniped populations. (National Register, 2003) Most species of whales appear to react to aircraft overflights only when the aircraft fly at low altitude (below 150 meters [500 feet]). Reactions, if any, appear to be brief, and no long-term changes in whale distribution have been identified. Most missile overflights are at altitudes greater than 305 meters (1,000 feet) in a few seconds, and the transient noise produced is not expected to exceed the acoustic disturbance criteria for marine mammals. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a)

Studies (U.S. Department of the Air Force, 1997) indicate that 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. 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. Waterfowl would quickly resume feeding and other normal behavior patterns after a launch is completed. Waterfowl driven from preferred feeding areas by aircraft or explosions usually return soon after the disturbance stops, as long as the disturbance is not severe or repeated (Federal Aviation Administration, 1996).

Colonies of several species of seabirds such as the Brandt's cormorant, western gull, and black oystercatcher occur within the 100-dB contour area. Although ambient noise levels along the coast may exceed 100 dB, the potential still exists for impacts to these breeding seabirds. The existing colonies of Brandt's cormorants are monitored to determine if the birds react adversely to various military activities such as launches. The activity would stop if it appears to cause an adverse reaction, until control and/or mitigation measures are developed. Due to the short duration of the missile overflight, the infrequent occurrence, and low density of seabirds on the Sea Range (less than 2.5 birds per hectare [1 bird per acre]), noise impacts to seabirds are not anticipated to be substantial. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a)

Debris

Nominal launch activities are not expected to adversely impact Essential Fish Habitat. Although spent boosters and intercept debris could affect any species close to the surface, the number of individuals injured or killed would not likely affect overall species' populations. The majority of propellant would be expended before booster drop and impact and thus only trace amounts of propellant would be left, which would minimize the potential for toxic effects. The potential for debris impacts to species in the open ocean area is discussed in section 4.4.3.

In the event of a launch mishap, scattered pieces of burning propellant could enter coastal water and potentially affect pinnipeds hauled out along the adjacent coastline and Essential Fish Habitat. Concentrations of toxic materials would be highest in this shallow water and have a greater chance of being ingested by feeding animals. However, the potential for a launch mishap is relatively slight, and in most cases the errant missile would be moving at a rapid rate such that pieces of propellant and other toxic debris would strike the water further downrange. The debris would also be widely scattered, which would reduce the possibility of ingestion. As mentioned above, the number of individuals injured or killed would not likely affect overall species' populations. (U.S. Department of the Air Force, 2001)

Fire from an early flight termination could impact terrestrial wildlife near the launch site. However, emergency fire-fighting personnel are available for all launch activities as a protective measure.

Electromagnetic Radiation

In terms of the potential for EMR impacts to wildlife, the power densities emitted from the FCR are unlikely to cause any biological effects in animals or birds. The FCR is not expected to radiate lower than 5 degrees, which would preclude EMR impacts to terrestrial species on the beach. The potential for main-beam (airborne) exposure thermal effects to birds exists. The potential for impacts to birds and other wildlife was addressed in the *Ground-Based Radar (GBR) Family of Radars EA* (U.S. Army Program Executive Office Missile Defense, 1993). The analysis was based on the conservative assumption that the energy absorption rate of a bird's body was equal to its resting metabolic rate and that this could pose a potential for adverse effects. Birds in general typically expend energy at up to 20 times their resting metabolic rates during flight. Mitigating these concerns is the fact that radar beams are relatively narrow. 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. Since birds are not likely to remain continuously within the radar beam, the likelihood of harmful exposure is not great. (Pacific Missile Range Facility, Barking Sands, 1998) The use of existing sensors is part of routine activities on San Nicolas Island.

Threatened and Endangered Species

Emissions

As mentioned above, hydrogen chloride and aluminum oxide deposition is not anticipated to adversely affect wildlife, including threatened or endangered wildlife species.

Noise

There are no published studies on the reaction of sea otters to aircraft overflights. As discussed above, most missile overflights are at altitudes greater than 305 meters (1,000 feet) in a few seconds and the transient noise produced are not expected to exceed the acoustic disturbance criteria for marine mammals. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a) The potential for debris impacts to species in the open ocean area is discussed in section 4.4.3.

The California pelican roosts mainly along the eastern end of San Nicolas Island, away from the highest launch noise levels. The western snowy plover has established nests in the vicinity of N807; the closest in 1998 was approximately 300 meters (984 feet) from the site. Snowy plovers in the vicinity could be affected by noise of the launch as well as by the increased presence of personnel during tests. Nesting beaches are closed and regular monitoring of the area is conducted during the breeding season to locate nests and protect them from human disturbance. As discussed above, due to the short duration of the missile overflight, the infrequent occurrence, and low density of seabirds on the Sea Range (less than 2.5 birds per hectare [1 bird per acre]), noise impacts to seabirds are not anticipated to be substantial. Numbers of threatened and endangered seabirds are even less dense further reducing the potential for impact. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a)

Debris

Debris from a nominal launch would fall into the open ocean area and would not impact sea otters along the coast of San Nicolas Island.

As discussed above, due to the infrequent occurrence and low density of seabirds on the Sea Range (less than 2.5 birds per hectare [1 bird per acre]), debris impacts to seabirds are not anticipated to be substantial. Numbers of threatened and endangered seabirds are even less dense further reducing the potential for impact. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a) The potential for debris impacts to species in the open ocean area is discussed in section 4.4.3.

Electromagnetic Radiation

As explained above, in terms of the potential for EMR impacts to wildlife, the power densities emitted from the FCR are unlikely to cause any biological effects in animals or birds, including threatened and endangered species.

Environmentally Sensitive Habitat

Nominal AWS launches are not anticipated to result in adverse impacts to environmentally sensitive habitat. In the event of a mishap, debris could potentially affect snowy plover critical habitat and wetlands (Tule Creek) within the ESQD. Personnel would be instructed to avoid bird nesting and roosting locations and pinniped haul-out areas.

4.1.3.3 Post Launch Test Activities

After the second flight test of each caravan, the AWS equipment would be dismantled and packed for shipment back to Israel. Impacts would be the same as discussed in section 4.1.3.1. Recovery of missile components after an unsuccessful launch would be coordinated with San Nicolas Island environmental personnel to minimize impacts to sensitive resources.

4.1.3.4 Cumulative Impacts

The potential cumulative impacts to biological resources from activities associated with site preparation and the limited number of AWS launches, when combined with proposed Vandal launches, would not be substantial. No cumulative impacts from proposed, current, and prior San Nicolas Island launches have been identified.

4.1.4 CULTURAL RESOURCES—SAN NICOLAS ISLAND

4.1.4.1 System Transportation and Launch Preparation Activities

The Arrow launcher site would require launch support equipment positioned behind the FCR at the Mobile 1 site. An area of approximately 0.1 hectare (0.25 acre) would need to be disturbed in preparation for the proposed activities. If fiber optic cable is installed underground, additional ground disturbance would occur, potentially greater than 0.4 hectare (1 acre). San Nicolas Island has been extensively surveyed, with known and potential sites of cultural significance identified. The layout for cable trenching would be coordinated with the environmental office to avoid these known sites. As project details are further delineated, coordination would occur with the Point Mugu Environmental Planning and Management Department to further ensure that cultural resources would be protected. If previously undocumented cultural resource items are found during excavation, clearing, or other ground-disturbing activities, work would immediately cease. In addition, work would be temporarily suspended within an area surrounding the discovery of the cultural resources until it has been properly evaluated and secured. Any discovery of previously unidentified cultural resources would be reported to the Point Mugu Environmental Project Office.

Potentially adverse effects to historic and prehistoric resources could also occur as a result of the unauthorized collection of artifacts by flight preparation personnel. Culturally sensitive areas are located near the test sites; however, personnel would receive a brief orientation involving a definition of cultural resources and protective federal regulations.

4.1.4.2 Flight Testing and Test Mishaps

Potential impacts from flight testing or test mishaps during the ASIP could result from debris striking the ground where surface or subsurface archaeological deposits are located. The

probability of this occurring, however, is considered remote and negligible adverse effects are anticipated. Debris falling offshore would pose no threat to San Nicolas' cultural resources, and no efforts are planned at this time to recover a missile from a failed missile intercept that falls into the ocean.

4.1.4.3 Post Launch Test Activities

At the conclusion of testing activities, Arrow program personnel would remove all mobile equipment/assets brought to the range. 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.

If required, debris recovery on land may involve the use of helicopters and off-road vehicles. Recovery of missile and missile components after unsuccessful launches would be determined by the Environmental Planning and Management Department in accordance with 36 CFR 800 regulations. If the potential exists to disturb cultural resources during debris recovery activities, recovery efforts would be coordinated with Environmental Planning and Management Department personnel to avoid impact to sensitive resources and to restore natural areas as necessary following debris recovery efforts.

4.1.4.4 Cumulative Impacts

The Proposed Action, in conjunction with current planned and anticipated launches, and construction activities, is well within the level of activity established in the Point Mugu EIS. Combined activities would be performed at different times and locations, and therefore, no significant cumulative impacts to cultural resources are anticipated at San Nicolas Island.

4.1.5 GEOLOGY AND SOILS—SAN NICOLAS ISLAND

Geology and soils impacts were evaluated based on the following criteria: potential for ground disturbance; substantial erosion or sedimentation from water and wind during construction and operation; and contamination resulting from target missile and AWS launches. Direct geology and soils impacts can result from site disturbance during construction, and indirect effects can occur from leaching of contaminants during launch into local soils. The significance of geology and soils effects depend upon whether ground disturbance would alter soil stability and/or result in erosion and sedimentation, and whether potential soil contamination would degrade soil characteristics. Due to the nature of the Proposed Action (i.e., four test flights with only minor modifications to existing launch and support facilities), the following analysis of environmental consequences does not address geologic hazards or mineral resources.

4.1.5.1 System Transportation and Launch Preparation Activities

No new facility construction is proposed at San Nicolas Island. Instead, several already developed sites are being evaluated for use for launch and support facilities. The proposed improvements at any of the sites on San Nicolas Island would only occur on graded and packed earth or on concrete or asphalt pad areas. Minor site development would be required at these existing facilities.

AWS launch on San Nicolas Island would occur at one of three launch sites: the Rock Crusher site, the Vandal Launch Pad, or the Miscellaneous Pad site. If located at San Nicolas Island, the CCA would be placed at the Miscellaneous Pad site or the Mobile 1 site. At these alternative locations, additional concrete or asphalt would be poured adjacent to existing concrete and asphalt to extend the existing launch pads and support areas. Additionally, pylons would be added within the concrete pad area or steel matting would be used, depending on soil density. Clearing and leveling would be required at the Mobile 1 site to create level concrete pads for support facilities. Clearing and soil disturbance would be minor at the Vandal, Rock Crusher, and Miscellaneous Pads locations. Approximately 0.1 hectare (0.25 acre) of disturbance would be required at San Nicolas Island. In the event that fiber optic cable is installed underground, additional ground disturbance would occur, potentially greater than 0.4 hectare (1 acre). Administrative and other ASIP support activities would be located within existing facilities and would not require any additional improvements on San Nicolas Island.

During the construction period, soils at the proposed construction site would be subject to wind or water erosion. However, soil disturbance from new construction would be of short duration and would be limited to the immediate vicinity of the construction site. Best Management Practices, such as regular watering of excavated material, would reduce the potential for soil erosion during construction. No geology or soils impacts would result from construction activities on San Nicolas Island.

Preparations for AWS launch could result in fuel spills and contamination. However, fueling operations would utilize containment measures; spill control kits would be available at the AWS launch site; and bulk fuel would be stored at an approved facility. Therefore, no significant soils impacts would result from fuel spills associated with the proposed AWS launches.

4.1.5.2 Flight Testing and Test Mishaps

AWS launch would generate emissions of combustion products from missile exhaust, and very small amounts of launch combustion products could settle on soils at San Nicolas Island in the vicinity of the launch complex. Exhaust emissions disperse rapidly in the air and they would be deposited in very minimal amounts during target missile launches. Because of the very low amount of launch emissions and the very low number of AWS launches, no significant soils impacts would result from emissions from the proposed missile launches.

In the event of a testing mishap, including termination of the flight on the launcher/launch pad, termination of a flight shortly after liftoff, or termination of a flight after it has exited the vicinity of the launcher/launch pad, the potential results would cause localized, short-term impacts to soil quality in the form of combustion by-products and potentially hazardous materials seeping into regional soils. Provisions would be made for the availability of fire suppression, hazardous materials emergency response, and emergency medical teams during launch operations. These provisions, in combination with the low probability of a launch mishap, would result in only a short-term, localized impact to regional soil quality.

4.1.5.3 Post Launch Test Activities

At the conclusion of testing activities, Arrow program personnel would remove all mobile equipment/assets brought to the range. These activities would result in impacts less than those

caused by site preparation. Specific restoration actions, if necessary, would be determined on a case-by-case basis.

4.1.5.4 Cumulative Impacts

Only two AWS tests are proposed in each of two caravans, for a maximum of four launch events from San Nicolas Island in a multi-year program. No substantial accumulation of emission products would occur in the soil at San Nicolas Island as a result of normal flight operations. In the event that debris associated with a launch failure was deposited at San Nicolas Island, the debris would be removed, thus posing no cumulative impact at the test ranges. Since no direct soils and geologic impacts would result from the proposed ASIP itself, there would be no cumulative soils and geologic effect because of the very low number and very low frequency of proposed AWS launches.

4.1.6 HAZARDOUS MATERIALS AND WASTE—SAN NICOLAS ISLAND

4.1.6.1 System Transportation and Launch Preparation Activities

System Transportation

The Arrow interceptor missiles (solid rocket propellant) and supporting components would be transported to San Nicolas according to DOT and Department of Army, Air Force, and Navy standards. Transportation of ordnance, batteries, compressed gases and potentially hazardous materials such as ethylene glycol to San Nicolas Island would be accomplished following an Explosive Safety Review as discussed in section 4.1.7. The existing transportation infrastructure (including commercial ship or air transport or barge landing) would be used without the need for revised procedures, because of the similarity of ASIP materials to those currently in use at San Nicolas. Missile components, chemicals, and compressed gases would be packaged separately and stored in canisters or rigid metal boxes according applicable hazard classification. Explosion mats, overpacks, and safety pins/harnesses would be used. Fire suppressants and absorbents would be available on transport vessels and in storage areas. As a minimum, containment devices would be required for resting fuel tankers, vehicles, generators, and cooling units for environmental protection from leaks and spills of hazardous materials such as fuels, lubricants, and coolants.

Launch Preparation

No new permanent facilities would be required to support the ASIP operations. Any modification to existing facilities would occur in previously disturbed areas in accordance with host installation guidelines and regulations and therefore would not be considered significant.

For the full deployment scenario, launch preparation would include receipt, inspection, and temporary storage of interceptors, launcher, launch components, and the Arrow CCA; transportation of the interceptors to the launch location; mounting of interceptors; and set-up of all support equipment, including the FCC and FCR. Proposed launch preparation operations would have a short-term impact on hazardous materials use at San Nicolas in the form of compressed gases, fuels, lubricants, hydraulic fluids, and ethylene-glycol (FCR cooling system). A nitrogen gas station, composed of 12 nitrogen bottles, would provide cooling for the launcher/missile electronics. Expected usage is approximately six bottles per week. Approximately 19,000 liters (5,000 gallons) of diesel fuel would be required for the CCA

generators, and 7,600 liters (2,000 gallons) of diesel fuel would be required for the Launch Site generators. This amounts to a 2-day and 1-week fuel supply, respectively. Fuel would be stored in tankers in the vicinity of the respective generators. Fuel would also be required for ASIP over-road vehicles and equipment. The quantities and types of lubricating oils/hydraulic fluids would vary depending on fill-up requirements and maintenance schedules. The FCR cooling system would be composed of approximately 3,629 kilograms (8,000 pounds) of an ethylene glycol and water mixture (50 percent water). This is expected to be a one-time requirement. The fuel tankers, generators, FCR, and cooling unit would have secondary containment to restrict/collect potential spills and leaks. The tankers and ASIP equipment would be routinely inspected.

Split deployment would eliminate the requirement for ethylene glycol and reduce the quantity of diesel fuel needed for the generators by approximately 19,000 liters (5,000 gallons). Since there would be less equipment and fewer vehicles, the quantities of lubricants and other fuels required for launch preparation would also be less than for full deployment.

Either scenario would result in an added throughput in the Supply Department. However, this increase is not expected to be significant. Actual procurement, handling, and use of hazardous materials at San Nicolas Island would be the responsibility of the ASIP operations; however, San Nicolas would provide oversight to ensure that operations are conducted in accordance with state and federal requirements and established Range/base policies and procedures.

No new procedures would be required to store or use these materials. Therefore, the short-term impact from the use of hazardous materials at San Nicolas Island for ASIP launch preparation would not be considered significant.

4.1.6.2 Flight Testing and Test Mishaps

At San Nicolas Island, all defensive missile operations involving explosives would require implementation of a written procedure which has been approved by the Point Mugu Sea Range Safety Office (Range Safety Approval) and must be conducted under the supervision of an approved ordnance officer using explosive-certified personnel. All potentially hazardous materials, including fuels/propellants, would be assessed for possible toxic hazards from a launch mishap.

During a nominal launch there would be minimal to no hazardous materials or hazardous waste impacts. However, safety procedures would be followed as discussed in section 4.1.7.

Potentially hazardous substances such as hydrogen chloride, aluminum oxide, carbon monoxide, and oxides of nitrogen would be generated from combustion of the solid propellant during launch or in the event of a launch failure or abort. For a nominal launch, propellant would burn to completion. The effects of exhaust products/launch emissions are addressed in section 4.1.1. It is anticipated that the levels of emissions would be similar to previously launched vehicles at San Nicolas Island.

Although unlikely, it is possible that a missile's flight could be terminated early. An on-pad/launcher or in-flight launch failure would result in the partial destruction of a missile. The missile debris would impact inside the Surface Hazard Area/Surveillance Area. In such an

impact, the missile would contain a varying level of propellant that would depend on the flight time. If solid propellant is scattered on the ground, potential pollutant concentrations downwind are expected to be less than with a normal launch, as the propellant would likely burn more slowly in the open air than in a rocket motor. Provisions would be made for the availability of fire suppression. The incident would be handled as an explosive ordnance event, and remaining potentially hazardous materials would be regarded as hazardous waste for management purposes.

4.1.6.3 Post Launch Test Activities

ASIP equipment and assets brought to San Nicolas Island whether for full or split deployment would be dismantled and removed following completion of test activities. As such, waste oils, fuels, and spent coolants may be generated. Split deployment would reduce the amount of potentially hazardous waste generated at San Nicolas; however, the quantitative difference between the two scenarios would not likely be significant. The hazardous material/hazardous waste management systems currently in place at San Nicolas Island are designed to prevent releases of hazardous materials to the environment, where their presence could create a contamination issue. Consequently, the management systems emphasize the need to use or dispose of all materials in a timely and acceptable manner, in accordance with applicable regulatory and public policy requirements.

Hazardous waste generated by ASIP operations would be transported to the less-than-90-day accumulation area. Disposal of ASIP generated hazardous wastes would occur along with disposal of other hazardous wastes from San Nicolas Island, with all shipping and disposal procedures performed in accordance with RCRA and DOT requirements.

Proper management of ASIP associated hazardous materials and waste would preclude any impact due to their accumulation in the environment as a result of routine usage. In the event of an unplanned release, San Nicolas has emergency response procedures to aid in the evaluation and cleanup of any hazardous materials released.

The procedures and infrastructure at San Nicolas Island and its support organizations at Port Hueneme are sufficient to accommodate the hazardous waste produced by the proposed ASIP test operations. There would be no requirement to obtain additional hazardous waste permits through the California Department of Toxic Substances Control for ASIP hazardous waste operations.

The proposed ASIP operations, including post-launch activities, would not create a significant increase in the total quantities or types of waste currently generated. Collection, accumulation and packaging procedures for ASIP hazardous wastes would be performed in accordance with established San Nicolas Island hazardous waste management procedures. No significant long-term adverse impacts to current hazardous waste management practices from post-launch test activities are anticipated.

4.1.6.4 Cumulative Impacts

Impacts from ASIP support and operation are most likely to arise from an increase in the amount of fuel required. Impacts to fuel storage and throughput from implementation of the

ASIP operation would be less than significant even for full deployment. The use of the required reporting process and adherence to applicable base procedures and DoD directives concerning hazardous material handling and tracking, and hazardous waste disposal would preclude the potential for significant incremental, additive cumulative impact to hazardous materials and waste management practices at San Nicolas. Additional activities at San Nicolas Island could further increase hazardous materials used and hazardous waste produced, but the current system is capable of meeting any foreseeable increase efficiently and without incident. The small number of ASIP missile launches proposed per year at San Nicolas would not cause a significant impact on hazardous materials/waste management.

4.1.7 HEALTH AND SAFETY—SAN NICOLAS ISLAND

4.1.7.1 System Transportation and Launch Preparation Activities

At San Nicolas Island, all operations involving explosives require a written procedure which has been reviewed and approved by the Point Mugu Sea Range Safety Office (Explosive Safety Review) prior to implementation, and must be conducted using explosive-certified personnel under the supervision of an approved ordnance officer. The Explosive Safety Review includes evaluation of packaging configurations to ensure that transportation, handling, and storage of all ASIP equipment and assets, including hazardous materials and ordnance, would be in accordance with DOT, DoD, and existing San Nicolas protocol and procedures. As such, missile components, chemicals and compressed gases would be packaged as discussed in section 4.1.6. Explosion mats, overpacks, and safety pins/harnesses would be used. Appropriate fire and spill response equipment would be available on transport vessels and in storage areas. All components and personnel would be grounded and all personnel associated with transport and handling of ASIP equipment and assets would be trained and certified.

Depending on test operations, ASIP equipment and assets may be temporarily stored in Ordnance Assembly Building 110 or 290 (missile assembly) and storage magazines 106 or 107. All storage areas would meet U.S. Navy safety requirements for class 1.1 and 1.3 hazardous items. ESQDs based upon the maximum quantity of explosive material permitted for the facility would be established for each facility to ensure safety in the event of explosion. Absorbents would be available and containment devices would be employed for environmental protection from leaks and spills of hazardous materials such as fuels, lubricants, and coolants. Normal fire protection measures would be in place. As such, buildings/storage areas would be equipped with fire extinguisher systems and alarms. Security and security patrols would be provided at times that the vehicle is in the missile assembly area to secure and safe the vehicle.

Launch preparations are similar in many ways to those currently conducted for weapons systems at San Nicolas and would require that similar safety procedures be put in place. Thus, ASIP operations would not require the implementation of additional prelaunch safety requirements.

All launch preparation activities, including fiber optic cable installation, would comply with OSHA, the U.S. Army Corps of Engineers *Safety and Health Requirements Manual (EM 385-1-1)*, Range Safety requirements, and other recognized standards for operations that involve construction or facility modifications. A health and safety plan would be prepared to ensure the health and safety of onsite workers. Compliance with regulations would ensure that no health and safety impacts would result during construction.

4.1.7.2 Flight Testing and Test Mishaps

The Point Mugu *Sea Range Safety Handbook,* NAWCWPNSINST 5100.2, dated 9 July 1993, and the *Final Environmental Impact Statement/Overseas Environmental Impact Statement, Point Mugu Sea Range* (Department of the Navy, Naval Air Warfare Center Weapons Division, 2002) provide specific guidance and requirements for range operators and users. Included in the Range Safety Instruction are procedures for developing Range Safety Approvals and Range Safety Operations Plans, as well as the requirements and specifications of FTS. Requirements for range surveillance by aircraft and prior to testing are also provided in the safety instructions. ASIP personnel would be briefed on the safety instructions and a test site safety plan would be developed that reflects ASIP/AWS-specific safety requirements as well as range regulations.

Test mishaps are defined in terms of three scenarios: missile failure on the launch pad, termination of a flight shortly after liftoff, and termination of a flight after the missile has exited the vicinity of the launch site.

Termination of a flight on the launch pad is characterized by either detonation of the booster or a conflagration in which the propellant burns but does not explode. An ESQD surrounding the launch pad would be calculated based on the equivalent explosive force of all propellant and pyrotechnic materials contained in the flight vehicle. During all launch activities, provisions would be made to maintain a stand-by emergency response team near the launch site to ensure immediate response and rapid control in the event of an accident.

ASIP launch activities occurring at San Nicolas Island would require the establishment of an LHA for each launch operation. The LHA provides a designated hazard area, which is cleared of people based upon the potential to be affected by missile debris resulting from an unsuccessful launch. The size of the LHA is approved by the Point Mugu Sea Range Safety Office based upon specific mission parameters and the capabilities of the San Nicolas Island and Test Range instrumentation. The LHA represents the area which bounds all potential debris impact points in the event of a launch pad/launcher or near-launch anomaly or termination. For purposes of planning for ASIP activities at San Nicolas Island, a preliminary LHA radius of 6,100 meters (20,000 feet) has been assumed, which provides a sufficient area to encompass any ASIP mission-specific LHAs. Since implementation of LHA procedures allows management of the population which can be affected by a launch, hazards associated with unplanned flight termination are not considered to be significant.

In-flight anomalies and booster drop zones in the event of successful or unsuccessful intercepts would result in the impact of debris in two separate areas (one for the target vehicle and one for the defensive missile), referred to as impact zones. For both the successful and unsuccessful intercept cases, it is possible to determine the extent and location of the two associated impact zones prior to launch based upon mission parameters.

Access to San Nicolas Island is strictly controlled and limited to pre-approved personnel. The impact areas of both the target vehicle and intercept vehicle (in the event of a failed intercept) would be controlled and determined to be evacuated of personnel through enforcement of exclusionary zones (three surface-restricted areas located around San Nicolas Island and two airspace restricted areas over San Nicolas) and the issuance of NOTAMs and NOTMARs prior to ASIP test operations.

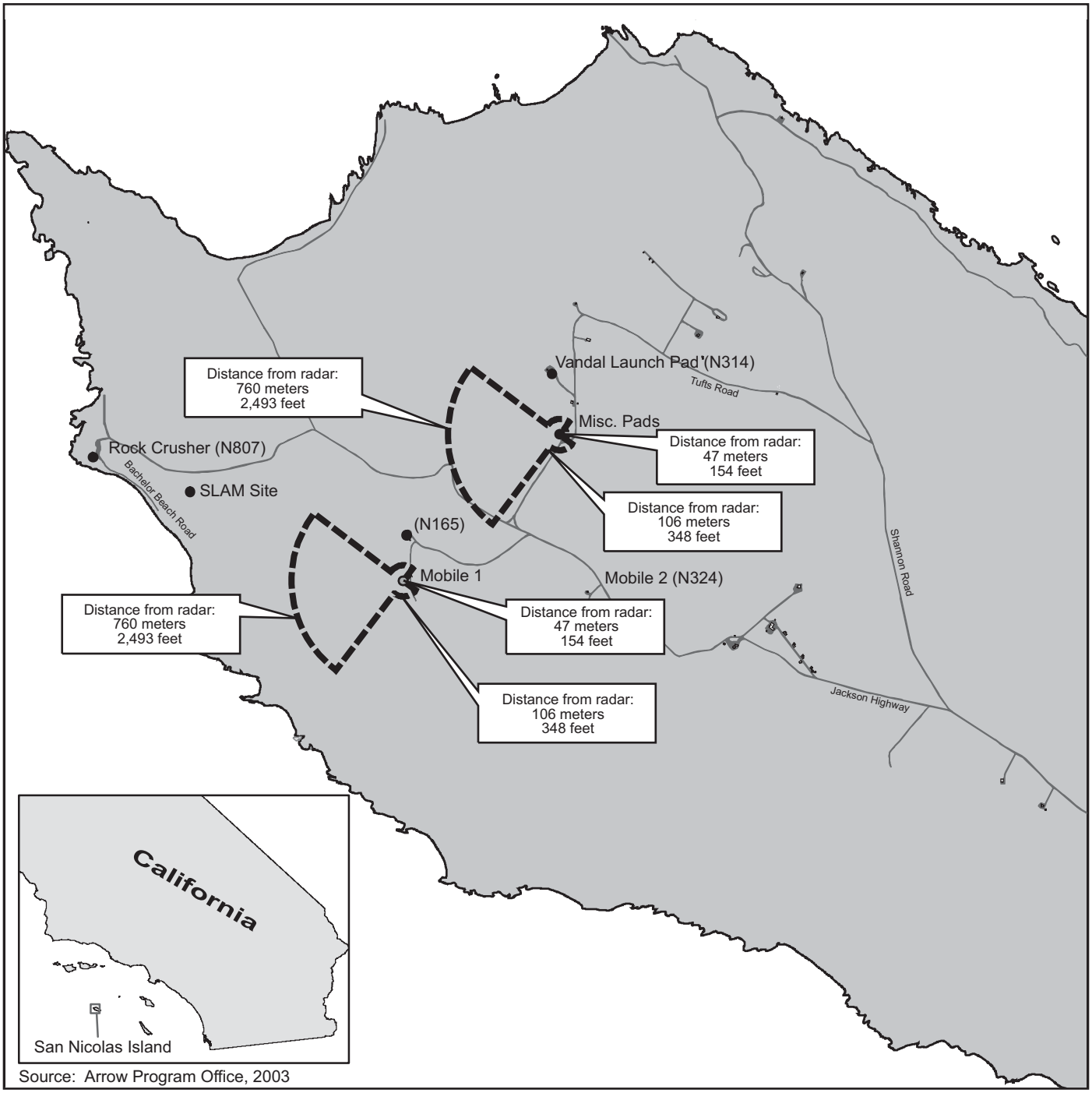
The launch of missiles associated with the ASIP operations would not significantly impact existing safety procedures or ongoing range operations at San Nicolas and would not significantly increase health and safety risks to military personnel or the general public. Implementation of standard safety procedures and reviews, as well as similarity to current operations, would aid in reducing the potential for safety hazards.

Radiation Hazards

Radar and other electromagnetic sources at San Nicolas can potentially pose hazards to personnel ordnance and fuel exposed to radiation above specified levels. During the siting process for any new EMR source, such as the Arrow FCR, HERP, HERO, and HERF analyses are conducted to assess the potential hazards posed by the additional EMR source and assure safe operations and noninterference with Range instrumentation, aircraft, or seacraft to personnel, ordnance, and fuel. Hazard areas for personnel, ordnance, and fuel would be established, if required. The hazard areas would be plainly marked on base maps as circular arcs.

Preliminary analyses using worse case scenario calculations indicate there are no potential HERP, HERO, and HERF hazards associated with locating the proposed Arrow FCR at the Miscellaneous Pads site or the Mobile 1 site (figures 4-1 and 4-2). Preliminary exclusionary distances based on FCR operation at maximum radiated power levels are:

- HERF:
  - 71 meters (232 feet) - (Main beam - over ocean)
  - 10 meters (32 feet) - (Side lobe)
  - 4.4 meters (14 feet) - (Back lobe)
- HERP:
  - 760 meters (2,495 feet) - Controlled environment - (Main beam - over ocean)
  - 106 meters (345 feet) - (Side lobe)
  - 47 meters (154 feet) - (Back lobe)
- HERO:
  - Main beam
  - Unsafe = 7,660 meters (25,240 feet) - (pointed over ocean)
  - Susceptible = 4,270 meters (14,000 feet)
- Side Lobe
  - Unsafe = 1,060 meters (3480 feet)
  - Susceptible = 590 meters (1,940 feet)
- Back Lobe
  - Susceptible = 265 meters (870 feet)
- Low Power
  - Unsafe = 3.1 meters (10 feet)
  - Susceptible = 1.7 meters (6 feet)



Source: Arrow Program Office, 2003

EXPLANATION

- Water
- San Nicolas Island
- Roads
- Hazards of Electromagnetic Radiation to Personnel (HERP)

Scale

0 508 1,016 meters

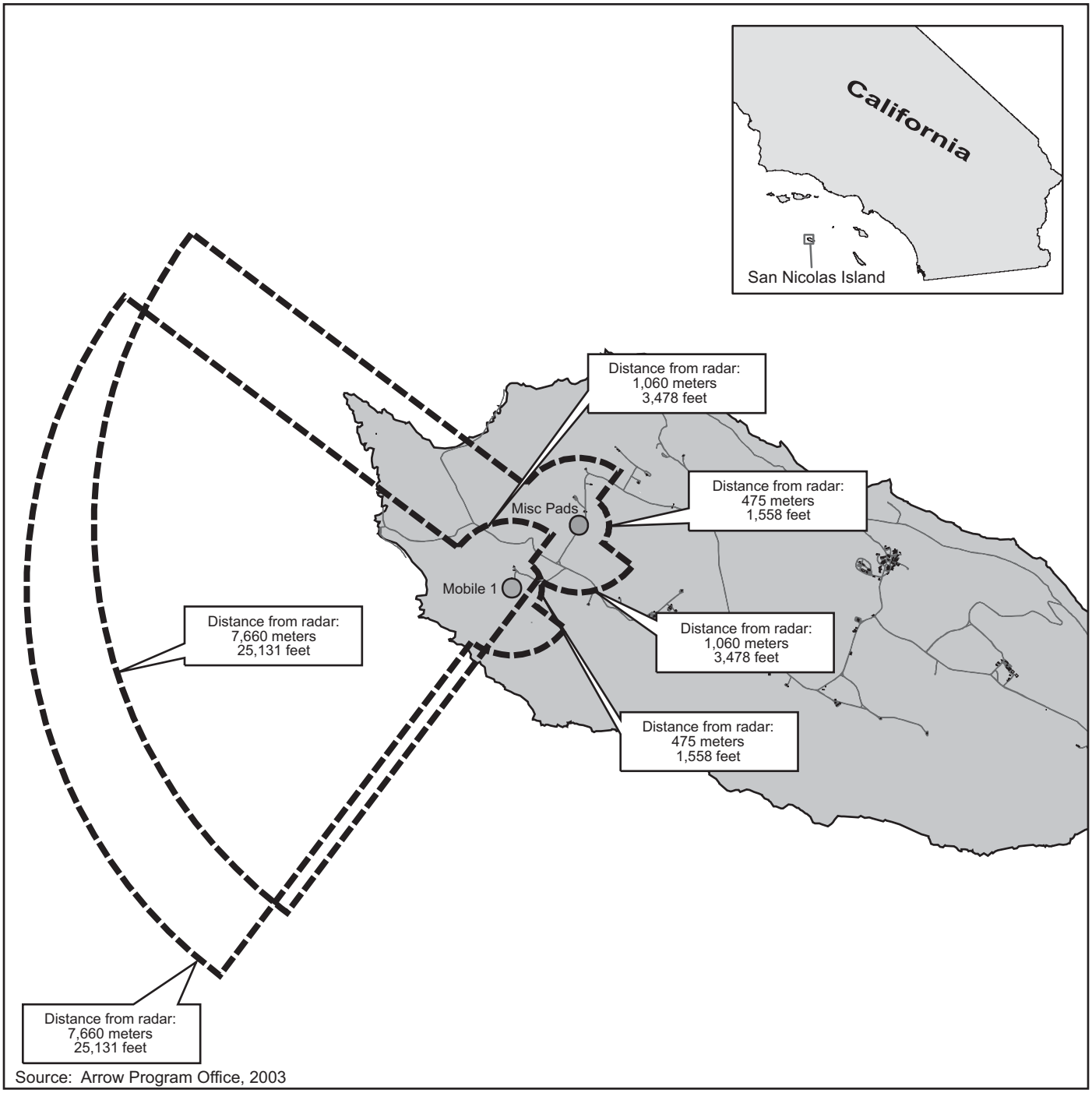
NORTH 0 1,666.5 3,333 feet

10-14-03 San Nicolas HERP

Hazards of Electromagnetic Radiation to Personnel (HERP) on San Nicolas Island

San Nicolas Island, California

Figure 4-1



Source: Arrow Program Office, 2003

EXPLANATION

- Water
- San Nicolas Island
- Roads
- Radar Sites
- Hazards of Electromagnetic Radiation to Ordnance (HERO)

Scale

0 1.2 2.4 kilometers

NORTH 0 0.75 1.5 miles

10-14-03 Sna Nicolas HERO

Hazards of Electromagnetic Radiation to Ordnance (HERO) on San Nicolas Island

San Nicolas Island, California

Figure 4-2

Actual power limits of the FCR during day to day operations would be far less than the maximum radiated power levels used for the preliminary analysis. Therefore, actual HERO, HERF, and HERP exclusionary distances would likely be reduced. In addition to maintaining exclusionary distances, fuel, ordnance, and personnel exposure would be further minimized by coordinating Range activities around the Alpha site with scheduled periods of FCR operations. (Peppers, 2003a)

FCR operators would be reviewed and monitored to ensure that EMR sources are being used in accordance with published safety procedures. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a) In addition, radar emission detectors would be installed around the CCA and would be connected to the FCR where the detectors are monitored. The monitors would sound an alarm if the radiation exceeds the safety level or if the connection to the detectors fails.

Human Exposure

The analysis method used to evaluate potential effects of RF radiation is the Institute of Electrical and Electronics Engineers (IEEE) Maximum Permissible Exposure Level (MPEL), which defines the maximum time-averaged radiofrequency (RF) power density allowed for uncontrolled human exposure. The MPEL method is independent of body size or tissue density being exposed. EMR hazard zones provide a safety factor 10 times greater than the MPEL. MPELs are capped at 5 mW/cm^2 for frequencies greater than 1,500 MHz, as per IEEE Standard C95.1-1999, *Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.* General public exposure is typically limited to one-fifth of the occupational limits. For non-ionizing radiation, OSHA established a radiation protection guide (29 CFR 1910.97, *Nonionizing Radiation*) for normal environmental conditions and for incident electromagnetic energy of frequencies from 10 megahertz to 100 megahertz. This radiation protection guide is 10 mW/cm^2, as averaged over any possible 1-hour period. DoD Instruction 6055.11, *Protection of DoD Personnel from Exposure to Radiofrequency Radiation*, established PELs for controlled and uncontrolled environments and for high-power microwave narrow-band and electromagnetic pulse broad-band simulator systems.

Most microwave protection guides are based on the time-average value of exposure; i.e., the value of power density when averaged over any 6-minute period. Thus, while 5 mW/cm^2 is permitted for 6 minutes or greater, the so-called continuous limit, higher values are acceptable if the exposure time can be limited to less than 6 minutes. For example, if the exposure time is only 3 minutes long, then 10 mW/cm^2 is acceptable; if the exposure duration is only 1 minute, then 30 mW/cm^2 would be acceptable. Exposure analyses that do not take into account the fact that the radar beams would be almost constantly moving about would generally significantly overestimate the actual power densities that would occur during normal operations.

Electro-explosive Devices

The potential impacts to electro-explosive devices (EEDs) from emissions from the FCR are twofold: the EED could be made not to work, or the EED could be inadvertently initiated. The majority of the time, an EED is either installed in its intended application with its leads attached (the presence phase) or is in the shipping/storage phase. Typical EED applications in the presence phase would include fire extinguishers, automotive airbags, a missile attached to the wing of an aircraft, and military aircraft ejection seats. However infrequently, EEDs are sometimes handled without the protection of a storage container (handling/loading phase).

Therefore, different susceptibility criteria have been developed for each of these two distinct conditions described above.

EEDs in the handling/loading phase are substantially more susceptible to EMR hazards; however, main beam illumination on the ground would not occur. It is assumed that the handling/loading of EEDs would not occur when aircraft are airborne. However, main beam illumination of aircraft with EEDs (mainly military aircraft ejection seats) in the presence and shipping phases is possible. To ensure aircraft bearing EEDs are not threatened by grating or sidelobes, a high energy radiation area of 2.3 kilometers (1.4 miles) on the ground and 7.5 kilometers (4.7 miles) in the air would be published on appropriate aeronautical charts around the FCR to inform pilots of the potential electromagnetic interference hazard to certain aircraft.

Fuels

HERF constraints at San Nicolas are considered to be negligible (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a).

Communications–Electronics Frequency-related Interference

Communications–Electronics In-band Radio Frequency Interference. In-band RF interference occurs when two pieces of communications-electronics equipment are located within the same frequency band. Therefore, equipment with frequencies falling within the L-band would most likely be affected.

Communications–Electronics Adjacent Band Interference. Adjacent band RF interference is similar to in-band RF interference. The adjacent bands for the L-band include all frequencies that are within approximately 5 percent of the operating frequency.

Communications–Electronics Harmonic Band Radio Frequency Interference. Harmonic band interference refers to interference produced in harmonically related receivers or interference caused by sub-harmonically related transmitters. Harmonic frequencies include those frequencies that are integer multiples of the operating frequencies.

Communications–Electronics Non-frequency-related Interference

High Power Effects. Non-frequency-related interference from the FCR to the electromagnetic environment would likely be limited to high-power effects. High-power effects typically occur in receivers that are located in proximity to high power transmitters and may be the result of either antenna coupled signals or equipment case penetration. The impact of high-power effects is similar to that of in-band interference in that it would degrade the performance of the system. An example of the interference caused by high-power effects would be fuzziness on televisions or static on AM/FM car radios encountered while driving near high-voltage power lines. However, high-power effects are non-linear and therefore difficult to predict.

Aircraft/Avionics. The potential exists for EMR emissions from the main beam of the FCR to adversely affect fly-by-wire aircraft and avionics systems. The fly-by-wire concept uses an electronic flight control system coupled with a digital computer to replace conventional mechanical flight controls. The impacts to aircraft flying through electromagnetic fields exceeding the recommended standards are the introduction of spurious emissions into the automated flight control systems.

Both the DoD and the FAA have standards for EMR interference to aircraft, which should not be exceeded. DoD uses MIL-STD-464 with a peak threshold standard of 3,500 volts per meter and an average of 1,270 volts per meter. The FAA 8110.71 peak threshold is 3,000 volts per meter and an average of 300 volts per meter.

Implementation of FCR operational safety procedures, including establishment of controlled areas, and limitations in the areas subject to illumination by the radar units, would preclude any potential safety hazard to either the public or workforce from exposure to EMR. The total amount of radar RF radiation would be approximately 5 to 6 hours per day during testing. The duration of radar RF radiation would decrease to 3 to 4 hours per day during actual ASIP/AWS mission activities. FCR operations would be coordinated by the Point Mugu Range Safety Office with the FAA, Coast Guard, and other groups or agencies as appropriate. Therefore, no health and safety impacts to coastal areas, airspace/aircraft, or mariners are anticipated.

4.1.7.3 Post Launch Test Activities

ASIP equipment and assets brought to San Nicolas Island whether for full or split deployment would be dismantled and removed following completion of test activities. As such, no change in safety protocol or significant impact to health and safety is expected.

4.1.7.4 Cumulative Impacts

The increased use of hazardous materials and ordnance associated with these proposed launches, whether for full or split deployment, represents a small short-term increase in potential safety risk at San Nicolas Island. These potential increases in risk would not represent a significant impact to existing safety operations and procedures at San Nicolas. Safety standards are high at San Nicolas Island and would serve to keep the total safety impacts attributable to all San Nicolas Island operations within acceptable standards to both workers and the public.

Radar and other potential electromagnetic sources are situated and operated to minimize potentially hazardous situations. The U.S. Navy requirements and local Range/San Nicolas procedures are covered by OPNAVINST 5100 23D and NAWSPMINST 5100.1, Chapter 2 (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a). Since San Nicolas has established procedures in place to minimize or prevent exposure to mission critical personnel or the general public to EMR, and because of controlled access to the island, the impact of FCR use in the event of full ASIP deployment is expected to be less than significant.

Also, the concept of time averaging is important in consideration of the potential cumulative exposures that might occur near operating radars. Because tracking and search radar beams move rapidly, depending on the particular mission or exercise, it is unlikely that environmental exposures would ever consist of continuous, constant values of power density. Rather, almost universally, exposures would be intermittent and, when the radars are transmitting, the electromagnetic fields would be constantly changing in intensity. Thus, the potential for additive, incremental cumulative impacts from electromagnetic radiation exposure is extremely limited.

4.1.8 INFRASTRUCTURE—SAN NICOLAS ISLAND

The primary proposed activities that may have a potential effect on infrastructure include pre-launch activities such as launch site preparation, launch activities, and post-launch activities.

The AWS interceptor would be launched from San Nicolas Island. AWS components, support equipment, and program personnel would begin to arrive at the test range approximately 2 to 3 months before a scheduled launch. Building N-189 on San Nicolas Island is a potential location for the miscellaneous flight readiness testing that would occur during this time period. Launch equipment would consist of the launcher, FCR, FCC, LCC, radar power generators, administrative trailers, supporting light vehicles for equipment and supply transportation, and miscellaneous small equipment and supplies. Over the 4 to 5 months required for each caravan, a maximum of about 100 personnel would be located at the range to perform pre-launch, launch/intercept, and post-launch operations.

Pre-flight operations would be considered routine activities for the range, and no additional permanent range facility personnel would be required. No increases to infrastructure capacity demands would be necessary to support these operations.

4.1.8.1 System Transportation and Launch Preparation Activities

Energy

The launch site would include two separate electrical power systems: an operational (tactical generator) electrical system for the AWS test operational components; and an administrative electrical system for the launch site (to handle general lighting, maintenance center, administrative area, and such). The administrative electrical power could be connected to the range power grid or to a generator. All electrical panels would be protected (sealed) for seashore environmental conditions. Emplacement of generators, ranging from 20 kilovolt-amperes (kVA) to 1,200 kVA would be required. Power use would be typical for the island and of limited duration. The potential impact to current power supply resulting from system transportation and launch-preparation activities would be minimal.

Water

Transportation to facility sites of water for human consumption and general use would be required during construction activities, and would comply with any local standards or regulations. Assuming a typical demand of 189 liters (50 gallons) of potable water per day per person, there would be a maximum demand of 15,142 liters (4,000 gallons) of water per day for 80 personnel for the full deployment scenario and 3,785 liters (1,000 gallons) per day for 20 personnel for the split deployment. As the island's potable sources allow storage of up to 3.8 million liters (1 million gallons), and the current maximum for daily consumption is 114,000 liters (30,000 gallons) per day (only 3 percent of storage capacity), there should be more than sufficient potable water available to handle the extra load. Some water would also be required for temporary use at the cement batch plant and for firefighting purposes. The temporary usage would be typical and present only a minor effect on water capabilities. However, depending on potable water levels at the time of a full deployment scenario, there is still the possibility that water would have to be brought in to San Nicolas Island (Eick, 2003).

Wastewater

Assuming a typical demand of 170 liters (45 gallons) wastewater capacity per person, and thus an average demand of 13,627 liters (3,600 gallons) of wastewater per day for a maximum of 80 personnel during full deployment, demand would equal only 11.25 percent of the island's sewage treatment plant capacity, which handles up to 151,461 liters (40,000 gallons) per day. Combined with current demands of 7.5 percent, for a total of 18.75 percent, project demands would produce no overall effects on island wastewater handling. Split deployment, with a typical demand of 3,406 liters (900 gallons) for 20 personnel, would decrease the former demand to one-fourth, producing even less of an effect on wastewater handling capacity. Moreover, the potential use of portable toilets, which can be located as required to support deployed personnel, would further lessen the effects on wastewater capacity.

Solid Waste

In keeping with established procedures, solid waste would be barged off-island to Port Hueneme and then transferred to a municipal landfill. Such activities are routine and would pose no impact on solid waste handling/transport.

Aviation Transportation

As stated in chapter 2.0, a contracted commercial sea vessel and/or commercial aircraft would transport the AWS from Israel to San Nicolas Island. For cargo transported by air, the first port of entry into the United States is not known at this time, but would require U.S. Customs/ Department of Agriculture inspection before continuing to the final destination at San Nicolas Island. It is anticipated that the only requirement at this node is for airfield/runway operations (e.g., refueling) and U.S. Customs inspection at a temporary holding area on the tarmac within airfield ground operations. Any subsequent airfield nodes utilized before reaching final destination would be required only for refueling operations or for emergencies.

The airfield at San Nicolas Island would be the final destination for the AWS airlift operations. It is anticipated that the only requirement at this node is for airfield/runway operations such as offloading upon arrival and reloading upon departure. AWS components and equipment flown in would be offloaded at the airfield and then transported by road to emplacement sites on the island.

Adherence to standard operating procedures for spill prevention, containment, and control measures while transporting equipment and materials would preclude safety impacts to aviation transportation. Use of the airfield would be intermittent during this phase and its use considered typical, producing no impact on aviation transport.

Ground Transportation

At San Nicolas Island, transportation activities would occur on routes and/or roads currently used for similar maneuvers and would follow existing applicable regulations. All transportation of equipment and materials such as fuels would be conducted in accordance with DOT regulations and applicable service regulations.

Subsequent to offloading procedures or prior to reloading procedures at the San Nicolas Island airfield, the AWS would be transported by road to emplacement sites on the island. This would also apply to cargo transported by sea. As necessary, the San Nicolas Island motor pool would

provide all vehicles. Adherence to standard operating procedures for spill prevention, containment, and control measures while transporting equipment and materials would preclude safety impacts to ground transportation. Average daily traffic would increase, but the increase would be considered a typical "ramping up" for launch preparations and would be considered routine and of no impact.

Water Transportation

For cargo transported by sea, the first port of entry into the United States would be the port facilities at Port Hueneme, California. The requirements at either port would include unloading docks for commercial freighters, secure and temporary storage for U.S. Customs inspection of the AWS, and loading facilities for barge operations. The barge landing site on San Nicolas Island would be the final destination for all AWS sealift operations.

AWS components and equipment transported by sea would arrive at the barge landing site on the island and then transported by road to emplacement sites on the island.

Point Mugu would ship diesel fuel out to San Nicolas Island and would also supply spill containment and control equipment and personnel.

Adherence to standard operating procedures for spill prevention, containment, and control measures while transporting equipment and materials would preclude impacts to water transportation. Barge transport is typical for the area and would be accomplished via current procedures. There would be no impact on water transportation from launch-preparation activities.

4.1.8.2 Flight Testing and Test Mishaps

Interceptor launches would occur from San Nicolas Island within the Point Mugu Sea Range. Shortly before launch, all mission-essential personnel would be evacuated from the launch control area. Non-mission-essential personnel would be evacuated from the island.

Testing operations would be considered routine activities for the range, and no additional permanent range facility personnel would be required. No increases to infrastructure capacity demands would be necessary to support these operations.

As areas would be cleared of vessels, vehicles, and non-mission-essential personnel during actual testing, flight termination or test mishap would have little to no safety effects on area infrastructure.

Energy

Telephone and commercial power lines would be required at the launch site. Power and communication cables would be placed on the ground, and no cable trenching would be required. Temporary trailers would be used to house administrative functions, and radar power generators would be moved to the site. Refueling operations for motorized vehicles and generators would be performed at existing, authorized sites on the test range.

On-island generators, or generators that had been transported onto the island for project purposes, would accommodate any power needs. The use of self-contained generators would also preclude potential impacts on island energy resources.

Water

Any potential water use resulting from launch activities and personnel would be minimal, as described in section 4.1.8.1, and would not substantially increase demand on available base water supply.

Wastewater

The potential increase in wastewater generated from launch activities and personnel would be minimal, as described in section 4.1.8.1, and would not substantially increase demand on island wastewater handling capacity.

Solid Waste

The potential increase in solid waste generated from launch activities personnel would be minimal, as described in section 4.1.8.1, and would not substantially increase solid waste levels or produce any effects on solid waste handling capabilities.

Aviation Transportation

Before missile launch, Range Safety officials would issue NOTAMs, which would identify areas to remain clear of and the times that avoidance of the area is advised. The Range Safety officials would then determine that the areas are clear of aircraft. Missile launches would be put on hold until the impact area is clear of air traffic. Range clearance and access control would be in accordance with existing range procedures. Such measures are standard practices of limited duration and as such would have no impact on area aviation transportation. If closure periods were extended due to mishap, the effects would be slightly greater, but the chances of such mishaps are considered low and the launch periods would be only occasional.

Other airfield operations would be required only between San Nicolas Island and Point Mugu Main Base for the transport of test personnel, personal items, and small cargo items such as repair parts. The temporary increase during launches would be considered routine and would have no impact on aviation transportation.

Ground Transportation

At San Nicolas Island, transportation activities would occur on routes and/or roads currently used for similar maneuvers and would follow existing applicable regulations. All transportation of equipment and materials such as fuels would be conducted in accordance with DOT regulations and applicable service regulations. Test personnel would be transported on-island by shuttle buses or dedicated test site passenger vans. Though increases in road traffic are typical for launch periods, the use of vans and buses would further lower the effects of launches on area ground transport.

Water Transportation

Before missile launch, Range Safety officials would issue NOTMARs, which would identify areas to avoid and the times that avoidance of the area is advised. The Range Safety officials would then determine that the areas are clear of surface vessels; if ships or fishing boats are seen in a designated impact area, their cooperation would be requested to leave the area voluntarily. Missile launches would be put on hold until the impact area is cleared. Such measures are standard practices of limited duration and as such would have no impact on area water transportation.

4.1.8.3 Post Launch Test Activities

Utilities

Impacts on utilities from personnel would remain the same as previously mentioned in section 4.1.8.1, and would lessen as personnel were transported off-site.

Any solid waste materials generated would be disposed of according to applicable regulations and range procedures and policy by Point Mugu.

Transportation

After the second flight test of each caravan, the AWS equipment would be dismantled and packed for shipment back to Israel. This process would take approximately 1 month and would be accomplished in reverse manner as shipment to the United States. Thus the effects would basically be the same as during launch preparation, and no impacts are expected.

4.1.8.4 Cumulative Impacts

The potential cumulative impacts to infrastructure from activities associated with site preparation and the limited number of AWS launches would not be substantial. No cumulative impacts from proposed, current, and prior San Nicolas Island launches have been identified.

4.1.9 LAND USE—SAN NICOLAS ISLAND

4.1.9.1 System Transportation and Launch Preparation Activities

System transportation and launch preparation activities would involve the transportation and storage of missile components and emplacement of the CCA, including FCR, FCC, and associated support equipment to San Nicolas Island. All missile components and support equipment would be handled, labeled, and stored in accordance with all pertinent U.S. Customs/Department of Agriculture, FAA, DOT, OSHA, U.S. Air Force, and Navy safety and biological mitigation regulations/inspections for transportation by air and/or over land by trucks. Regulations/inspections would minimize the potential for significant adverse impacts to land use and provide a means of mitigating adverse effects should an improbable transportation mishap occur.

Storage of intercept missiles and their propellants would occur in separate existing storage areas designed for such use in accordance with all accepted governing standards. ESQDs would be established and maintained around storage facilities.

Before each launch, the target missile and necessary components would be moved from storage to a missile assembly building where it would be assembled and checked before being transported to the launch pad or other temporary Support Locations. Transportation of assembled target missiles and support components would use existing roads. All temporary island road closures would be of short duration and considered normal activity, failing to produce an adverse impact to land use.

Although the exact location of CCA components siting has yet to be determined, assembly and positioning would occur immediately upon arrival to San Nicolas Island. Assembly along with possible minor site preparations, to stabilize the already existing site, would only temporarily alter land use within the immediate vicinity. Such activity would be of short duration and considered a normal activity that would fail to produce a significant impact.

Immediate launch preparations scheduled at San Nicolas Island would follow standard evacuation procedures of the launch vicinity. During the time the interceptor missile booster is on the launch pad, potential impacts to land use could occur. Areas that are within the LHA would be cleared before launch and guarded to ensure they remain clear of all non-mission personnel. Temporary clearance of LHAs could have an impact on recreational and commercial use of these waters, particularly by the commercial and sportfishing industry. However, clearance and closures are considered normal operations. A notice of intent to clear hazardous areas would be broadcast throughout the local media. Furthermore, since the LHA would be activated infrequently and last only 1 hour or less, the impacts to land use are not considered significant.

4.1.9.2 Flight Testing and Test Mishaps

Launch operations would utilize one or more of the already existing launch sites (figure 2-18). No new LHA would be created or extended that would violate existing or off-base land uses. Accordingly, potential impacts to the California Coastal Zone would not occur.

Activities involving the operation of FCR and FCC would be contained within the operational trailers and only occur during times of ASIP exercises. Access to equipment and facilities would be limited to authorized personnel. Under the authority of the Range Safety Officer, each EMR hazard exclusion area would be cleared before operation.

Although operation of the associated support equipment would temporarily alter land utilization by preventing encroachment into the hazard exclusion area, changes or possible conflicts to land use would be confined to the previously disturbed immediate operational area and the EMR hazard exclusion area. Adjacent lands would not experience any changes or decrease in land utilization.

A pre-flight or early flight malfunction resulting in flight termination within the ROI would have a temporary impact on San Nicolas Island land use. In the event of an early flight termination within the boundaries of San Nicolas Island, target missile and/or debris recovery would follow applicable environmental regulations and range procedures as directed by the Range Safety Officer to minimize impacts on land use.

4.1.9.3 Post Launch Test Activities

As soon as the Range Safety Officer concludes that all hazardous areas are safe, all non-mission essential personnel would be allowed to return. Post-flight activities would also include removal of blast residue from the launch pad and other minor facility maintenance. These activities would be confined to areas currently used for similar launch activities having no effect on land use.

All ASIP operations involving the launch of Arrow missiles and CCA operations would be coordinated with the California Coastal Consistency Commission to ensure that the Proposed Action would be consistent with the California Coastal Zone Management Program.

4.1.9.4 Cumulative Impacts

The use of existing San Nicolas Island facilities to launch defensive missiles and operate CCA facilities and support equipment would not alter the overall land use and management of the island. Similarly, since the proposed activities would only use existing facilities and perform minor modifications on an installation already utilized for launching missiles, and all missile flight tests would be scheduled and approved by the Point Mugu Sea Range Safety Office providing advanced public notification of LHAs, the possibility of significant adverse, incremental cumulative land use impacts would be avoided.

4.1.10 NOISE—SAN NICOLAS ISLAND

The analysis in this section is concerned with human receptors; noise effects on wildlife are discussed under biological resources.

4.1.10.1 System Transportation and Launch Preparation Activities

Any modifications to existing sites would be minor. Noise from site preparation, including fiber optic cable installation, would comply with OSHA, the U.S. Army Corps of Engineers *Safety and Health Requirements Manual (EM 385-1-1)*, Range Safety requirements, and other recognized standards for operations that involve construction or facility modifications. A health and safety plan, requiring the use of hearing protection when appropriate, would be prepared to ensure heath and safety of onsite workers. With no known sensitive receptors within the vicinity, no noise impacts are expected.

The transportation of the AWS to San Nicolas Island would not affect existing noise levels as current modes of transportation and the existing airfield would be used. The transportation of the AWS would be conducted according to DOT regulations. The storage and assembly of the Arrow interceptor would be performed within the missile assembly building and would not have an impact on noise levels.

4.1.10.2 Flight Testing and Test Mishaps

Missile launches would increase ambient noise levels at San Nicolas Island for very short periods of time.

During launches, most personnel would be in the LCC or FCC and protected from noise levels. Other personnel would be required to be outside of the LHA, approximately 6,100 meters (20,000 feet) away. If personnel are required to be within the LHA, personnel protective equipment would be utilized in compliance with OSHA 29 CFR 1910.95.

In addition to the noise of the rocket engine, sonic booms are possible. A sonic boom is a sound that resembles rolling thunder, and is produced by a shock wave that forms at the nose of a vehicle that is traveling faster than the speed of sound. However, AWS launches would be in a westerly direction over the open ocean and a sonic boom would not occur over land. They are not expected to impact San Nicolas Island or any of the surrounding Channel Islands. Vessels potentially impacted by sonic booms would be expected to experience sound resembling mild thunder.

4.1.10.3 Post Launch Test Activities

Post-launch activities would include the dismantling and packaging of AWS equipment for return shipment. These activities are not expected to cause or contribute to noise impacts on San Nicolas Island.

4.1.10.4 Cumulative Impacts

No known sensitive noise receptors are in the vicinity; thus, no noise impacts are expected. Since the sound level generated by each launch is a short, discrete event, potential cumulative impacts to noise from AWS launches would not be substantial. It is not likely that the proposed action, in conjunction with currently planned or anticipated launches, would result in cumulative impacts.

4.1.11 WATER RESOURCES—SAN NICOLAS ISLAND

This section addresses potential impacts to surface water and groundwater resources. Both freshwater and marine surface waters are covered. Potential changes in the availability of water supplies for consumptive purposes are also addressed. None of the action alternatives would involve the construction of new facilities in a floodplain; therefore, floodplain-related impacts are not addressed. Wetland-related impacts are addressed in section 4.1.3.

Best Management Practices and other procedures would be used during construction and operational activities to minimize erosion and other types of impacts that could reduce the quality of affected water resources. Water quality-related procedures that apply to each of the action alternatives are listed below.

- Site preparation—vegetation preservation and protection, topsoil preservation, dust control, and temporary gravel construction entrance and exit
- Surface stabilization—temporary and permanent seeding and use of mulches and fabric and gravel blankets
- Runoff control and conveyance measures—installation of diversions, dikes, grassed waterways, and temporary slope drains
- Sediment barriers—straw bale and rock barriers, sediment fences

- Sediment traps and basins
- Stream protection—temporary stream crossings and streambank stabilization
- Protection of soil and fill storage piles

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

4.1.11.1 System Transportation and Launch Preparation Activities

Implementation of the ASIP would result in minor modifications of the Rock Crusher site, the Vandal Launch Pad, or the Miscellaneous Pad site on San Nicolas Island. Potential sites for locating the CCA or the launch support equipment would also require minimal disturbed area. The cumulative disturbed area at San Nicolas Island would be approximately 0.1 hectare (0.25 acre). In the event that fiber optic cable is installed underground, additional ground disturbance would occur. If the disturbed area would be 0.4 hectare (1 acre) or greater, modification of the National Pollutant Discharge Elimination System permit would be required. Implementation of Best Management Practices and other procedures would be expected to minimize water quality impacts. Only minor erosion and turbidity impacts, and insignificant and accidental spillage of petroleum products and other construction materials would be expected. The procedures in place at San Nicolas include such measures as collecting and disposing of sewage off-site, monitoring of soil conditions, periodic inspection to ensure erosion and sediment control structures are working properly, hazardous waste management measures and off-site disposal, post-launch monitoring and revegetation of areas around launch sites if needed.

4.1.11.2 Flight Testing and Test Mishaps

The Arrow interceptor propellant consists of HTPB, ammonium perchlorate, and aluminum powder. It is anticipated that the levels of exhaust emissions of the interceptor would be similar to previously launched vehicles at San Nicolas Island. Due to the mobile nature of the missile itself, only a small portion of the launch exhaust would be emitted near the ground and these emissions would have a minimal impact on regional water quality.

In the event of a testing mishap, including termination of the flight on the launcher/launch pad, termination of a flight shortly after liftoff or termination of a flight after it has exited the vicinity of the launcher/launch pad, the potential results would cause localized, short-term impacts to water quality in the form of combustion by-products and potentially hazardous materials seeping into regional water. Provisions would be made for the availability of fire suppression, hazardous materials emergency response, and emergency medical teams during launch operations. These provisions would result in only a short-term, localized impact to regional water quality.

4.1.11.3 Post Launch Test Activities

At the conclusion of testing activities, Arrow program personnel would remove all mobile equipment/assets brought to the range. 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.

4.1.11.4 Cumulative Impacts

The Proposed Action, in conjunction with other proposed or planned activities at San Nicolas Island, would not exceed the limits established in the Point Mugu EIS; therefore, no cumulative impacts on water resources are expected.

4.2 POINT MUGU

4.2.1 AIR QUALITY—POINT MUGU

4.2.1.1 System Transportation and Launch Preparation Activities

System transportation to Point Mugu would be intermittent and in accordance with DOT rules and regulations. A measurable impact on regional air quality surrounding Point Mugu would not occur.

Facilities at Point Mugu, including the Alpha Complex, the Nike Zeus site, and administrative and equipment storage space, would be used for AWS support and no permanent facility construction would be required. Minor alterations and changes to existing facilities and areas would be needed. Any construction required for these changes would be minimal. It is likely that construction would result in short-term emissions of PM-10 due to dust being entrained in the air. However, the dust would tend to settle quickly, and impact would be most evident in limited area around the site, but impact to regional air quality would be negligible.

4.2.1.2 Flight Testing and Test Mishaps

The Proposed Action would require the use of either generators or connection to the range electrical supply system to provide appropriate power. Generator engines associated with ASIP are exempt from permit requirements because the equipment qualifies as Military Tactical Support Equipment under California's Portable Equipment Registration Program. As such, impacts to regional air quality would not be expected.

4.2.1.3 Post Launch Test Activities

Post launch activities would include the dismantling and removal of all AWS equipment and assets brought to Point Mugu. This removal would cause a negligible impact to air quality resulting from slightly increased vehicular emissions and localized amounts of fugitive dust (PM-10).

4.2.1.4 Cumulative Impacts

No exceedances of air quality standards or health-based standards of non-criteria pollutants are anticipated.

4.2.2 AIRSPACE—POINT MUGU

4.2.2.1 System Transportation and Launch Preparation Activities

System transportation and launch preparation activities would involve transportation, storage, and positioning of the Arrow FCC and FCR components to Point Mugu. Transportation, storage, positioning and other minimal launch preparation activities would not restrict a clear view of runways, helipads, taxiways, or traffic patterns from the airport air traffic control tower, decrease airport capacity or efficiency, affect future VFR or IFR, affect the usable length of an existing or planned runway, or constitute an obstruction to air navigation. Therefore, no impacts to airspace would occur from transportation or launch preparation activities associated with Point Mugu.

4.2.2.2 Flight Testing and Test Mishaps

The proposed flight activities would not restrict access to or affect the use of the existing public use airports and airfields. Similarly, existing airfield/airport arrival and departure traffic flows would not be affected. Program activities would utilize the existing Special Use Airspace, Restricted Area R-2519. Although the nature and intensity of utilization varies over time and by individual operational area, the proposed activities do not represent a direct adverse impact on Special Use Airspace. Rather, they represent precisely the kinds of activities for which Special Use Airspace was created—to accommodate national security and necessary military activities and to confine or segregate activities considered to be hazardous to nonparticipating aircraft.

The proposed use of the FCR radar on Point Mugu would necessitate advising non-participating aircraft to avoid the radar areas and the associated EMR emissions. Operation of the FCR radar has the potential for interference with airborne weather radar systems. However, aircraft would be notified by the issuance of NOTAMs to advise avoidance of the FCR radar area during program activities. Moreover, the FCR radar area is likely to be contained within Restricted Area R-2519.

The unlikely event of an early flight termination or test mishaps would be associated with launch locations. Therefore, no impact to airspace within the ROI due to flight termination or test mishaps would occur concerning Point Mugu.

4.2.2.3 Post Launch Test Activities

After the second flight test of each caravan, the AWS equipment would be dismantled and transported in the reverse manner as shipped to the United States. Such impacts to airspace would be the same as described in section 4.2.2.1. In addition, no post-launch impacts are expected to occur concerning the release of restricted airspaces and warning areas to normal non-hazardous use. Therefore, no impacts to regional airspace would be expected from post-launch activities.

4.2.2.4 Cumulative Impacts

The operation of the Arrow FCC and FCR would only occur for a short-term and the associated restricted/warning area airspaces released to other users immediately after each test flight. The required scheduling process for the use of airspace within restricted and warning areas would

obviate the potential for cumulative impacts; therefore, cumulative impacts to airspace use are considered not significant in this scenario. The impact upon the air traffic control system could be reduced by timely and responsive scheduling during low-traffic hours. The required coordination procedures with the FAA and scheduling requirements of the test range minimize any potential impacts so that no additional mitigation measures have been identified as necessary for the proposed test flights.

4.2.3 BIOLOGICAL RESOURCES—POINT MUGU

4.2.3.1 System Transportation and Launch Preparation Activities

AWS components would be transported to Point Mugu by commercial sealift and/or airlift. The Point Mugu airfield would be used for offloading and reloading at departure. Cargo transported by sea would arrive at Port Hueneme, California. The AWS equipment would be offloaded and then transported by road to final emplacement sites on Point Mugu. Transportation activities would occur on routes and/or roads currently used for similar maneuvers and would follow existing applicable regulations. All transportation of equipment and materials such as fuels would be conducted in accordance with DOT regulations and applicable service regulations. Adherence to standard operating procedures for spill prevention, containment, and control measures while transporting equipment and materials would preclude impacts to biological resources. No permanent facility construction is planned at Point Mugu. All AWS components would be placed on graded and packed earth or existing concrete or steel matting.

No interceptor launches would occur from Point Mugu. The CCA, including the FCR, FCC, and associated equipment, would be emplaced and operated at Point Mugu. If the FCR is located at the Alpha Complex on Point Mugu, along with the FCC, additional concrete pads may be required. This would take place within a previously disturbed area with minor to no impacts to biological resources. Structures or equipment at the Alpha complex that create perching sites for predatory birds, such as lightning protection poles, would be outfitted with anti-perching materials in coordination with the Naval Base Ventura County environmental division.

4.2.3.2 Flight Testing and Test Mishaps

The potential for impacts to biological resources from operation of the FCR would be the same as those described above for San Nicolas Island. In terms of the potential for EMR impacts to wildlife, the power densities emitted from the FCR are unlikely to cause any biological effects in animals or birds. As stated in section 4.1.3.2, the FCR is not expected to radiate lower than 5 degrees. This would preclude EMR impacts to species on the beach, such as nesting snowy plovers. To remain in the radar beam for any period would require the bird to fly directly along the beam axis or hover there for a significant period of time. Since the birds are not likely to remain continuously within the radar beam, the likelihood of harmful exposure is not great. Personnel would be instructed to avoid snowy plover beach habitat during the nesting season. The proposed fence around the FCR perimeter would keep personnel restricted to the work area. The fence would be designed to minimize perching in the area. Program activities would be conducted in accordance with any existing Point Mugu environmental restrictions. The use of existing sensors is part of routine activities on Point Mugu.

4.2.3.3 Post Launch Test Activities

After the second flight test of each caravan, the AWS equipment would be dismantled and packed for shipment back to Israel. Impacts would be the same as discussed in section 4.2.3.1.

4.2.3.4 Cumulative Impacts

The potential cumulative impacts to biological resources from activities associated with site preparation and operation of AWS components and equipment on Point Mugu would not be substantial. No cumulative impacts from proposed, current, and prior Point Mugu activities have been identified.

4.2.4 CULTURAL RESOURCES—POINT MUGU

4.2.4.1 System Transportation and Launch Preparation Activities

If Arrow interceptor launches occur from San Nicolas, facilities at Point Mugu Main Base would be used for support. Facilities proposed for use at Point Mugu include the Alpha Complex, the Nike Zeus site, and administrative and equipment storage space. No permanent facility construction would be planned at the Point Mugu Main Base. All AWS components would be placed on previously disturbed, graded, and packed earth or existing concrete or steel matting.

Should the FCR be located at Point Mugu Alpha Complex, along with the FCC, additional construction would be needed for the site. This area has been previously disturbed, and impacts to cultural resources are not anticipated.

An existing room within the Range Operations facility would be used to house the Arrow TMCC communications and electronics equipment consoles. Minor room alterations would be required; however, these alterations would not have any adverse impacts to cultural resources.

As project details are further delineated, coordination would occur with the Point Mugu Environmental Project Office to further ensure that cultural resources would be protected. If previously undocumented cultural resource items are found during excavation, grading, or other ground-disturbing activities, work would immediately cease. In addition, work would be temporarily suspended within an area surrounding the discovery of the cultural resources until it has been properly evaluated and secured. Any discovery of previously unidentified cultural resources would be reported to the Point Mugu Environmental Project Office.

Potentially adverse effects to historic and prehistoric resources could also occur as a result of the unauthorized collection of artifacts by flight preparation personnel. Personnel would receive a brief orientation involving a definition of cultural resources and protective federal regulations.

4.2.4.2 Flight Testing and Test Mishaps

Actual flights would not occur from Point Mugu; therefore, there would be no impacts to cultural resources due to flight testing or test mishaps.

4.2.4.3 Post Launch Test Activities

At the conclusion of testing activities, Arrow program personnel would remove all mobile equipment/assets brought to the range. 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.

4.2.4.4 Cumulative Impacts

It is not likely that the Proposed Action, in conjunction with current planned or anticipated launches, or construction activities would exceed the level of activity established for Point Mugu in the Point Mugu EIS. Combined activities would be performed at different times and locations; therefore, no significant cumulative impacts to cultural resources are anticipated at Point Mugu.

4.2.5 GEOLOGY AND SOILS—POINT MUGU

4.2.5.1 System Transportation and Launch Preparation Activities

The Point Mugu airfield would be used for offloading and reloading at departure. Transportation activities would occur on routes and/or roads currently used for maneuvers and would follow existing applicable regulations. All transportation of equipment and materials such as fuels would be conducted in accordance with DOT regulations and applicable service regulations. Adherence to standard operating procedures for spill prevention, containment, and control measures while transporting equipment and materials would minimize impacts to geology and soils.

The CCA, including the FCR, FCC, the calibration antenna, and associated equipment, would be emplaced and operated at Point Mugu. Facilities proposed for use at Point Mugu include the Alpha Complex for the CCA, the Nike Zeus site for the calibration antenna, Building 53 for the TMCC, and administrative and equipment storage space. No permanent facility construction would be planned at the Point Mugu Main Base. All AWS components would be placed on previously disturbed, graded, and packed earth or existing concrete or steel matting with minor to no impacts to geology and soils.

4.2.5.2 Flight Testing and Test Mishaps

No interceptor launches would occur from Point Mugu. Therefore, there would be no impacts to geology and soils due to flight testing or test mishaps.

4.2.5.3 Post Launch Test Activities

After the second flight test of each caravan, the AWS equipment would be dismantled and packed for shipment back to Israel. Impacts would be less than those discussed in section 4.2.5.1.

4.2.5.4 Cumulative Impacts

No launches would occur at Point Mugu. Because no direct soils and geologic impacts would result from the proposed activities at Point Mugu, there would be no cumulative soils and geologic effect.

4.2.6 HAZARDOUS MATERIALS AND WASTE—POINT MUGU

4.2.6.1 System Transportation and Launch Preparation Activities

The potential hazards associated with the transportation and handling of ASIP/AWS components such as the Arrow CCA/FCR prior to and during launch preparation are similar to those discussed in section 4.1.6. No ordnance would be transported to Point Mugu.

No new permanent facilities would be required to support Arrow CCA at Point Mugu. Any modification to existing facilities would be minor and occur in previously disturbed areas. Any construction/facility modification would be completed in accordance with host installation guidelines and regulations and therefore would not be considered significant.

Approximately 19,000 liters (5,000 gallons) of diesel fuel would be required for the CCA generators. This amounts to a two-day fuel supply. Fuel would be stored in a tanker in the vicinity of the generators. Gasoline would also be required for ASIP over-road vehicles. The quantities and types of lubricating oils/hydraulic fluids would vary depending on fill-up requirements and maintenance schedules. The FCR cooling system would be comprised of approximately 3,629 kilograms (8,000 pounds) of an ethylene glycol and water mixture (50 percent water). This is expected to be a one-time requirement. The fuel tanker, generators, FCR, and cooling unit would have secondary containment to restrict/collect potential spills and leaks. The tanker and ASIP equipment would be routinely inspected. No new procedures would be required to store or use these materials. Therefore, the short-term impact from the use of hazardous materials at Point Mugu for ASIP launch preparation activities would not be considered significant.

Point Mugu would serve to support ASIP/AWS operations on San Nicolas by transport of materials to the Island. The increases in the amount of hazardous materials used in both the full and split deployment scenario would therefore result in added throughput in the Point Mugu Sea Range Supply Department. However, this increase is not expected to be significant. Actual procurement, handling and use of hazardous materials at San Nicolas Island and Point Mugu for Arrow launches would be the responsibility of the ASIP/AWS operations. San Nicolas and Point Mugu personnel would provide oversight to ensure that operations are conducted in accordance with state and federal requirements and established Range/base policies and procedures.

4.2.6.2 Flight Testing and Test Mishaps

No missile launches would occur from Point Mugu. In the full deployment scenario, Range support operations at Point Mugu would increase. Support operations would include servicing of the Arrow systems/components by transport of personnel, replacement parts/equipment and materials to San Nicolas Island and would result in a minor increase of hazardous materials use and handling. Impacts are most likely to arise from an increase in the amount of fuel required

for ASIP/AWS support and operation. Support to San Nicolas is considered routine and this small increase in servicing operations would not significantly affect the existing hazardous materials management system. Impacts to fuel storage and throughput would be short-term. Therefore, no significant impact to ongoing operations at Point Mugu from ASIP/AWS activities is expected.

4.2.6.3 Post Launch Test Activities

ASIP equipment and assets brought to Point Mugu would be dismantled and removed following completion of test activities. As such, waste oils, fuels, spent coolants, and solvents may be generated. Similar wastes are currently generated from ongoing activities at Point Mugu and the quantity of potentially hazardous waste generated would not likely be significant. The hazardous material/hazardous waste management systems currently in place at Point Mugu are designed to prevent releases of hazardous materials to the environment, where their presence could create a contamination issue. Consequently, the management systems emphasize the need to use or dispose of all materials in a timely and acceptable manner, in accordance with applicable regulatory and public policy requirements.

Hazardous waste generated by ASIP operations would be stored at hazardous waste accumulation areas at Point Mugu. It is expected that these accumulation areas would be able to accommodate the limited quantity of hazardous waste generated by the ASIP operations. Transportation of ASIP-generated hazardous wastes would occur along with other hazardous wastes from Point Mugu, with all shipping and disposal procedures performed in accordance with RCRA and DOT requirements. The procedures and infrastructure at Point Mugu are sufficient to accommodate the hazardous waste produced by the proposed ASIP test operations. There would be no requirement to obtain additional hazardous waste permits through the California Department of Toxic Substances Control for ASIP hazardous waste operations.

Proper management of ASIP-associated hazardous materials and waste would preclude any impact due to their accumulation in the environment as a result of routine usage/generation. In the event of an unplanned release, Point Mugu has emergency response procedures to aid in the evaluation and cleanup of any hazardous materials released.

No significant long-term adverse impacts to current hazardous waste management practices from post-launch test activities are anticipated.

4.2.6.4 Cumulative Impacts

Impacts from ASIP support and operation are most likely to arise from an increase in the amount of fuel required. Impacts to fuel storage and throughput from implementation of the ASIP operation would be less than significant. The use of the required reporting process and adherence to applicable base procedures and DoD directives concerning hazardous material handling and tracking and hazardous waste disposal would preclude the potential for significant incremental, additive cumulative impact to hazardous materials and waste management practices at Point Mugu. Additional activities at Point Mugu could further increase hazardous materials used and hazardous waste produced, but the current system is capable of meeting any foreseeable increase efficiently and without incident.

4.2.7 HEALTH AND SAFETY—POINT MUGU

4.2.7.1 System Transportation and Launch Preparation Activities

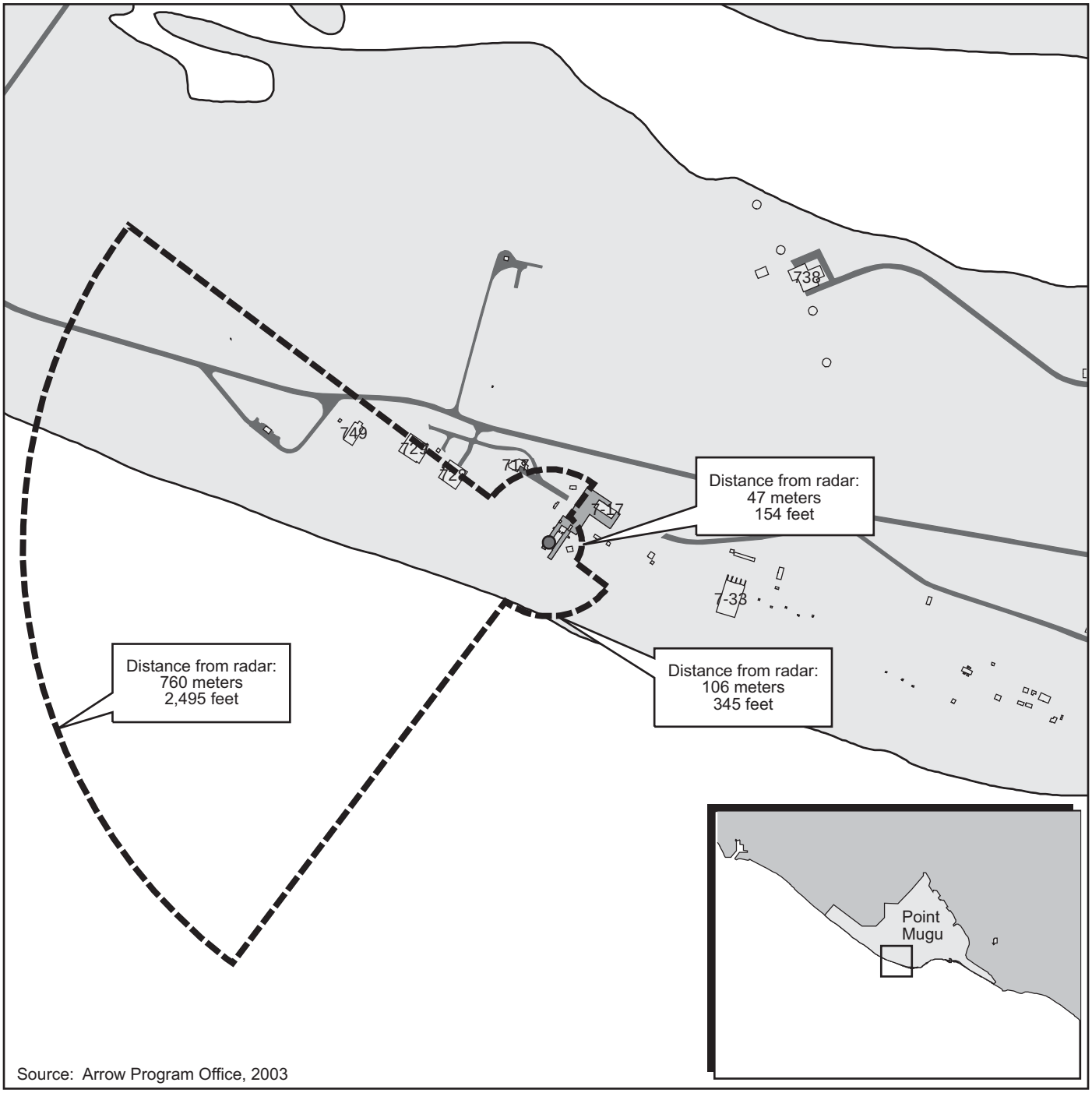
Transportation, handling, and storage of all ASIP equipment and assets, such as the CCA, shall be in accordance with DOT, DoD, and existing Point Mugu Sea Range and Point Mugu protocol and procedures. Since the FCR is similar to radar currently used at Point Mugu, transportation can be accomplished via existing base infrastructure, without necessitating revised safety procedures or unusual requirements.

Readying the CCA for a launch would use limited quantities of potentially hazardous materials, such as fuels, lubricants, hydraulic fluids, and coolants (ethylene glycol). Similar materials are currently in use at Point Mugu radar operations; therefore, the ASIP/AWS operations would not be expected to impact current health and safety training and monitoring practices or personal protection equipment.

Point Mugu would support ASIP/AWS operations on San Nicolas by supply and transport of materials such as nitrogen gas (once per week), fuels, lubricants, hydraulic fluids, and coolants to the island. However, this increase in materials handling would be short-term, and the quantities are not expected to be significant. Actual procurement, handling, and use of hazardous materials for Arrow launches would be the responsibility of the ASIP/AWS operations; however, San Nicolas and Point Mugu personnel would provide oversight to ensure that operations are conducted in accordance with established Point Mugu Sea Range and base safety procedures. Transportation, handling, and storage of all potentially hazardous materials would be in accordance with DOT, DoD, and existing Range/Point Mugu protocol and procedures. As such, chemicals and compressed gases would be packaged separately in canisters, rigid or metal boxes according applicable hazard classification. Explosion mats, overpacks, and safety pins/harnesses would be used. Fire suppressants and absorbents would be available on transport vessels and in storage areas. No impact to current health and safety practices is expected.

4.2.7.2 Flight Testing and Test Mishaps

There are numerous EMR sources and emitters at Point Mugu. When these sources are active and producing EMR, they can potentially cause hazards to personnel, ordnance and fuel. The potential hazards associated with these radar and other electromagnetic sources are similar to those discussed in section 4.1.7. During the siting process for any new EMR source, such as the Arrow FCR, HERP, HERO, and HERF analyses, as discussed in section 4.1.7, are conducted to assess the potential hazards posed by any additional EMR source and to assure safe operations and noninterference with Range instrumentation, aircraft or seacraft, to personnel, ordnance, and fuel. Hazard areas for personnel, ordnance, and fuel would be established, if required. The hazard areas would be plainly marked on base maps as circular arcs. Preliminary analyses using worse case scenario calculations indicate there are no potential HERP, HERO, and HERF hazards associated with locating the proposed Arrow FCR at the Alpha site (figures 4-3 and 4-4).



EXPLANATION

- Water
- Point Mugu
- Hazard of Electromagnetic Radiation to Personnel (HERP)
- Radar
- Alpha Site
- Buildings

Scale

0 107.9 215.8 meters

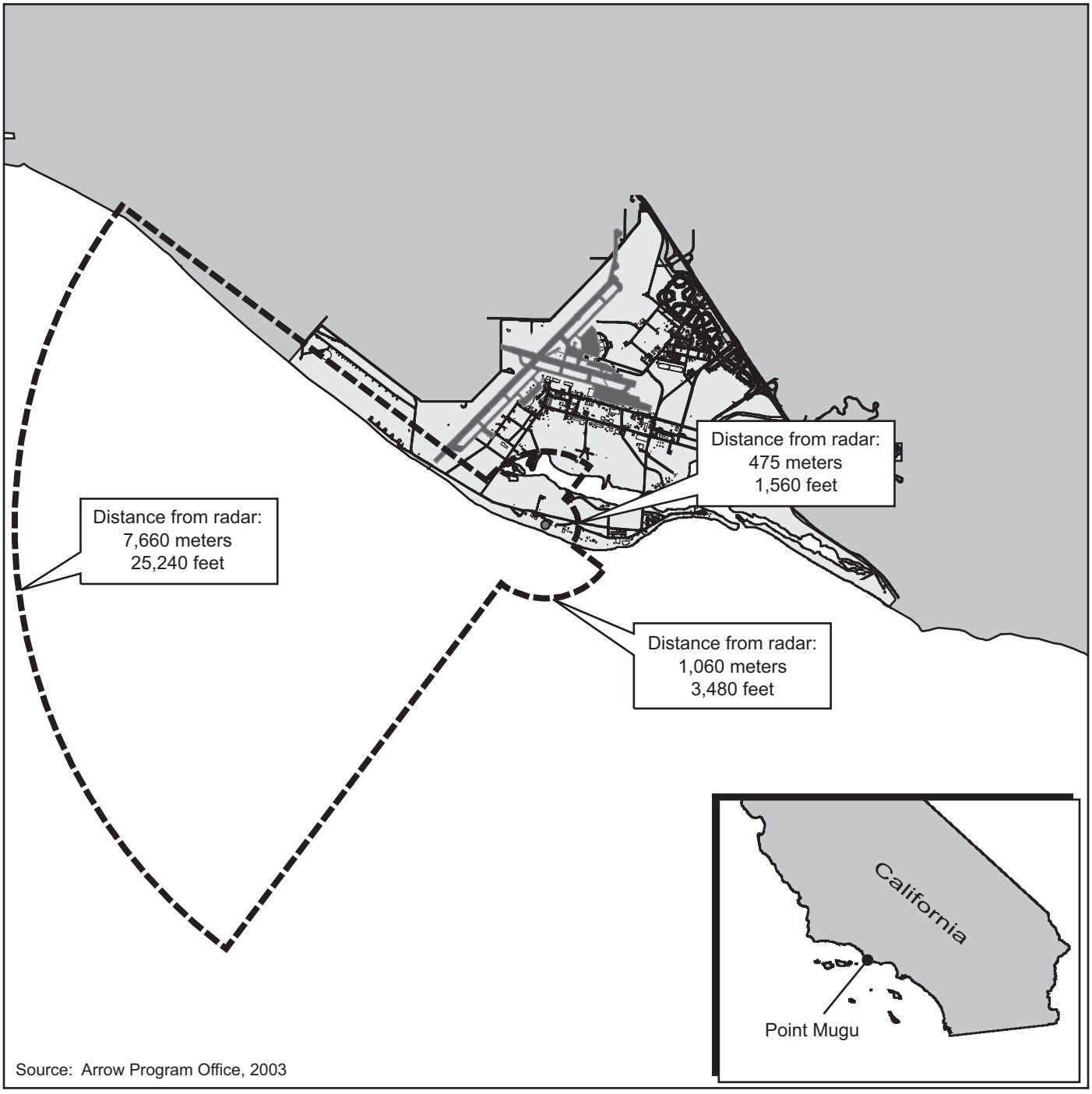
NORTH 0 354 708 feet

10-14-03 Pt Mugu HERP

Hazards of Electromagnetic Radiation to Personnel (HERP) at Point Mugu

Point Mugu, California

Figure 4-3



EXPLANATION

- Water
- Land
- Point Mugu
- Hazards of Electromagnetic Radiation to Ordnance (HERO)
- Roads
- Buildings
- Radar

Scale

0 1 2.1 kilometers

0 0.65 1.3 miles

NORTH

10-14-03 Pt Mugu HERO

Hazards of Electromagnetic Radiation to Ordnance (HERO) on Point Mugu

Point Mugu, California

Figure 4-4

Preliminary exclusionary distances based on FCR operation at maximum radiated power levels are:

- HERF:
  - 71 meters (232 feet) - (Main beam - over ocean)
  - 10 meters (32 feet) - (Side lobe)
  - 4.4 meters (14 feet) - (Back lobe)
- HERP:
  - 760 meters (2,495 feet) - Controlled Environment - (Main beam - over ocean)
  - 106 meters (345 feet) - (Side lobe)
  - 47 meters (154 feet) - (Back lobe)
- HERO:
  - Main beam
  - Unsafe = 7,660 m (25,240 feet) - (pointed over ocean)
  - Susceptible = 4,270 meters (14,000 feet)
- Side Lobe
  - Unsafe = 1,060 meters (3,480 feet)
  - Susceptible = 590 meters (1,940 feet)
- Back Lobe
  - Susceptible = 265 meters (870 feet)
- Low Power
  - Unsafe = 3.1 meters (10 feet)
  - Susceptible = 1.7 meters (6 feet)

Actual power limits of the FCR during day to day operations would be far less than the maximum radiated power levels used for the preliminary analysis. Therefore, actual HERO, HERF, and HERP exclusionary distances would likely be reduced. In addition to maintaining exclusionary distances, fuel, ordnance, and personnel exposure would be further minimized by coordinating Range activities around the Alpha site with scheduled periods of FCR operations. (Peppers, 2003a).

FCR operators would be reviewed and monitored to ensure that EMR sources are being used in accordance with published safety procedures. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a) In addition, radar emission detectors would be installed around the CCA and would be connected to the FCR where the detectors are monitored. The monitors would sound an alarm if the radiation exceeds the safety level or if the connection to the detectors fails.

4.2.7.3 Post Launch Test Activities

ASIP equipment and assets brought to Point Mugu would be dismantled and removed following completion of test activities. As such, no change in safety protocol or significant impact to health and safety is expected.

4.2.7.4 Cumulative Impacts

The increased use of radar and the transport of potentially hazardous materials associated with ASIP operation represent a small short-term increase in potential safety risk at Point Mugu. These potential increases in risk would not represent a significant impact to existing safety operations and procedures. Safety standards are high at Point Mugu and would serve to keep the total safety impacts attributable to all operations within acceptable standards to both workers and the public.

The required siting and monitoring process and adherence to applicable range safety procedures and DoD directives concerning EMR would preclude the potential for any significant incremental, additive cumulative impact at Point Mugu. Additional activities at Point Mugu could further increase potential EMR safety risk, but the current system is capable of meeting any foreseeable increase efficiently and without incident.

Radar and other potential electromagnetic sources are situated and operated to minimize potentially hazardous situations. The Navy requirements and local Range procedures are covered by OPNAVINST 5100 23D and NAWSPMINST 5100.1, Chapter 2 (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a). Since Point Mugu has established procedures in place to minimize or prevent exposure to mission critical personnel or the general public to EMR and because of controlled access to the base, the impact of FCR use in the event of split deployment is expected to be less than significant.

Also, the concept of time averaging is important in consideration of the potential cumulative exposures that might occur near operating radars. Because tracking and search radar beams move rapidly, depending on the particular mission or exercise, it is unlikely that environmental exposures would ever consist of continuous, constant values of power density. Rather, almost universally, exposures would be intermittent and, when the radars are transmitting, the electromagnetic fields would be constantly changing in intensity. Thus, the potential for additive, incremental cumulative impacts from EMR exposure is extremely limited.

4.2.8 INFRASTRUCTURE—POINT MUGU

Two configurations for the AWS deployment at Point Mugu Sea Range are currently being investigated and evaluated. The first configuration would position the entire AWS on San Nicolas Island. The other, a “split deployment,” would result in the Arrow CCA, consisting primarily of FCC and FCR elements, being located on Point Mugu’s mainland. AWS components, support equipment, and program personnel would begin to arrive at the test range approximately 2 to 3 months before a scheduled launch. Building 7-17 (the “Alpha Complex”) at Point Mugu is a potential location for the miscellaneous flight readiness testing that would occur during this time period.

Over the 4 to 5 months required for each caravan, a maximum of about 80 personnel would be located at the range to perform pre-launch, launch/intercept, and post-launch operations.

4.2.8.1 System Transportation and Launch Preparation Activities

Energy

System-specific equipment within the CCA would derive their power from a No Break System run by a 1250-kW main generator, with a 250-kW backup generator also available. Non-system-specific facilities would derive their power from available commercial power.

The CCA would have two different and separated electrical power systems: one, a generator electrical system for the AWS test operational components (cooling system, antenna, FCR, etc.), and second, an electrical system feeding the CCA administrative systems (e.g., area lights, buildings, etc.). The administrative electrical system may either be connected to the range electrical supply system or to separate generators. Electrical boards at the sites would be sealed for seashore environmental conditions. Power use would be typical for Point Mugu and of limited duration. The use of self-contained generators would also lessen potential impacts on Point Mugu energy levels. Even given requirements for non-system-specific facilities, use of commercial power is currently only at 18.2 percent of total capacity and would more than accommodate project requirements. No impacts to available energy levels are anticipated.

Water

Point Mugu's existing water system has a capacity of 22.0 million liters (5.8 million gallons) per day, while average demand is some 6.1 million liters (1.6 million gallons) per day, or about 28 percent of the capacity. Assuming a typical demand of 189 liters (50 gallons) of potable water per day per person, there would be a maximum demand of 3,785 liters (1,000 gallons) per day for 20 personnel for the full deployment, and 15,142 liters (4,000 gallons) of water per day for 80 personnel for the split deployment scenario. Even given maximum project demands of the split deployment, amounting to an increase of only about 0.068 percent, Point Mugu's water system would easily handle project requirements. No impacts to available potable water systems/levels would be expected.

Wastewater

The currently configured capacity of Point Mugu's wastewater treatment system is 15.2 million liters (4 million gallons) per day, with a load of about 1.8 million liters (480,000 gallons) per day, or about 12 percent of total capacity. Even given an anticipated typical demand of 3,406 liters (900 gallons) for 20 personnel for the full deployment, or an average demand of 13,627 liters (3,600 gallons) of wastewater per day, or 0.09 percent of available capacity, for the maximum 80 personnel involved during a split deployment, the system would easily handle wastewater requirements. No impacts to wastewater services would be expected.

Solid Waste

Solid waste from Point Mugu is collected by private contractor and taken to an off-base transfer station before being delivered to a landfill. Project-related demands would be handled in this manner; the procedure would be considered typical of operations of this kind and produce no effect other than temporary increases in transfer needs due to limited increases in solid waste produced.

Aviation Transportation

Transportation of the AWS components to Point Mugu Main Base would be accomplished by commercial sealift and/or airlift. For cargo transported by air, the first port of entry into the United States is not known at this time, but would require U.S. Customs/Department of Agriculture inspection before continuing to the final destination at Point Mugu. Any subsequent airfield nodes utilized before reaching final destination would be required only for refueling operations or for emergencies. The airfield at Point Mugu would be the final destination for the FCR operations. It is anticipated that the only requirement at this node is for airfield/runway operations such as offloading upon arrival and reloading upon departure. The AWS would be transported to Point Mugu over a period of 30 days.

Adherence to standard operating procedures for spill prevention, containment, and control measures while transporting equipment and materials would preclude safety impacts to aviation transportation. Use of the airfield would be intermittent during this phase and its use considered typical, producing no impact on aviation transport.

Ground Transportation As necessary, the Point Mugu motor pool would provide all vehicles. Transportation activities would occur on routes and/or roads currently used for similar maneuvers and would follow existing applicable regulations. All transportation of equipment and materials such as fuels would be conducted in accordance with DOT regulations and applicable service regulations.

Adherence to standard operating procedures for spill prevention, containment, and control measures while transporting equipment and materials would preclude safety impacts to ground transportation. Average daily traffic would increase, but the increase would be considered a typical “ramping up” for launch preparations and would be considered routine and of no impact. Existing on-base roadways are adequate to cover current and projected traffic loads, and should accommodate project-related increases which would be minimal and of limited duration. No impacts to area roadways are anticipated.

Water Transportation

Transportation of the AWS components to Point Mugu Main Base would be accomplished by commercial sealift and/or airlift. For cargo transported by sea, the first port of entry into the United States would be the port facilities at Port Hueneme, California. The port requirements would include unloading docks for commercial freighters, secure and temporary storage for U.S. Customs inspection of the AWS, and loading facilities for barge operations. The AWS equipment would then be transported by road to the final emplacement sites at Point Mugu. Adherence to standard operating procedures for spill prevention, containment, and control measures while transporting equipment and materials would preclude impacts to water transportation.

4.2.8.2 Flight Testing and Test Mishaps

Since actual flight testing would not occur from Point Mugu, there would be no impacts from flight testing or test mishaps to the infrastructure. Limited impacts would come from on-site personnel engaged in any required testing. These levels of use and their effects are covered in 4.2.8.1.

4.2.8.3 Post Launch Test Activities

No impacts upon infrastructure from post-launch activities are anticipated.

Utilities

Effects on Point Mugu utilities from personnel would remain the same as previously mentioned in section 4.2.8.1, and would lessen as personnel were transported off-site.

Energy

There would be no expected increase in demand to current power supply resulting from post-launch activities.

Water

Any potential water use resulting from post-launch activities would be minimal and would not substantially increase demand on available base water supply.

Wastewater

The potential increase in wastewater generated from post-launch activities would be minimal and would not substantially increase demand on base wastewater handling capacity.

Solid Waste

Any solid waste materials generated would be disposed of according to applicable regulations and range procedures and policy by Point Mugu. Typically, this involves collection of solid waste from Point Mugu by private contractor and taken to an off-base transfer station before being delivered to a landfill. The potential increase in solid waste levels during post-launch activities would be minimal and would not substantially increase demand on the waste-handling capacity.

Transportation

Following test activities, projected-related materials would be dismantled and repacked for shipment. As stated in section 4.1.8.3, this process would be accomplished in reverse manner as in its original shipment to the United States. Thus, the effects on transportation would basically be the same as during the launch preparation period, and no impacts are expected.

4.2.8.4 Cumulative Impacts

The potential cumulative impacts to infrastructure from activities associated with site preparation and the limited number of AWS launches would not be substantial. No cumulative impacts from proposed, current, and prior Point Mugu launches have been identified.

4.2.9 LAND USE—POINT MUGU

4.2.9.1 System Transportation and Launch Preparation Activities

AWS transportation and launch preparation activities would involve the transportation, storage and emplacement of the CCA, including FCR, FCC, and associated equipment to Point Mugu.

All missile components and support would be handled, and labeled in accordance with all pertinent U.S. Customs/Department of Agriculture, FAA, DOT, OSHA, U.S. Air Force, and U.S. Navy safety regulations/inspections for transportation by air and/or over land by trucks. Regulations/inspections would minimize the potential for significant adverse impacts to land use and provide a means of mitigating adverse effects should an improbable mishap occur.

Upon arrival at Point Mugu, CCA components would be assembled and positioned utilizing the Point Mugu Alpha Complex and Nike Zeus site for the calibration antenna. Assembly along with possible minor site preparations, to stabilize an already existing site, would only temporarily alter land use within the immediate vicinity. Such activity would be of short duration and considered normal activity that would fail to produce a significant impact.

4.2.9.2 Flight Testing and Test Mishaps

Activities involving the operation of FCR and FCC would be contained within the operational trailers and only occur during times of ASIP exercises. Access to equipment and facilities would be limited to authorized personnel. Under the authority of the Range Safety Officer, each EMR hazard exclusion area would be cleared before operation.

Although operation of the associated support equipment would temporarily alter land utilization by preventing encroachment into the hazard exclusion area, changes or possible conflicts to land use would be confined to the previously disturbed immediate operational area and the EMR hazard exclusion area. Adjacent lands would not experience any changes or decrease in land utilization.

The unlikely event of an early flight termination or test mishaps would be associated with launch locations. Therefore, no impact to land use within the ROI due to flight termination or test mishaps would occur concerning Point Mugu.

4.2.9.3 Post Launch Test Activities

As soon as the Range Safety Officer concludes that all hazardous areas are safe, all non-mission essential personnel would be allowed to return. After the second flight test of each caravan, the AWS equipment would be dismantled and transported in the reverse manner as shipped to the United States. Such impacts to land use would be the same as described in section 4.2.9.1. These activities would be confined to areas currently used for similar activities and have no affect on land use. Therefore, no impacts to the regional land use would be expected from post-launch activities.

All ASIP operations associated with the launch of defense missiles and CCA operations would be coordinated with the California Coastal Consistency Commission to ensure that the Proposed Action would be consistent with the California Coastal Zone Management Program.

4.2.9.4 Cumulative Impacts

Under the Proposed Action, the use of existing Point Mugu facilities to operate the CCA facilities and support equipment would not alter the overall land use and management of the base. Similarly, since the proposed activities would only use existing facilities and perform minor

modifications on a military installation already utilized for such activity, the possibility of significant adverse, incremental cumulative land use impacts would be avoided.

4.2.10 NOISE—POINT MUGU

The analysis in this section is concerned with human receptors; noise effects on wildlife are discussed under biological resources.

4.2.10.1 System Transportation and Launch Preparation Activities

Transportation of AWS components would not affect existing noise levels at Point Mugu and be conducted within DOT regulations. No permanent facility construction is planned to occur. Changes to existing facilities at Point Mugu would be minor. No noise impacts are anticipated from system transportation and launch preparations.

4.2.10.2 Flight Testing and Test Mishaps

No missile launches associated with the AWS would be launched from Point Mugu. Radar and support activities to San Nicolas Island at Point Mugu are ongoing activities and would not be expected to significantly increase noise levels beyond existing conditions.

4.2.10.3 Post Launch Test Activities

Post launch activities of dismantling and preparing AWS equipment for return shipment would be short-term and localized due to vehicular traffic and the dismantling of equipment. These activities are not anticipated to cause or contribute to noise impacts.

4.2.10.4 Cumulative Impacts

Proposed AWS activities would be typical of ongoing activities at Point Mugu. Use of current noise control practices and worker protection measures would preclude any significant increase in noise levels and would not cause cumulative impacts.

4.2.11 SOCIOECONOMICS—POINT MUGU

General socioeconomic impacts resulting from the Proposed Action can lead to an economic gain or loss for the community or area. Potential socioeconomic impacts of the project stem from construction or operational activities, the extent of displacement or modification of existing activities, and diversion or temporary suspension of access associated with the Proposed Action. Impact analysis would primarily focus on the following broad areas of economic or social impacts: displacement of populations, residences, or businesses; housing/accommodation availability; employment and income; growth inducement; and potential impacts to locally significant industries such as tourism, commercial fishing, or agriculture.

4.2.11.1 System Transportation and Launch Preparation Activities

ASIP components would be shipped to either the Main Base at Point Mugu or to San Nicolas Island via sea or air.

Implementation of the ASIP would result in modification of the Point Mugu Alpha Complex on the Main Base at Point Mugu. Construction personnel would be primarily associated with the Arrow program. Construction and modification materials and personnel would not represent a significant economic impact to the community.

Construction activities related to the ASIP would not cause any displacement of populations, residences, or businesses within Ventura County. The accommodations for construction personnel would be provided by local hotels and similar facilities. Given the extent of available facilities in the Point Mugu area, this is not considered a potentially significant impact.

By spending money in the local economy, mainly via accommodation and procurement of goods and services, the additional construction personnel would represent both a potential increase in local service-based employment opportunities and a small but positive temporary economic impact to the local community. The overall impact would, however, be slight and would not cause any population growth. No significant impacts to locally significant businesses or industries are anticipated during construction activities. No significant socioeconomic impacts would occur through the construction activities associated with the ASIP.

4.2.11.2 Flight Testing and Test Mishaps

Implementation of the ASIP would result in launches in separate caravans from San Nicolas Island. AWS components would be transported by sea or air to San Nicolas and possibly to the Main Base at Point Mugu. There would be a total of four flight tests (two in 2004 and two that are planned for 2007) over 4 to 5 months requiring a maximum of 100 personnel for each flight test. After each launch, a majority of these personnel would depart Point Mugu.

Similar to pre-launch activities, launch activities related to the ASIP would not cause any displacement of populations, residences, or businesses within Ventura County. The accommodations for personnel would be provided by local hotels and similar facilities. Given the extent of available facilities in the Point Mugu area, this is not considered a potentially significant impact.

By spending money in the local economy, mainly via accommodation and procurement of goods and services, the additional launch personnel would represent both a potential increase in local service-based employment opportunities and a small but positive temporary economic impact to the local community. The overall impact would, however, be slight and would not cause any population growth. No significant impacts to locally significant businesses or industries are anticipated during launch activities. No significant socioeconomic impacts would occur through the launch activities associated with the ASIP.

4.2.11.3 Post Launch Test Activities

At the conclusion of testing activities, Arrow program personnel would remove all mobile equipment/assets brought to the range. 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.

4.2.11.4 Cumulative Impacts

Based on preliminary planning information for fiscal year 2003 through fiscal year 2007, the Proposed Action of a single launch from San Nicolas Island, along with construction activities planned for San Nicolas Island and/or Point Mugu, in conjunction with current planned or anticipated launches would be well within the limits established in the Point Mugu EIS. The addition of the ASIP construction and launches to the identified ongoing and future programs in the ROI would result in a positive cumulative socioeconomic impact.

4.2.12 WATER RESOURCES—POINT MUGU

4.2.12.1 System Transportation and Launch Preparation Activities

Should Arrow interceptor launches occur from San Nicolas, it is possible that facilities at Point Mugu Main Base may be used for support. Facilities proposed for use at Point Mugu include: the Alpha Complex, the Nike Zeus site, and administrative and equipment storage space.

These activities would result in minor modifications and the number of areas disturbed would be minimal. If the disturbed area would be 0.4 hectare (1.0 acre) or greater, modification of the National Pollutant Discharge Elimination System permit would be required. Implementation of Best Management Practices and other procedures are expected to minimize the magnitude of adverse water quality impacts. Only minor erosion and turbidity impacts, and insignificant and accidental spillage of petroleum products and other construction materials are expected.

The procedures in place at Point Mugu include such measures as collecting and disposing of sewage off-site, monitoring of soil conditions, periodic inspection to ensure erosion and sediment control structures are working properly, hazardous waste management measures and off-site disposal, post-launch monitoring and revegetation of areas around launch sites if needed.

Point Mugu's existing water system has a capacity of 22.0 million liters (5.8 million gallons) per day, while average demand is some 6.1 million liters (1.6 million gallons) per day, or about 28 percent of the capacity. Assuming a typical demand of 189 liters (50 gallons) of potable water per day per person, there would be a maximum demand of 3,785 liters (1,000 gallons) per day for 20 personnel for the full deployment, and 15,142 liters (4,000 gallons) of water per day for 80 personnel for the split deployment scenario. Even given maximum project demands of the split deployment, amounting to an increase of only about 0.068 percent, Point Mugu's water system would easily handle project requirements. No impacts to available potable water systems/levels would be expected.

4.2.12.2 Flight Testing and Test Mishaps

Actual flights would not occur from Point Mugu, and therefore, there would be no impacts from flight testing or test mishaps to the water resources there. The only potential impacts to water resources would occur from utilization of the resource from launch personnel. This impact would be minor and the effects to the water resources at Point Mugu would be negligible.

4.2.12.3 Post Launch Test Activities

At the conclusion of testing activities, Arrow program personnel would remove all mobile equipment/assets brought to the range. 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.

4.2.12.4 Cumulative Impacts

The Proposed Action, in conjunction with other proposed or planned activities at Point Mugu, would not exceed the limits established in the Point Mugu EIS; therefore, no cumulative impacts on water resources are expected.

4.3 VANDENBERG AIR FORCE BASE

4.3.1 AIR QUALITY—VANDENBERG AIR FORCE BASE

4.3.1.1 System Transportation and Launch Preparation Activities

Emissions from system transportation and launch preparation activities would be regulated in accordance with the Memorandum of Agreement between Vandenberg AFB and the Santa Barbara County Air Pollution Control District. Vandenberg AFB complies with Santa Barbara County Air Pollution Control District rules and regulations.

Mobile emissions resulting from the transportation of the LFTS and its liquid propellants would be intermittent and would not have a measurable impact to regional air quality.

The LFTS would be fueled at Vandenberg AFB in compliance with Santa Barbara County Air Pollution Control District requirements. General operating requirements for fueling at Vandenberg AFB include bulk fuels and oxidizers being stored under a nitrogen blanket and vapor scrubbing systems for both fuel and oxidizer (Commander, 30th Space Wing, 1998). Fueling operation activities, including flushing of the fueling system, would utilize existing fueling equipment previously used and analyzed in the *Liquid Propellant Missile (LPM) Site Preparation and Launch EA*. These activities would qualify for the Santa Barbara County Air Pollution Control District Rule 202 de minimis exemption (Harding, 2003). Although total oxidizer and fuel vapor emissions can vary depending on the propellant transfer equipment used and how it is assembled, it is anticipated that only very small amounts of vapors would be released to the atmosphere.

An accidental release of liquid propellants (fuel, oxidizer, or initiator fuel) during the fueling of the LFTS is unlikely. However, if such an accident were to occur, it would most likely occur during fueling. Actual hazard distances would depend on the amount of propellant released, meteorological conditions, and emergency response measures taken. Standard operating procedures would be developed and would include personal protection equipment procedures, distances at which it would be safe to establish fueling operations area boundaries, and limited public access. Establishment of and adherence to these standard operating procedures would minimize the potential hazards to personnel in the unlikely event of an unplanned propellant release. The low likelihood of such an occurrence and the implementation of approved emergency response plans would limit the impact of such a release.

4.3.1.2 Flight Testing and Test Mishaps

Launch activities would also comply with any and all Santa Barbara County Air Pollution Control District rules and regulations. Emissions from rocket and missile launches are not considered stationary sources by the Santa Barbara County Air Pollution Control District.

While a preferred target launch site has not been determined, candidate sites in the southern portion of Vandenberg AFB include the SSI site and the SLC-3W launch site. The SLC-3W launch site is included within existing Vandenberg AFB air permits and as indicated in the *EA for Booster Verification Test, Vandenberg AFB* (U.S. Department of the Air Force, 1999) and the *Theater Ballistic Missile Targets Programmatic EA, Vandenberg Air Force Base, California* (U.S. Department of the Air Force, 1997), air quality impacts from prior Vandenberg AFB target launches have been determined to be insignificant. SSI is considered a separate stationary source from Vandenberg AFB, but does not maintain any air permits as existing emissions fall below 0.91 metric ton (1 ton) per year. It is anticipated that Arrow launch activities would not affect this 0.91 metric ton (1 ton) per year threshold and cause permits to be required. No exceedance of air quality standards or health-based standards of non-criteria pollutants is anticipated. Missile launches are short-term, discrete events, thus allowing time between launches for emission products to be dispersed. Based upon these results, the proposed LFTS launches would not cause or contribute to violation of any air quality standards.

An auxiliary power unit with a 30-kilowatt generator would be utilized to raise and lower the transportation erector launch equipment. The generator would be a Vandenberg AFB-permitted generator and would be registered with the 30 CEV Environmental Office.

4.3.1.3 Post Launch Test Activities

Post-launch activities would include the removal of all LFTS equipment and assets brought to Vandenberg AFB. This removal would cause a negligible impact to regional air quality resulting from a slight increase in vehicular emissions and localized amounts of fugitive dust.

Determination of Non-Applicability

Air quality impacts from Vandenberg AFB target launches have been previously analyzed in the *LPM Site Preparation and Launch EA* (U.S. Department of Defense, Missile Defense Agency, 2002a) and the *Theater Ballistic Missile Targets Programmatic EA* (U.S. Department of the Air Force, 1997). In the Theater Ballistic Missile Targets EA, it was determined that approximately 2.7 metric tons (3 tons) of volatile organic compounds and 1.8 metric tons (2 tons) of oxides of nitrogen would be emitted from the launching of 30 missiles (solid and liquid) per year (U.S. Department of the Air Force, 1997). The federal *de minimis* annual limits are 45 metric tons (50 tons). The Santa Barbara County Air Pollution Control District emission budgets for on-road mobile sources reactive organic gases and oxides of nitrogen are 15.8 metric tons (17.42 tons) and 20 metric tons (22.07 tons) per day, respectively. Analysis from the *Theater Ballistic Missile Targets Programmatic EA* determined that five missile launches in one day would result in 0.070 metric ton (0.078 ton) of reactive organic gases and 0.102 metric ton (0.112 ton) of oxides of nitrogen. (U.S. Department of Defense, Missile Defense Agency, 2002a)

Based on these results, the review of the Proposed Action as required by the General Conformity Rule resulted in a finding of presumed compliance with the State Implementation Plan. Total foreseeable direct and indirect emissions caused by the launch of up to two LFTSs

from Vandenberg AFB are both less than the mandated federal *de minimis* thresholds and less than 10 percent of the established Santa Barbara County Air Pollution Control District budget. The two proposed launches would not cause or contribute to any new violation of any air quality standards in the ROI and should be ruled as being exempt from the requirement for a Conformity Determination due to non-applicability.

4.3.1.4 Cumulative Impacts

No exceedances of air quality standards or health-based standards of non-criteria pollutants are anticipated. Missile launches are short-term, discrete events, thus allowing time between launches for emission products to be dispersed.

4.3.2 AIRSPACE—VANDENBERG AIR FORCE BASE

4.3.2.1 System Transportation and Launch Preparation Activities

System transportation and launch preparation activities would involve the transportation, exclusively by truck, and storage of missile components and support equipment to Vandenberg AFB. Transportation, storage, and other minimal launch preparation activities would not restrict a clear view of runways, helipads, taxiways, or traffic patterns from the airport air traffic control tower, decrease airport capacity or efficiency, affect future VFR or IFR, or affect the usable length of an existing or planned runway, they would also not constitute an obstruction to air navigation. Therefore, no impacts to airspace would occur from transportation or launch preparation activities associated with Vandenberg AFB.

4.3.2.2 Flight Testing and Test Mishaps

Target missile launches from Vandenberg AFB restricted area R-2517 would not result in adverse effects on aerial operations on local area airports or flights. All target launches and intercepts would occur at sufficient distances and altitudes so that they would be little noticed by local flight activities. The impacts from the tests of the ASIP, compared to the Vandenberg AFB average of 15 missile launches per year, would not be considered significant.

Only a pre-flight or early flight malfunction resulting in flight termination within the ROI would have any impact on Vandenberg AFB. In the event of an early flight termination target missile and/or debris recovery would follow applicable range procedures as directed by the Range Safety Officer to minimize any possible impact to regional airspace.

4.3.2.3 Post Launch Test Activities

After an LFTS flight test, the launch equipment would be dismantled and transported in the reverse manner as shipped to Vandenberg AFB. Such impacts to airspace would be the same as described in section 4.3.2.1. In addition, no post-launch impacts are expected to occur concerning the release of any restricted airspace to normal non-hazardous use. Therefore, no impacts to regional airspace would be expected from post launch activities.

4.3.2.4 Cumulative Impacts

All missile launches would take place in either an existing restricted airspace that would be cleared of non-participating aircraft. The required scheduling process for the use of airspace within ROI would obviate the potential for cumulative impacts; therefore, cumulative impacts to airspace use are not anticipated to be significant in this scenario.

The impact upon the air traffic control system may be reduced by scheduling tests during hours of low air traffic. Coordination with Vandenberg AFB, Fleet Area Control and Surveillance Detachment airspace manager, and Los Angeles ARTCC may provide additional mitigation avenues. Required coordination procedures with the FAA and scheduling requirements of the test range minimize any potential impacts so that no additional mitigation measures have been identified as necessary for the proposed test flights.

4.3.3 BIOLOGICAL RESOURCES—VANDENBERG AIR FORCE BASE

4.3.3.1 System Transportation and Launch Preparation Activities

System Transportation

The LFTS would be transported unfueled to the proposed launch site from Redstone Arsenal, Alabama. The liquid propellant associated with the LFTS would be shipped in approved shipping containers by truck to Vandenberg AFB. Transportation activities would occur on routes and/or roads currently used for similar maneuvers and would follow existing applicable regulations. All transportation of equipment and materials such as fuels would be conducted in accordance with DOT regulations and applicable service regulations. Adherence to standard operating procedures for spill prevention, containment, and control measures while transporting equipment and materials would preclude impacts to biological resources.

Launch Preparation Activities

Vegetation

The proposed launch sites, SSI and SLC-3W, are existing launch pads. The minor site preparation activities would result in no ground disturbance and thus there would be no impacts to vegetation, including the federally endangered beach layia.

Wildlife

Site preparation activities would not occur in areas that could result in impacts to Essential Fish Habitat or water bodies that could potentially contain the steelhead trout, tidewater goby, unarmored threespine stickleback, or California red-legged frog. Site preparation activities would be limited in duration, and no direct physical auditory changes are anticipated. Since no ground disturbance is planned, no impacts are expected to burrowing owls, California horned lizards, or silvery legless lizards.

California sea lions, northern elephant seals, northern fur seals, and other sensitive marine mammals in adjacent offshore areas would normally be at least approximately 1,700 meters (5,600 feet) from the closest launch site and are not expected to be affected by site preparation activities. Site preparation activities are also not anticipated to result in impacts to the southern

sea otter or other sensitive marine mammals in adjacent offshore areas due to the distance from the proposed LFTS-related facilities to the shoreline.

The Vandenberg Ecological Reserve is outside the area that could potentially be disturbed during site preparation activities.

4.3.3.2 Flight Testing and Test Mishaps

In the unlikely event of an accidental release of stored liquid propellant, Vandenberg AFB's *Hazardous Materials Emergency Response Plan* and *Spill Control and Countermeasures Plan* would be implemented in order to prevent impacts to biological resources in the vicinity. All applicable U.S. Air Force, DOT, and U.S. Army safety regulations and OSHA requirements would be followed, which would minimize the potential for accidental spills, as well as provide the means for mitigating or minimizing effects to wildlife if an accident were to occur. With the plans mentioned above in place, no impacts to vegetation or wildlife are expected as a result of accidental release of liquid propellant.

Vegetation

Normal launch activities are not expected to impact vegetation. All vehicle fueling operations and minor mechanical repairs would be performed on impermeable barriers using routine containment measures. Any required defueling would use a closed-loop system and would also occur on an impermeable surface. In the event of a leak or spill, the material would be collected, containerized, and disposed of in accordance with Vandenberg AFB procedures. Launch exhaust products would include carbon monoxide, carbon dioxide, nitrogen, water, and nitric oxide. Combustion products generated by the target missile would dissipate quickly based on their relatively small amounts, prevailing winds, and rapid decrease in ambient air temperature from ground level to their respective altitudes, thus minimizing the potential for impacts to vegetation.

A launch mishap or early flight termination could result in the unlikely, but possible, limited emission of nitric acid through release of inhibited red fuming nitric acid propellant from the target missile. The reaction of nitric acid and sea water would initially cause violent spattering, an increase in water temperature, and lowering of the pH value in the local area. However, the low levels of the emission and the natural buffering capacity of water, particularly seawater combined with strong currents, would neutralize the reaction in a relatively short period of time.

Vandenberg AFB has a wildland fuels management plan, prepared by the U.S. Forest Service, containing measures to help prevent large wildfires (such as prescribed burning activities that lower the age class of area vegetation). Moreover, emergency fire-fighting personnel are on stand-by status for all launch activities as a protective measure.

Wildlife

Species that could be impacted from launches from South Vandenberg AFB include nesting seabirds, Pacific harbor seals, California sea lions, northern elephant seals, and northern fur seals. The potential for debris impacts to species in the open ocean area is discussed in section 4.4.3.

Emissions

Combustion products generated by the target missile would dissipate quickly based on their relatively small amounts, prevailing winds, and rapid decrease in ambient air temperature from ground level to their respective altitudes, thus minimizing the potential for impacts to wildlife.

Noise

The primary potential for impacts to wildlife would be from the noise created during the proposed missile launches. Wildlife in general is known to exhibit a startle response when exposed to short-term noise impacts. Waterfowl driven from preferred feeding areas by aircraft or explosions usually return soon after the disturbance stops, as long as the disturbance is not severe or repeated (Federal Aviation Administration, 1996). Studies 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 (U.S. Department of the Air Force, 1997). 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.

Pinniped species using southern Vandenberg AFB would normally be at least approximately 1,700 meters (5,600 feet) from the closest launch site. Noise from prior launches has not appeared to affect pinniped use of the coastal areas on Vandenberg AFB. Effects from sonic booms are discussed in section 4.4.2 since a sonic boom would occur upon reentry over the open ocean. Pinniped monitoring has been performed for launches of larger missiles on Vandenberg AFB such as the Peacekeeper and Delta II. The effect to harbor seals, which were most susceptible to disturbance, has been a negligible short-term (5- to 30-minute) abandonment of a haul-out area at Spur Road and Purisima Point. No pinniped mother-pup separations have been noted at the harbor seal haul-out sites closest to other launch sites on the base. The U.S. Air Force, 30 SW, Vandenberg AFB began monitoring harbor seals at launch sites on the northern part of the base for Minuteman and Peacekeeper launches that occurred during the harbor seal pupping season (March–June) in accordance with the 5-year programmatic permit and Letter of Authorization issued by National Marine Fisheries Service to the 30 SW.

Acoustic monitoring was performed for two recent LFTS launches from northern Vandenberg AFB. The launch noise was measured at approximately 685 meters (2,247 feet) and 375 meters (1,230 feet) from the launch site. The launch sound exposure levels ranged from 114.5 dBA to 120.9 dBA. As a comparison, the sound exposure of an F-16 overflight has been measured at 113.1 dBA. (U.S. Air Force Detachment 9 Space and Missile System Center, 2003) No impacts to wildlife have been identified.

Noise monitoring would also be performed during the initial launch of LFTS target missiles and similar harbor seal monitoring would be conducted during the pupping season in accordance with Vandenberg AFB guidelines. The target launches would be included with previously approved Peacekeeper and Minuteman launches in the 10 yearly (total) intercontinental ballistic missile launches allowed under Vandenberg AFB's 5-year programmatic permit and Letter of Authorization.

Threatened and Endangered Species

Vegetation

Normal launch activities are not expected to impact vegetation, including the federally endangered beach layia.

Wildlife

Applicable regulatory agencies were consulted on the potential for impacts to biological resources as part of the assessment of prior target launches at Vandenberg AFB. Monitoring/minimization measures have been identified to ensure there are no significant impacts. These measures have been addressed in several documents: *U.S. Fish and Wildlife Service Biological Opinion for the Theater Ballistic Missile Targets Program*, May 1998; the *Threatened/Endangered Species Monitoring Plan for the Theater Ballistic Missile Targets Program prepared in compliance with the Biological Opinion*, September 1999; *U.S. Fish and Wildlife Service Biological Opinion for the Spaceport Launch Program*, 1999; and the *Programmatic Marine Mammal Incidental Harassment Authorization for Space and Missile Launches on Vandenberg AFB*, May 2000. (U.S. Fish and Wildlife Service, 1998; 1999a; 1999b; Federal Register, 2000b)

The U.S. Fish and Wildlife Service has stated that target launches are not likely to jeopardize the continued existence of threatened and endangered species on Vandenberg AFB, such as the brown pelican, California least tern, American peregrine falcon, western snowy plover, southern sea otter, or California red-legged frog as long as reasonable and prudent measures are taken to minimize the potential for impacts. These measures include the following: that night launches be avoided where possible; potential effects of launch emissions on the California red-legged frog be avoided whenever possible; monitoring occur as necessary based on evaluation by the Air Force, Fish and Wildlife Service, and National Marine Fisheries Service; and launches avoid overflights of Point Pedernales and Point Arguello during nesting seasons.

Emissions. Combustion products generated by the target missile would dissipate quickly based on their relatively small amounts, prevailing winds, and rapid decrease in ambient air temperature from ground level to their respective altitudes, thus minimizing the potential for impacts to threatened and endangered wildlife.

Noise. The California least tern, California brown pelican, marbled murrelet, southwestern willow flycatcher, and western snowy plover preferentially forage and roost along the coast of southern Vandenberg AFB. The snowy plover nests near the SLC-3W site. No effects to sensitive bird species have been identified from prior launches in the area. Proposed launch activities are unlikely to adversely affect the long-term wellbeing, reproduction rates, or survival of these listed birds. The level of noise during launch and flight is also expected to be relatively short in duration. Noise monitoring would be performed in accordance with Vandenberg AFB guidelines.

Southern sea otters in adjacent offshore areas would also be at least approximately 1,700 meters (5,600 feet) from the closest launch site. Noise from prior launches has not appeared to affect sea otter use of the coastal areas on Vandenberg AFB. Noise from launches of the larger Delta II missile has not affected use of coastal areas by sea otters with dependent pups. Disturbance as a result of visual stimulus is unlikely because the target missile would be at a

relatively high altitude as it arches past the coastline. The limited number of intermittent launches planned for the ASIP tests are not expected to substantially impact the southern sea otter. (U.S. Department of the Air Force, 1997; 1999)

Debris. Impacts to threatened and endangered species resulting from proposed ASIP activities would be similar to those addressed above for wildlife. Debris from nominal launches is not expected to impact water bodies that could potentially contain the steelhead trout, tidewater goby, unarmored threespine stickleback, or California red-legged frog. Emergency fire-fighting personnel are on stand-by status for all launch activities as a protective measure. Any required recovery activities would follow Vandenberg AFB standard operating procedures with negligible adverse effects expected to the snowy plovers and their habitat. The reproductive success of the snowy plover does not appear to have been affected by prior launches.

Debris impact and booster drops in the open ocean area are discussed in section 4.4.2.

Environmentally Sensitive Habitat

No impacts to the Vandenberg Ecological Reserve or within the current Channel Islands National Marine Sanctuary located off the coast south of Vandenberg AFB are anticipated as a result of proposed ASIP activities. Recovery of missile components after an unsuccessful launch would be coordinated with Vandenberg AFB environmental personnel to minimize impacts to sensitive resources.

4.3.3.3 Post Launch Test Activities

After the second flight test of each caravan, the LFTS equipment would be dismantled and packed for shipment back to Israel. Impacts would be the same as discussed in section 4.3.3.1.

4.3.3.4 Cumulative Impacts

The proposed launches would be included in the number of intercontinental ballistic missile launches currently allowed under Vandenberg AFB's 5-year programmatic permit and Letter of Authorization. If the annual launch rates from Vandenberg AFB increase above the levels currently projected and covered under the National Marine Fisheries Service authorization, the Letter of Authorization would be amended accordingly with appropriate analysis of impacts to marine mammals. The National Marine Fisheries Service has determined that the monitoring program at Vandenberg AFB and the data from pre- and post-launch observation of marine mammals have shown that rocket launch activities have a negligible impact on marine mammal populations and stocks (Federal Register, 2002). No other significant impacts from prior launches at Vandenberg AFB have been identified.

Missile launches are short-term, discrete events, thus allowing time between launches for emission products to be dispersed and minimizing the potential for cumulative impacts to vegetation and wildlife. Launch activities would also be performed at different times and locations. Debris from the Proposed Action and other launch operations on Vandenberg such as the Ground-Based Midcourse Defense test program would impact different areas of the Pacific Ocean. Initial defensive operations capabilities being developed at Vandenberg AFB would not include missile launches. Therefore no cumulative impacts to biological resources

are anticipated from the proposed missile launches when combined with other current and planned activities on Vandenberg AFB.

No cumulative impacts to biological resources are expected as a result of fuel and oxidizer transport operations. Accidental releases or spills of liquid or gaseous materials would be contained or dispersed before reaching sensitive vegetation or wildlife. The amount of gaseous materials dispersed during launch is not expected to result in an increased potential for cumulative impact to marine species when combined with the missile launches currently planned from Vandenberg AFB.

4.3.4 CULTURAL RESOURCES—VANDENBERG AIR FORCE BASE

4.3.4.1 System Transportation and Launch Preparation Activities

Proposed target launches may occur from Vandenberg AFB. These activities are routine at Vandenberg AFB and no facility modifications or launch preparation activities are planned at this time. As project details are further delineated, coordination would occur with the Vandenberg AFB Environmental Planning Section and the Cultural Resources Section to further ensure that cultural resources would be protected.

Potentially adverse effects to historic and prehistoric resources could also occur as a result of the unauthorized collection of artifacts by flight preparation personnel. Personnel would receive a brief orientation involving a definition of cultural resources and protective federal regulations.

The LFTS and missile components would arrive at Vandenberg via either truck or air. Either scenario would use only paved, previously disturbed roadways or runways.

4.3.4.2 Flight Testing and Test Mishaps

Potential impacts from flight testing or test mishaps during the ASIP could result from debris striking the ground where surface or subsurface archaeological deposits (such as the two archeological sites and one historical site near SSI) are located. The probability of this occurring, however, is considered remote and negligible adverse effects are anticipated. Debris falling offshore would pose no threat to Vandenberg AFB's cultural resources and no efforts are planned at this time to recover a missile from a failed missile intercept that falls into the ocean.

4.3.4.3 Post Launch Test Activities

If required, debris recovery on land may involve the use of helicopters and off-road vehicles. Recovery of missile and missile components after unsuccessful launches would be conducted in accordance with Vandenberg AFB procedures. If the potential exists to disturb cultural resources during debris recovery activities, recovery efforts would be coordinated with Vandenberg AFB personnel to avoid impact to sensitive resources and to restore natural areas as necessary following debris recovery efforts.

4.3.4.4 Cumulative Impacts

The proposed activities would occur with minimal impact and not result in cumulative impacts to cultural resources. The proposed launches would be included in the number of intercontinental ballistic missile currently allowed under Vandenberg AFB's 5-year programmatic permit and Letter of Authorization. The Proposed Action, in conjunction with current planned or anticipated launches, is not expected to exceed this number. Missile launches are short-term, discrete events. Activities would be performed at different times and locations, and therefore no cumulative impacts to cultural resources are anticipated.

4.3.5 GEOLOGY AND SOILS—VANDENBERG AIR FORCE BASE

4.3.5.1 System Transportation and Launch Preparation Activities

Two fully-developed launch sites at Vandenberg AFB are being evaluated for use for target missile launch and support facilities: the SSI site and the SLC-3W launch site. No new facility construction or ground disturbance would be required at any of these two existing sites; therefore, there would be no geology or soils effects from construction activities.

4.3.5.2 Flight Testing and Test Mishaps

It is anticipated that the levels of exhaust emissions of the LFTS would be similar to previously launched vehicles described in the *LPM Site Preparation and Launch EA* for Vandenberg AFB (U.S. Department of Defense, Missile Defense Agency, 2002a). Due to the mobile nature of the missile itself, only a small portion of the launch exhaust would be emitted near the ground and these emissions would have a minimal impact on regional soil quality. Pre-launch and post-launch soil testing was conducted at Vandenberg AFB to assess the level and extent of contamination resulting from launches of a similar LFTS target vehicle. Analytical data indicated there was no soil contamination of volatile organic compounds, semi-volatile compounds, or metals resulting from the launch.

In the event of a testing mishap, including termination of the flight on the launcher/launch pad, termination of a flight shortly after liftoff, or termination of a flight after it has exited the vicinity of the launcher/launch pad, the potential results would cause localized, short-term impacts to soils in the form of combustion by-products and potentially hazardous materials seeping into regional soils. Provisions would be made for the availability of fire suppression, hazardous materials emergency response, and emergency medical teams during launch operations. These provisions, in combination with the low probability of a launch mishap, would result in only a short-term, localized impact to regional soil quality.

A missile system failure during a target missile launch at Vandenberg AFB could scatter debris over a large area of the base. Propellants used in the target missile systems include kerosene-based liquid fuel, inhibited red fuming nitric acid, and initiator fuels. Flight termination after launch would release small amounts of these unburned propellants that could be dispersed over an area of several kilometers (miles). In the event of a launch failure, identifiable unburned or residual burned propellants would be recovered during the debris recovery process. The impact of this recovery activity would be short-term, and the recovered fuel and residue would be disposed in accordance with standard hazardous waste management procedures. The overall concentration and toxicity of propellant released during a launch failure would be negligible and would not have any substantial adverse effect on soils at Vandenberg AFB.

4.3.5.3 Post Launch Test Activities

At the conclusion of testing activities, Arrow program personnel would remove all mobile equipment/assets brought to Vandenberg AFB. These activities would result in impacts less than those caused by site preparation. Specific restoration actions, if necessary, would be determined on a case-by-case basis.

4.3.5.4 Cumulative Impacts

Only one target missile launch is proposed in each of two caravans, for a maximum of two launches from Vandenberg AFB in a multi-year program. No substantial accumulation of emission products would occur in the soil at Vandenberg AFB as a result of normal flight operations. In the event that debris associated with a launch failure was deposited at Vandenberg AFB, the debris would be removed, thus posing no cumulative impact at the test ranges. Since no direct soils and geologic impacts would result from the proposed ASIP program itself, there would be no cumulative soils and geologic effect because of the very low number and very low frequency of proposed target missile launches.

4.3.6 HAZARDOUS MATERIALS AND WASTE—VANDENBERG AIR FORCE BASE

4.3.6.1 System Transportation and Launch Preparation Activities

Propellants for liquid-fueled missiles are transported to Vandenberg AFB in DOT-certified transport/storage containers. Proposed launch preparation operations could use limited quantities of potentially hazardous materials, such as motor fuels, lubricants, hydraulic fluids, paints, and solvents. Similar materials are currently used at Vandenberg AFB as part of routine maintenance and launch operations. Use of hazardous materials would be minimized in accordance with the current pollution prevention practices of Vandenberg AFB. Concrete lips would be added around three sides of the concrete fueling area to contain any spilled propellant if necessary. All hazardous materials and waste would be handled, stored, and disposed of in accordance with applicable Vandenberg AFB and state regulations, particularly the *Hazardous Materials Management Plan,* the *Hazardous Waste Management Plan,* Chapter 2 *Wastewater Generation, Collection and Compliance* of U.S. Air Force Instruction 32-7041, *Water Quality Compliance*, as well as any applicable Chemical Material Safety Data Sheets. Such measures would be designed to minimize the potential for impacts to personnel and the environment.

The existing hazardous materials storage and handling capabilities at Vandenberg AFB are adequate to ensure that all materials are safely handled in accordance with applicable regulatory procedures. No new permanent facilities would be required to support the ASIP operations. Any modification to existing facilities would occur in previously disturbed areas in accordance with host installation guidelines and regulations, and therefore would not be considered significant.

4.3.6.2 Flight Testing and Test Mishaps

All hazardous materials, specifically fuels and oxidizers, would be assessed by 30 SW/SE prior to launch for possible toxic hazards from a launch mishap or a spill on the launch pad. Final safety approval would be based on detailed safety analysis completed if Vandenberg AFB is selected as an alternative site for LFTS launch. A Liquid Propellant Accident Response Plan

currently in use minimizes impacts in the event of an accidental spill. Monitoring would be performed during transfer operations to ensure that no propellant releases have occurred, and all propellant transfer equipment is leak-checked prior to use.

A site-specific Spill Prevention Control and Countermeasure Plan would provide resources and guidelines for use in the control, cleanup, and emergency response for launch mishaps, spills of hazardous material or waste. In the event that release of hazardous material or waste would occur, affected areas would be treated in accordance with Vandenberg AFB's *Hazardous Materials Emergency Response Plan* and applicable federal, state, and local regulations.

It is currently anticipated that oxidizer rinse solution and main fuel and initiator fuel alcohol rinse solutions (combined) would be collected for each missile fueled. The waste fuel and oxidizer solutions would be collected in empty drums and disposed of according to Vandenberg AFB *Hazardous Waste Management Plan* regulations. The proposed LFTS flight tests would generate wastes similar to others generated during ongoing operations at Vandenberg AFB and would not result in a substantial increase in the total quantities of hazardous waste. (U.S. Department of the Air Force, 1997)

4.3.6.3 Post Launch Test Activities

Vandenberg's current hazardous material and hazardous waste management systems are designed to prevent releases of hazardous materials to the environment, where their presence could create a contamination issue. Range management emphasizes the need to use or dispose of all materials in a timely and acceptable manner, in accordance with applicable federal and state regulatory and public policy requirements. Proper management of hazardous materials and waste would preclude any impact due to their accumulation in the environment. In the event of an unplanned release, Vandenberg AFB has emergency response procedures in place.

4.3.6.4 Cumulative Impacts

Hazardous materials used and hazardous wastes generated by the proposed LFTS activities, when added to existing and expected future programs, would not adversely affect existing permits or programs at Vandenberg AFB. The base has implemented an emergency response procedure that would aid in the evaluation and cleanup of any hazardous materials released. Therefore, cumulative impacts relative to hazardous materials or hazardous wastes are not expected.

4.3.7 HEALTH AND SAFETY—VANDENBERG AIR FORCE BASE

4.3.7.1 System Transportation and Launch Preparation Activities

Target missile launch preparations involving explosives at Vandenberg AFB, would require implementation of a written procedure which has been approved by 30 SW/SE and must be conducted under the supervision of an approved safety monitor in tandem with explosive-certified personnel. Final safety approval would be based on detailed safety analysis completed if Vandenberg AFB is selected as a site alternative. All electrical equipment is rated for use in hazardous environments.

Potential impacts to health and safety could result from accidents during transportation of the fuel and oxidizer to, and on, Vandenberg AFB. However, FAA, applicable U.S. Air Force, DOT, and U.S. Army safety regulations and OSHA requirements would be followed to minimize the potential for accidents, as well as provide the means for mitigating adverse effects if an accident were to occur. No effects to public health and safety are anticipated.

The unfueled target would be transported to Vandenberg AFB by over-the-road common carrier truck from Redstone Arsenal, Alabama. Liquid propellants would be transported in U.S. DOT-approved containers. Appropriate safety measures would be followed during transportation of the propellants as required by DOT and as described in the *Federal Hazardous Materials Regulations* (49 CFR 171-180). All transportation would be performed in accordance with appropriate DOT approved procedures and routing, as well as OSHA requirements and U.S. Army safety regulations.

The liquid propellant would be transported directly to the Hypergolic Storage Facility on Vandenberg AFB for storage until required for test operations. The initiator fuel would be stored with the main fuel at the Hypergolic Storage Facility until shortly before launch, at which time it would be transferred to a pressurized vessel. The target would undergo system checkout, missile integration, and end-to-end functional testing.

ESQDs have been established by the 30 SW/SE around propellant handling and explosive storage facilities to ensure safety in the event of an explosion. LHAs and surface danger zones would be established to minimize the potential for health and safety impacts during launches.

Preparation for the temporary launch site would include mainly clearance of existing vegetation and grading. Site preparation activities would be conducted in accordance with OSHA, U.S. Air Force, and U.S. Army Corps of Engineers requirements for health and safety to control exposure to occupational safety and health hazards.

4.3.7.2 Flight Testing and Test Mishaps

During launch, there is a potential for missile malfunction, resulting in explosion, fire, and debris impact in the launch site vicinity. Successful launches involve only small potential hazards, mainly for personnel in the immediate area; these personnel are protected or evacuated from the area and potential hazards are thus controlled. On the other hand, a launch pad or near-launch anomaly or termination requires stricter controls. (U.S. Department of Defense, Missile Defense Agency, 2002a)

To provide protection for mission-essential personnel, all Arrow-related launch activities would require establishment of an LHA as discussed in section 3.3.7. The standard LHA for the LFTS is a 500-meter (1,640-foot) radius around the launch site. (U.S. Department of Defense, Missile Defense Agency, 2002a)

To ensure immediate response and rapid control in the event of an accident, Vandenberg AFB would maintain a stand-by emergency response team (consisting of fire fighting, safety, medical and bioenvironmental engineering personnel) near the launch site. This team would have the ability to utilize additional Vandenberg AFB personnel and resources as necessary. (U.S. Department of Defense, Missile Defense Agency, 2002a)

Successful or unsuccessful intercepts would each result in the impact of debris in two separate areas (one for the target vehicle and one for the defensive missile), referred to as impact zones. For both the successful and unsuccessful intercept cases, it is possible to determine the extent and location of the two associated impact zones prior to launch based upon mission parameters. ASIP impact zones would be limited to the broad ocean area of the Point Mugu Sea Range. The launch scenario would be planned to ensure that in the event of debris impact to land the probable public risk would meet the RCC 321-02 criteria of less than 1 in 10 million fatality per event and 1 in 1 million fatality per year (U.S. Department of Defense, Missile Defense Agency, 2002a).

It is possible that the oil platforms near Vandenberg AFB would have to be closed or sheltered during launch to avoid impacts to health and safety. Evacuation would follow current Vandenberg AFB procedures.

For test operations, the following designated areas would be controlled and determined to be evacuated of personnel: the LHA, the impact areas of both the target vehicle and intercept vehicle (in the event of a failed intercept). (U.S. Department of Defense, Missile Defense Agency, 2002a)

Sounding rockets, Scout, Titan II/III/IV, Atlas, Minuteman II derivatives, and Athena (Castor-120) have been launched from south Vandenberg AFB. (McCombs, 2003) The proposed LFTS target missile is of equivalent size to a Strypi XI and is much smaller in size than the Taurus that was proposed for launch from SSI, Titan, and Minuteman missiles. A fuel shutoff would be used in the proposed Arrow target. Also, there would be no initiation device on the high explosives, so detonation would only occur with possible ground or water impact detonation. (Walls, 2003)

The proposed Arrow target would require less propellant than other missiles that have been launched from SSI or SLC-3W. Therefore, the launch hazard corridors from the proposed launch of the Arrow target from SSI or SLC-3W would be smaller than those from other larger missiles launched from those locations.

The launch of missiles associated with the ASIP operation would not significantly impact existing safety procedures or ongoing range operations at Vandenberg AFB and would not significantly increase health and safety risks to workers or the general public. Implementation of standard safety procedures such as the issuance of NOTAMs, NOTMARs, and following safety and security practices would minimize the potential risk to personnel and public health and safety. If the Arrow program requires launches from Vandenberg AFB, a Business Plan would be prepared in accordance with the California Health and Safety Code and submitted to 30th Civil Engineering Squadron/Environmental Management and the installation Fire Department to assist in emergency planning and response.

4.3.7.3 Post Launch Test Activities

LFTS equipment and assets brought to Vandenberg AFB would be dismantled and removed following completion of test activities. As such, no change in safety protocol or significant impact to health and safety is expected.

4.3.7.4 Cumulative Impacts

Activities associated with proposed ASIP launch operations would not significantly impact current health and safety procedures. Work on the Proposed Action would be performed in accordance with applicable state and federal health and safety regulations and existing range/base safety standards. Adherence to these regulations and standards would serve to keep the total safety impacts attributable to all Vandenberg AFB operations within acceptable standards to both workers and the public. Final safety approval would be based on detailed safety analysis completed if Vandenberg AFB is selected as an alternative site for LFTS launch. No other activities have been identified within the ROI that, when combined with the Proposed Action, would have a cumulative impact on health and safety.

4.3.8 INFRASTRUCTURE—VANDENBERG AIR FORCE BASE

The ROI includes areas on and in the vicinity of southern Vandenberg AFB that may potentially be affected by pre-launch and launch of the LFTS. No facility modifications are planned at this time that would impact infrastructure. Approximately 100 personnel would be at Vandenberg AFB for up to a 90 day period to perform pre-launch, launch/intercept, and post-launch operations. All personnel would be housed off-base.

4.3.8.1 System Transportation and Launch Preparation Activities

System transportation and launch preparation activities would involve the transportation to and storage of missile components and support equipment at Vandenberg AFB. All missile components and support would be handled, labeled, and stored in accordance with all pertinent federal and state safety regulations for transportation by over land by trucks. Typically, LFTSs and test and support equipment are transported to Vandenberg AFB approximately 6 to 8 weeks before launch by over-the-road common carrier truck from U.S. Government storage depots or contractor facilities. Liquid propellants would be transported in DOT-approved containers. Appropriate safety measures would be followed during transportation of the propellants as required by DOT and as described in the *Federal Hazardous Materials Regulations* (49 CFR 171-180). All transportation would be performed in accordance with appropriate DOT approved procedures and routing, as well as OSHA requirements and U.S. Army safety regulations and would provide a means of mitigating adverse effects should an improbable mishap occur.

Energy

Vandenberg AFB-permitted portable generators would be used as power sources at test ground instrumentation sites; for instance, any Mobile Launchers would have their own generators. All portable generators and tactical equipment would be registered with the 30 CEV Environmental Office. Any required electrical and fiber optic cables outside the launch radius would be placed on the ground surface, in cable trays, or routed through existing culverts and along existing electricity poles. Portable floodlights with permitted portable generators could be required at the launch site. No impacts to base energy capacity are expected.

Water

No additional water lines would be installed as a result of launch preparation activities. Any potential water use resulting from the nominal increase in personnel and launch preparation

activities would be minimal and would not substantially increase demand on available base water supply.

Wastewater

The potential increase in wastewater generated from the nominal increase in personnel and launch preparation activities would be minimal and would not substantially increase demand on existing septic systems. However, if the Arrow program requires launches from Vandenberg AFB, the systems would be evaluated as required for capacity constraints prior to ASIP-related activities.

Solid Waste

The potential increase in solid waste generated from the nominal increase in personnel and launch preparation activities would be minimal and would not substantially increase demand on the capacity of the Vandenberg AFB landfill.

Transportation

Liquid propellants would be transported in DOT-approved containers. Appropriate safety measures would be followed during transportation of the propellants as required by DOT and as described in 49 CFR 171-180. All transportation would be performed in accordance with appropriate DOT approved procedures and routing, as well as OSHA requirements and U.S. Army safety regulations.

Aviation Transportation

Use of air transport would not be required, and thus no impacts to air transportation are expected.

Ground Transportation

Since proposed target missiles are similar to those currently handled at Vandenberg AFB, their transportation can be accomplished via existing base infrastructure, without necessitating revised procedures or unusual requirements.

The LFTS would be transported unfueled to the proposed launch site at Vandenberg AFB. Typically, liquid propellant fuel, oxidizer, and initiator fuel for the LFTS would be shipped to the base by truck. All propellant would be transported in approved shipping containers in accordance with DOT and DoD hazardous materials shipping regulations. Transportation activities would occur on routes and/or roads currently used for similar maneuvers and would follow existing applicable regulations.

Before each launch, the target missile and necessary components would be transported from storage to a missile assembly building, where it would be assembled and checked before being transported to the launch pad. Transport of assembled target missiles would utilize on-base roadways. Although project-related roadway use and closures would cause a temporary impact on road transportation, they would be of a limited duration. Such measures are considered normal base activity and would not produce a significant impact to ground transportation routes.

Water Transportation

As part of pre-launch activities, establishment of an LHA would result in certain sea-surface areas being cleared. While the closure areas in question are significant in size, their nature is decidedly temporary; sea surface areas would be cleared approximately 4 hours before a launch. Such clearances are typical of testing activities at Vandenberg AFB and would produce only temporary effects. There would be no significant impacts to water transportation.

4.3.8.2 Flight Testing and Test Mishaps

A final target launch site has not been determined, but candidate sites in southern Vandenberg AFB include the SSI site and the SLC-3W launch site. As these sites are already used for such activities, no impacts to infrastructure are anticipated.

Only a pre-flight or early flight malfunction resulting in flight termination within the ROI would have any impact on Vandenberg AFB. In the event of an early flight termination within the boundaries of Vandenberg AFB, target missile and/or debris recovery would follow applicable environmental regulations and range procedures as directed by the Range Safety Officer to minimize impacts on infrastructure by the increased number of activities.

Aviation Transportation

Before missile launch, Range Safety officials would issue NOTAMs, which would identify areas to avoid and the times that avoidance of the area is advised. The Range Safety officials would then determine that the areas are clear of aircraft. Missile launches would be put on hold until the impact area is clear of air traffic. Range clearance and access control would be in accordance with existing range procedures. Such measures are standard practices of limited duration and as such would have no impact on area aviation transportation.

Ground Transportation

Immediate launch preparations scheduled at Vandenberg AFB would follow standard evacuation procedures of the launch vicinity. Land areas that are within the LHA would be cleared approximately 1 hour before launch and guarded to ensure they remain clear of all non-mission personnel. Restricted access to the launch area would result in a minimal and temporary impact to traffic. However, clearance and any necessary closures of nearby area roadways are considered normal operations and would be determined by necessary pre-launch missile LHA determinations. Their minimal and limited duration should have no impacts on ground transportation. Coordination with railways to prevent missile overflight of trains is also routine and would have only a temporary effect, and no impact, on railway transportation.

Water Transportation

Before missile launch, Range Safety officials would issue NOTMARs, which would identify areas to avoid and the times that avoidance of the area is advised. The Range Safety officials would then determine that the areas are clear of surface vessels. If ships or fishing boats are seen in a designated impact area, their cooperation would be requested to leave the area voluntarily. Missile launches would be put on hold until the impact area is cleared. Such measures are standard practices of limited duration and as such would have no impact on area water transportation.

4.3.8.3 Post Launch Test Activities

Once the Range Safety Officer concludes that all hazardous areas are safe, all non-mission-essential personnel would be allowed to return. Post-flight activities would also include removal of blast residue from the launch pad and other minor facility maintenance. These activities would be confined to areas currently used for similar launch activities having no affect on infrastructure.

Energy

There would be no expected increase in demand to current base power supply resulting from post-launch activities.

Water

Any potential water use resulting from post-launch activities and the presence of four to eight personnel would be minimal and would not substantially increase demand on available base water supply.

Wastewater

Typically after target launches, Mobile Launchers are driven to the wash-down area at Building 1800, the Missile Maintenance Facility. Mobile Launchers would be washed down to remove missile blast residue, and the collected wastewater would be tested for proper disposal. Approximately 1,893 liters (500 gallons) of wastewater would be generated for each launch. This very limited amount would have no impact on Vandenberg's wastewater capacity.

The potential increase in wastewater generated from any other post-launch activities, combined with the presence of approximately four to eight personnel, would be minimal and would not substantially increase demand on base wastewater handling capacity.

Solid Waste

The potential increase in solid waste generated from the nominal increase in personnel and post-launch activities would be minimal and would not substantially increase demand on the capacity of the Vandenberg AFB landfill.

Aviation Transportation

If required, debris recovery on land may involve the use of helicopters. Recovery of missile and missile components after unsuccessful launches would be conducted in accordance with Vandenberg AFB procedures. These procedures are routine and should have no impact on aviation transportation.

Ground Transportation

Transportation of the Mobile Launcher for refurbishment would follow established procedures and involve the temporary and routine use of area roadways. If required, debris recovery on land may involve the use of off-road vehicles. Recovery of missile and missile components after unsuccessful launches would be conducted in accordance with Vandenberg AFB procedures. These procedures are routine and should have no impact on ground transportation.

Minor facility maintenance would occur after each LFTS launch to ensure that the launch site would be operational for the next test. Post-launch procedures would include silo inspection, removal of blast residue, and minor silo refurbishing. Approximately four to eight personnel would be required for post-launch activities. Three to four personnel would remain at Vandenberg AFB between launches. This minor increase in personnel and vehicles would not impact transportation on or off base.

Water Transportation

Post-launch activities would include a cessation of area clearances as mandated by NOTMARs. There would be no impact on water transportation.

4.3.8.4 Cumulative Impacts

The use of existing Vandenberg AFB facilities to launch target missiles would not alter the overall mission of the base, where projected-related transportation and utilities demand are considered routine. Similarly, the proposed activities would only use existing facilities on a military installation already utilized for launching missiles. Therefore, no cumulative impacts to infrastructure at Vandenberg AFB would occur.

4.3.9 LAND USE—VANDENBERG AIR FORCE BASE

4.3.9.1 System Transportation and Launch Preparation Activities

System transportation and launch preparation activities would involve the transportation and storage of missile components and support equipment to Vandenberg AFB. All missile components and support would be handled, labeled, and stored in accordance with all pertinent federal and state safety regulations for transportation over land by trucks. Regulations would minimize the potential for significant adverse impacts to land use and provide a means of mitigating adverse effects should an improbable transportation mishap occur.

Storage of target missiles and their propellants would occur in separate existing storage areas designed for such use in accordance with all accepted governing standards. ESQDs would be established and maintained around storage facilities.

Before each launch, the target missile and necessary components would be moved from storage to a missile assembly building, where it would be assembled and checked before being transported to the launch pad. Transportation of assembled target missiles would use on-base roads. Although extensive road closures would cause a land use conflict to traffic, closures would be of short duration and considered normal base activity that would not produce a significant impact.

4.3.9.2 Flight Testing and Test Mishaps

Launch operations would utilize one or more of the already existing SSI and SLC-3 launch sites. During the time the interceptor missile booster is on the launch pad, potential impacts to land use could occur. Areas that are within the LHA would be cleared before launch and guarded to ensure they remain clear of all non-mission personnel. Temporary clearance of LHAs could have an impact on recreational coastal access. However, clearance and closures are

considered normal operations and would be determined by necessary launch missile LHA determinations and flight corridor clearances. A notice of intent to clear hazardous areas would be published in the local newspaper and broadcast in local media. Furthermore, since the LHA would be activated infrequently and last only 1 hour or less, the impacts are not considered significant.

Only a preflight or early flight malfunction resulting in flight termination within the ROI would have any impact on Vandenberg AFB. In the unlikely event of an early flight termination within the boundaries of Vandenberg AFB, target missile and/or debris recovery would follow applicable environmental regulations and range procedures as directed by the Range Safety Officer to minimize impacts on land use by the increase number of activities.

4.3.9.3 Post Launch Test Activities

As soon as the Range Safety Officer concludes that all hazardous areas are safe, all non-mission essential personnel would be allowed to return. Post-flight activities would also include removal of blast residue from the launch pad and other minor facility maintenance. These activities would be confined to areas currently used for similar launch activities having no affect on land use.

All ASIP operations involving the launch of target missiles would be consistent with the California Coastal Zone Management Program.

4.3.9.4 Cumulative Impacts

The use of existing Vandenberg AFB facilities to launch target missiles would not alter the overall land use and management of the base. Similarly, the proposed activities would only use existing facilities on a military installation already utilized for launching missiles. Therefore, no cumulative impacts to land use at Vandenberg AFB would occur.

4.3.10 NOISE—VANDENBERG AIR FORCE BASE

The analysis in this section is concerned with human receptors; noise effects on wildlife are discussed under biological resources.

4.3.10.1 System Transportation and Launch Preparation Activities

Noise from launch preparation would comply with the Occupational Safety and Health Act, the U.S. Air Force Occupational Safety and Health regulations, and other recognized standards. Restricted public access to the proposed project site would be ensured through use of signs and fencing. No permanent facility construction is planned to occur. No noise impacts are anticipated from system transportation and launch preparations.

4.3.10.2 Flight Testing and Test Mishaps

Noise impacts from prior Vandenberg AFB missile launches have been determined to be short term and therefore insignificant. Based on these results and compliance with OSHA regulations

established to protect personnel, the proposed launches would not cause or contribute to noise impacts.

The LFTS launch noise would fall within or below the noise level measurements of previously approved launch vehicles as previously determined in the Liquid Propellant Missile Site Preparation and Launch EA.

The flight pattern of the LFTS would be over the open ocean to the south and would not cross populated areas such as Lompoc or Santa Maria. In accordance with a consolidated evacuation agreement, Vandenberg AFB would limit public access to public parks in the flight path of the LFTS during launches. Therefore, impacts from noise to populated areas would be minor.

In addition to engine noise produced, a sonic boom is possible; however, as launches would be over the open ocean, a sonic boom would not be over land. Any vessels impacted by the sonic boom would be expected to experience a sound resembling mild thunder.

4.3.10.3 Post Launch Test Activities

No substantial noise would be expected from post-launch activities. Noise impacts would also be of a short duration. Post-launch activities would not cause or contribute to noise impacts.

4.3.10.4 Cumulative Impacts

Since the sound level generated by each launch is a short, discrete event, potential cumulative impacts to noise from LFTS launches would not be substantial. It is not likely that the proposed action, in conjunction with current planned or anticipated launches, would result in cumulative noise impacts.

4.3.11 SOCIOECONOMICS—VANDENBERG AIR FORCE BASE

4.3.11.1 System Transportation and Launch Preparation Activities

Implementation of the ASIP would not require any modification to any of the facilities at Vandenberg AFB. Personnel used for launch preparation activities would be primarily associated with the Arrow program and would not represent a significant economic impact to the community. Facility modifications or installation of utilities, if they become necessary, would be formally coordinated with and approved by the Vandenberg AFB Environmental Management Office prior to any activity proceeding.

Pre-launch activities related to the ASIP would not cause any displacement of populations, residences, or businesses within Santa Barbara County. The accommodations for approximately 100 personnel for up to 90 days would be provided by local hotels and similar facilities. Given the extent of available facilities in the Vandenberg AFB area, this is not considered a potentially significant impact.

The additional personnel, by spending money in the local economy, mainly via accommodation and procurement of goods and services would represent both a potential increase in local

service-based employment opportunities and a small but positive temporary economic impact to the local community. The overall impact would however be slight and would not cause any population growth. No significant impacts to locally significant businesses or industries are anticipated during pre-launch activities. No significant socioeconomic impacts would occur through the pre-launch activities associated with the ASIP.

4.3.11.2 Flight Testing and Test Mishaps

Potentially, Vandenberg AFB would be the launch site for a target in one or two flight tests of the program. Integration and assembly operations would be performed on-site. As part of pre-launch and flight activities, an LHA would be established around the launch site. The LHA would result in certain areas of Vandenberg AFB being cleared of personnel in the event of an accident during target launch. In conjunction with a consolidated evacuation agreement, county parks, including Jalama Beach County Park, could be included within the LHA and closed during a launch by Vandenberg AFB. Similarly, certain sea-surface areas would also have to be cleared. While the closure areas in question are significant in size, their nature is decidedly temporary; land areas would need to be cleared approximately 1 hour before a launch, with sea surface areas cleared approximately 4 hours before a launch. Upon the Range Safety Officer declaring the area safe after a launch, expected to be within hours, the areas can then be reoccupied. Also, the notice given to the local communities via local newspapers, broadcast media, and commercial fishing and tourist boat trade associations would be extensive. As such, entities with an economic interest in the use of these areas (such as the commercial fishing and tourist industries) would not be significantly impacted by the proposed clearance areas.

As mentioned in section 4.3.7, it is possible that the oil platforms near Vandenberg AFB would have to be closed or sheltered during launch. This action would be temporary and would result in negligible impacts to socioeconomics.

Support personnel would be housed in motels or hotels within the surrounding cities of Vandenberg AFB during the operational phase of the launch. Activities related to the implementation of the ASIP would not cause any displacement of populations, residences, or businesses within the areas surrounding Vandenberg AFB. There are numerous hotels and motels situated within the surrounding cities of Lompoc, Santa Maria, and Guadalupe, and the availability of temporary accommodation is considered to be adequate.

By spending money in the local economy, mainly via accommodation and procurement of goods and services, the additional personnel would represent both a potential increase in local service-based employment opportunities and a small but positive temporary economic impact to the local communities. The overall impact would, however, be slight and would not cause any population growth. No significant impacts to locally significant businesses or industries such as services, agriculture or manufacturing are anticipated during operational activities.

4.3.11.3 Post Launch Test Activities

At the conclusion of testing activities, Arrow program personnel would remove all mobile equipment/assets brought to the range. 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.

4.3.11.4 Cumulative Impacts

The proposed LFTS launch from Vandenberg AFB, in conjunction with current planned or anticipated launches should result in a small positive cumulative socioeconomic impact.

4.3.12 WATER RESOURCES—VANDENBERG AIR FORCE BASE

4.3.12.1 System Transportation and Launch Preparation Activities

Implementation of the ASIP would result in minor modifications of the SSI or SLC-3W sites on Vandenberg AFB; therefore, the disturbed areas would be minimal. Implementation of Best Management Practices, such as berms and impermeable basins, and other procedures would be expected to minimize water quality impacts. Only insignificant and accidental spillage of petroleum products and other construction materials would be expected. Stormwater runoff, pad/equipment washdown, spills, or other wastewater produced would be contained for waste disposition. Contained wastewaters would be sampled and analyzed for waste characterization prior to removal from the site. System transportation would occur only on established roads and/or airways and would have minimal impacts on water resources as well.

4.3.12.2 Flight Testing and Test Mishaps

It is anticipated that the levels of exhaust emissions of the LFTS would be similar to previously launched vehicles as described in the *LPM Site Preparation and Launch EA* for Vandenberg AFB (U.S. Department of Defense, Missile Defense Agency, 2002a). Due to the mobile nature of the missile itself, only a small portion of the launch exhaust would be emitted near the ground and these emissions would have a minimal impact on regional water quality

In the event of a testing mishap, including termination of the flight on the launcher/launch pad, termination of a flight shortly after liftoff or termination of a flight after it has exited the vicinity of the launcher/launch pad, the potential results would cause localized, short-term impacts to water quality in the form of combustion byproducts and potentially hazardous materials seeping into regional water. Provisions would be made for the availability of fire suppression, hazardous materials emergency response, and emergency medical teams during launch operations. These provisions, in combination with the low probability of a launch mishap, would result in only a short-term, localized impact to regional water quality.

4.3.12.3 Post Launch Test Activities

At the conclusion of testing activities, Arrow program personnel would remove all mobile equipment/assets brought to the range. 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.

As discussed in section 4.3.8.3, following target launches, Mobile Launchers are usually driven to the wash-down area at Building 1800, the Missile Maintenance Facility. Mobile Launchers would be washed down to remove missile blast residue, and the collected wastewater would be tested for proper disposal. Approximately 1,893 liters (500 gallons) of wastewater would be generated for each launch. This very limited amount would have no impact on Vandenberg's wastewater capacity.

The potential increase in wastewater generated from any other post-launch activities, combined with the presence of approximately four to eight personnel, would be minimal and would not substantially increase demand on base wastewater handling capacity.

4.3.12.4 Cumulative Impacts

Cumulative, but minor and temporary, increases in stormwater runoff and related discharges of sediments have occurred in base drainages. These insignificant impacts have typically occurred near areas that have been paved during past construction projects and where runoff rates have increased. Such impacts have been and would continue to be minimized by construction standard operating procedures and the other commitments included in the related Stormwater Pollution Prevention Plans. The Proposed Action, in combination with other planned launches, would not result in cumulative impacts to surface water, ground water, or ocean water quality.

4.4 OPEN OCEAN (FLIGHT TEST CORRIDOR)

4.4.1 AIRSPACE—OPEN OCEAN

4.4.1.1 System Transportation and Launch Preparation Activities

Transportation of AWS components would be accomplished as routine sealift and/or airlift. Launch preparations involving the open ocean of the Point Mugu Sea Range would follow standard evacuation procedures of the active warning area. Provisions would be made for surveillance of the affected airspace. In addition, safety regulations dictate that when it is known or suspected that any unauthorized aircraft have entered any part of the warning area, launch operations would be suspended 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 temporary operating areas during flight test. Clearance and closures of airspace are considered normal operations and would be determined by necessary pre-launch determinations and flight corridor clearances. Furthermore, system transportation and launch preparation activities would not have any adverse impacts to airspace over the ROI.

4.4.1.2 Flight Testing and Test Mishaps

The majority of the airspace in the ROI lies outside territorial limits in the international airspace and, consequently, is not part of the National Airspace System. Because the area is in international airspace, the procedures of the ICAO, outlined in ICAO Document 4444, *Air Traffic Management* (formerly the *Procedures for Air Navigation Services—Rules of the Air and Air Traffic Services),* are followed. ICAO Document 4444 is the equivalent air traffic control manual to FAA Handbook 7110.65, *Air Traffic Control*. The FAA acts as the U.S. agent for aeronautical information to the ICAO, and air traffic in the over-water ROI is managed by the Los Angeles ARTCC.

After launch, typically the target missiles would be above Flight Level 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 ALTRV 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 ALTRV—usually for a matter of a few hours, with a backup day reserved for the same hours. Because the airspace in the Temporary Operating Area is not heavily used by commercial aircraft, and is far removed from the en route airways and jet routes crossing the Point Mugu Sea Range, the impacts to controlled/uncontrolled airspace would be minimal.

For sea-launch target launches, it may be necessary to establish a 3.7-kilometer (2-nautical-mile) radius temporary warning area, extending from the surface up to 18,290 meters (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 open ocean ROI, 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 Point Mugu Sea Range, the impacts to controlled and uncontrolled airspace would be minimal. Missile intercepts and intercept debris would occur within special use airspace areas. The use of ALTRV procedures as authorized by the Central Altitude Reservation Function or Los Angeles ARTCC for airspace utilization under prescribed conditions in the Temporary Operating Area would not impact special use airspace. According to the FAA Handbook, 7610.44, ALTRVs may encompass certain rocket and missile activities and other special operations that may be authorized by FAA approval procedures.

The airways and jet routes that crisscross the ocean area airspace ROI have the potential to be affected by the Proposed Action. However, target missile launches would be conducted in coordination with the FAA and in compliance with DoD Directive 4540.1 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.” Therefore, no significant impacts to the ROI’s over-water airways and jet routes are identified.

4.4.1.3 Post Launch Test Activities

After the second flight test of each caravan, the AWS equipment would be dismantled and transported in the reverse manner as shipped to the United States. Such impacts to airspace would be the same as described in section 4.4.1.1. In addition, no post-launch impacts are expected to occur concerning the release of restricted airspaces and warning areas to normal non-hazardous use. Therefore, no impacts to regional airspace would be expected from post-launch activities.

4.4.1.4 Cumulative Impacts

Testing would require clearance of various areas of airspace, and may cause rerouting or rescheduling of flights. However, most impacts would be in remote areas that would have little effect on air traffic. There is no airspace segregation method such as warning or restricted area to insure that the area would be cleared of nonparticipating aircraft. Flight tests with intercepts in the vicinity of en route airways and jet routes, when combined with other missile test programs, could lead to cumulative impacts to airspace in the form of flight delays. Missile launches are short-term, discrete events, however, and using the required scheduling process for international airspace would minimize the potential for cumulative impacts.

4.4.2 BIOLOGICAL RESOURCES—OPEN OCEAN

4.4.2.1 System Transportation and Launch Preparation Activities

Air-launched targets would be flown in by C-17 aircraft from Yuma Proving Ground or Point Mugu for release in the test area. All transportation would be accomplished in accordance with DOT and DoD hazardous materials shipping regulations. Transportation activities would occur on routes currently used for similar maneuvers and would follow existing applicable regulations. No impacts to biological resources are anticipated.

4.4.2.2 Flight Testing and Test Mishaps

The proposed launches from San Nicolas Island, Vandenberg AFB, and the open ocean would have no discernible or measurable effect on the ocean's overall physical and chemical properties, and thus would have no impacts to the overall marine biology of the Ocean Area ROI. Moreover, the proposed test flight operations would have no discernible effect on the biological diversity of either the pelagic or benthic marine environments. The proposed activities would take place in the open ocean, or pelagic zone, which is far removed from land and contains approximately 2 percent of marine species. The density of species, including marine mammals, generally decreases, and the probability of impact from ASIP activities decreases, as the distance from shore increases. The potential for impacts exists from the AWS and target missile boosters' fall to the ocean surface and from the target payload falling to the ocean surface. Of particular concern is the potential for impacts to marine mammals from both auditory and non-auditory effects. Potential auditory effects include behavioral disturbance (including displacement), acoustic masking (elevated noise levels that drown out other noise sources), and (with very strong sounds) temporary or permanent hearing impairment. Potential non-acoustic effects include physical impact by falling debris, entanglement in debris, and contact with or ingestion of debris or hazardous materials. Potential adverse effects could occur from sonic boom overpressures, shock wave impact, ingestion of toxic solutions generated from the unburned propellant mixed with seawater, and ingestion of pieces of unburned propellant.

Hazardous Materials Deposition

The National Aeronautics and Space Administration conducted an evaluation of the effects of missile systems that are deposited in seawater. It concluded that the release of hazardous materials aboard missiles into seawater would not be significant. Materials would be rapidly diluted and, except for the immediate vicinity of the debris, would not be found at concentrations identified as producing any adverse effects. (National Aeronautics and Space Administration, 1973) The Pacific Ocean depth in the vicinity of the launch area is thousands of meters (feet) deep, and consequently impact from the fuel is expected to be minimal. The rocket components would sink to the ocean bottom, out of reach from marine mammals, sea turtles, and most other marine life (U.S. Department of the Air Force, 2001). Unburned solid fuel is hard and rubber-like, and any ammonium perchlorate would dissolve slowly out of the rubber-like binder, producing ammonia and chlorine that would disperse into the marine waters. Were hazardous materials to leach out of the intercept debris, the great volume of water in the ocean would dilute the contaminants to acceptable levels. The solid fuel's aluminum oxide is insoluble; in addition, as the fuel slowly dissolves, its outer layers become spongy, further retarding dissolution. Thus, no toxic levels of ammonia, chlorine, or aluminum would be expected. A recent study conducted for the U.S. Air Force (Lang, et al, 2001) measured the amount of perchlorate lost from solid propellant samples immersed in fresh and salt water. From the measurement of the concentration of the perchlorate ion in solution, the mass fraction loss of the propellant sample

due to perchlorate leaching was calculated. It would take approximately 270 days for 90 percent of the perchlorate to leach out of solid propellant that lands in the ocean (at 29 °C [84° F]). The perchlorate would be expected to be diluted as it mixes with the surrounding water.

Any area affected by the slow dissolution of the propellant would be relatively small due to the size of the rocket motor or propellant pieces relative to the quantity of seawater. (Federal Aviation Administration, 1996)

Under nominal launch conditions when the relative humidity is less than 100 percent, deposition of hydrogen chloride gas on the surface of the sea would not be significant. Analyses for the most conservative case, where rain would be present soon after test firing the advanced solid rocket motor, concluded that acid deposition to surface water would not result in any impacts to larger surface water bodies in the area. This analysis was based on the buffering capacity of fresh water, which is considerably lower than the buffering capacity of sea water; therefore, it is expected that even for the most conservative case condition where all of the hydrogen chloride emission falls over the open ocean area, the pH level would not be depressed by more than 0.2 standard units for more than a few minutes. (Pacific Missile Range Facility, Barking Sands, 1998)

Mathematical modeling results of advanced solid rocket motor tests indicated the maximum deposition of aluminum oxide would measure about 1.6 milligrams per square meter. Aluminum oxide is not considered toxic under natural conditions but may contribute potentially harmful species of soluble aluminum forms under acidic conditions. It is difficult to quantify the portion of aluminum oxide that reacts with hydrogen chloride to form additional toxic aluminum compounds. The most conservative approach assumes that all of the aluminum oxide deposited has reacted with hydrogen chloride. With this extremely conservative assumption, the deposition of about 1.6 milligrams per square meter of aluminum oxide equals approximately 0.0054 milligram per liter aluminum at a water depth of 0.15 meter (0.5 foot). This analysis is based on the assumption that it would not be raining at the time of the test event or within 2 hours after the event. (Pacific Missile Range Facility, Barking Sands, 1998)

No solid propellant would remain in the spent rocket motors that impact in the ocean. The residual aluminum oxide and burnt hydrocarbon coating the inside of the motor casings would not present any toxicity concerns. However, residual amounts of hydraulic fluid contained in the first-stage motor, and the contents of various batteries onboard the rocket motors and the reentry vehicle, may mix with the seawater causing contamination. The release of such contaminants could potentially harm marine life that comes in contact with or ingests the toxic solutions. (U.S. Department of the Air Force, 2001)

It is also expected that even in the most conservative scenario of an on-ship or early flight failure where all of the propellant is ignited and all of the hydrogen chloride and aluminum oxide is deposited, any toxic concentration of these products would be buffered and diluted by sea water to nontoxic levels within minutes. Consequently, any impacts from accidental release would be very transient. (Pacific Missile Range Facility, Barking Sands, 1998)

A launch mishap involving liquid propellant could result in the unlikely, but possible, limited emission of nitric acid through release of inhibited red fuming nitric acid (IRFNA). The reaction of the acid with water would initially cause violent spattering, an increase in water temperature,

and substantial lowering of the pH value in the local area. However, the low levels of the emission and the natural buffering capacity of water, particularly seawater combined with the strong ocean current, would neutralize the reaction in a relatively short period of time.

In the highly unlikely event that the propellants are deposited in surface water, residual nitric acid would cause a substantial, short-term pH change. The acid would mix with the water and eventually be neutralized and diluted. Hydrogen peroxide in surface water would decompose into water and oxygen within 8 hours to 20 days. Kerosene or JP-8 fuel would not mix with the water, but would form a slick on the surface that would stick to surfaces it contacts. Hydrazine fuels would degrade primarily into nitrogen gas and water over a period of hours to weeks, with degradation proceeding more rapidly in alkaline waters.

Debris

Debris impact and booster drops in the open ocean area could occur within the 322-kilometer (200-mile) limit of the Exclusive Economic Zone of San Nicolas Island and the affected coast of California. The natural buffering capacity of seawater and the strong ocean currents would neutralize reaction to any release of the small amount of liquid propellant contained within the Divert and Attitude Control System or Liquid Propellant Missile. Analysis in the *Marine Mammal Technical Report*, prepared in support of the *Final EIS/Overseas EIS, Point Mugu Sea Range* (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a), determined that there is a very low probability that a marine mammal would be killed by falling missile boosters, targets, or debris as a result of tests at the Point Mugu Sea Range (less than 0.0149 marine mammals exposed per year). The potential for an object or objects dropping from the air to affect marine mammals or other marine biological resources is less than 10^{-6} (1 in 1 million). The probability of a spent missile landing on a cetacean or other marine mammal is remote.

This probability calculation was based on the size of the area studied and the density of the marine mammal population in that area. The analysis concluded that the effect of this missile debris and intact missiles coming down in the open ocean would be negligible. (Pacific Missile Range Facility, Barking Sands, 1998)

The preliminary debris footprints shown in figures 2-1 through 2-4 are based upon known information about the Arrow missile and target vehicles (using the USFT-1 target as reference) using the Kinetic Impact Debris Dispersion model. These footprints indicate debris would be more than 30 miles from the coast of California given worst case monthly wind averages. Actual debris footprints depend on mission day meteorological conditions, flight geometry, and vehicle flight dynamics of both the interceptor and target at the time of the intercept event. Actual debris footprints are expected to be smaller. For test and safety planning purposes, the debris plots shown in figures 2-1 thru 2-4 include worst case conditions and resulting debris footprints for the nominal engagement scenarios. (Peppers, 2003b)

NAVAIR uses a risk based approach to quantify boundaries of acceptable debris impacts. Standard Missile and Vandal missile debris impacts within the NAVAIR Sea Range are comparable to the debris expected for Caravan 1. These systems are included in the Naval Air Warfare Center Weapons Division EIS (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a). NAVAIR uses the Kinetic Impact Debris Dispersion model in addition to other models and simulations to mitigate the potential for lethal debris landing in controlled areas. Risk is assessed in accordance with RCC-321-00 for nominal and off nominal

flight tests. Recent debris dispersion analysis indicates no impacts to San Nicolas Island or near the California coastline. However, the potential for debris impacting closer to the coastline during off nominal intercept events does exist and would be assessed using real-time analysis to ensure the risk is within acceptable limits as defined in RCC-321-00. (Peppers, 2003b)

The splashdown of the first- and second-stage target missile boosters and Arrow missile boosters, and the target vehicle's and defensive missile's payloads in the case of an unsuccessful intercept, is planned to occur in open ocean waters thousands of meters (feet) deep at considerable distance from the nearest land. The parts of solid rocket motor propellant expelled from a destroyed or exploded rocket motor that fall into the open ocean would most likely sink to the ocean floor at depths of thousands of meters (feet). At such depths, the propellant parts would be out of the way of feeding marine mammals. (Pacific Missile Range Facility, Barking Sands, 1998)

Following an air-launched target missile launch, the Booster Extraction System would continue a slow descent by parachute until impacting the water. Although the impact would occur at a reasonably slow velocity, the falling 1,225-kilogram (2,700-pound) pallet could strike and injure or kill a marine mammal or sea turtle. As previously discussed, however, the probability of striking an animal within the ROI is extremely remote. (U.S. Department of the Air Force, 2001)

The eight parachutes used to extract and prepare the air-launched target missile for launch would sink to the ocean bottom, along with the aluminum pallet. These parachutes, 4.6 to 28.7 meters (15 to 94 feet) in diameter, could cause entanglement of a marine mammal or sea turtle and potential drowning. However, such entanglement would be very unlikely since a parachute would either have to land directly on an animal, or an animal would have to swim blindly into it before it sinks to the ocean floor. The potential for a marine mammal or sea turtle to be in the same area and have physical contact with a parachute is remote. (U.S. Department of the Air Force, 2001)

Ingestion of Pieces of Unburned Propellant

Because of the slow rate at which the toxic materials dissolve out of the solid fuel matrix, the concentration and toxicity of dissolved solid rocket motor fuel in the ocean, from the unexpended rocket motor, or portions of it, is expected to be negligible and without any substantial effect.

The parts of solid rocket motor propellant expelled from a destroyed or exploded rocket motor that fall into the ocean would most likely sink to the ocean floor at depths of thousands of meters (feet). At such depths, the propellant parts would be out of the way of feeding marine mammals.

Noise

Potential auditory effects include behavioral disturbance (including displacement), acoustic masking (elevated noise levels that drown out other noise sources), and (with very strong sounds) temporary or permanent hearing impairment. Injury by the shock wave resulting from impact of a large, fast-moving object (such as a missile booster or target vehicle) with the water surface could be considered either an acoustic or non-acoustic effect. In particular, the U.S. Navy acknowledges that acoustic emissions from various products and activities could be interacting with marine mammals' hearing. Temporary Threshold Shift (TTS) is used as a measure of temporary reduction in hearing sensitivity. Federal regulations promulgated under the Marine Mammal Protection Act have recognized that some criterion of measurement is necessary. Furthermore, the National Marine Fisheries Service considers TTS a reversible decrease in hearing sensitivities that result from exposure to loud sound, as a potential measure for evaluating impacts of sound emissions.

For sound levels at or somewhat above the TTS threshold, hearing sensitivity recovers rapidly after exposure to the noise ends. Much greater single noise exposures would be required to result in permanent hearing damage, while lesser noise levels would involve only minor behavioral responses with no effect on hearing sensitivity.

Sonic Boom Overpressure Impacts

The missiles could generate a sonic boom upon reentry. Each missile would propagate a unique sonic boom contour depending upon its mass, shape, velocity, and reentry angle, among other variables. The location of the possible impact point would vary depending upon the particular flight test profile. It is therefore difficult to produce the specific location, extent, duration, or intensity of sonic boom impacts upon marine life. These noise levels would be of very short duration.

According to analysis provided in the Navy's Point Mugu Sea Range EIS, brief transient sounds such as sonic booms are unlikely to result in significant adverse effects to pinnipeds in the water. Pinnipeds seem tolerant of noise pulses from sonic booms, although reactions may occur. Temporary displacement, less than 1 or 2 days, is considered a less than significant impact. Momentary startle or alert reactions in response to a single transient sound such as a sonic boom are not considered a significant adverse effect to whales. Baleen whales (humpback, gray, and bowhead) have often been observed behaving normally in the presence of strong noise pulses from sources such as distant explosions and seismic vessels. Most gray and bowhead whales show some avoidance of areas where these noise pulses with pressures exceeding 170 dB re 1 micropascal are repeated. (U.S. Department of the Navy, Naval Air Warfare Center Weapons Division, 2002a)

The noise level thresholds of impact to marine life in general, and marine mammals in particular, are currently the subject of scientific analysis. There is the possibility that underwater noise levels resulting from missile reentry sonic booms could affect some marine mammals or sea turtles in the open ocean. In addition, since different species of marine mammals have varying sensitivity to different sound frequencies and may be found at different locations and depths in the ocean, it is difficult to generalize sound impacts to marine mammals from missile impacts in the open ocean area. Should consensus emerge from the scientific analysis about the effects of underwater noise upon marine mammals, it would then be possible to predict the consequences of a particular sonic boom contour upon marine mammals in the vicinity.

Recent analysis by Cheng and Lee has shown that disturbances from acoustic sources produced by interaction of a surface wave train with an incident sonic boom wave would attenuate in deep water at a rate much lower (slower) than those predicted by Sawyer's theory for a flat (non-wavy) ocean, and would accordingly overwhelm the latter at large depth. Experimental and theoretical research on underwater impact from sonic booms are performed to ascertain the significant influence of wavy ocean surface on sonic boom penetration power and to determine, through application of validated model to aircraft and space-launch examples, if predicted signal intensity and characteristics at depth belong to ranges and types that may allow meaningful impact assessment in the study of marine mammals (Missile Defense Agency, Headquarters Space and Missile System Center, and Institute for Environment, Safety and Occupational Health Risk Analysis, 2001).

Shock Wave Impact

The first-, second-, and third-stage target missile boosters and the target vehicle's payload, which all fall to the ocean surface, would impart a considerable amount of kinetic energy to the ocean water upon impact. Missiles and targets would hit the water with speeds of 91 to 914 meters (300 to 3,000 feet) per second. It is assumed that the shock wave from their impact with the water would be similar to that produced by explosives. At close ranges, injuries to internal organs and tissues would likely result. However, injury to any marine mammal by direct impact or shock wave impact would be extremely remote (less than 0.0006 marine mammals exposed per year). The splashdown of the target missile boosters and payload is planned to occur in open ocean waters thousands of meters (feet) deep at considerable distance from the nearest land. (U.S. Army Space and Missile Defense Command, 2001)

Standard range warning and checking procedures would check for visible large concentrations of marine mammals in the area of the target launch, trajectory, and first stage impact area. Patrol and surveillance aircraft would be dispatched before launch to search the water surface. If contacts are made and confirmed, the Flight Safety officer would determine whether to continue on schedule, delay the test flight, or postpone it until another day.

4.4.2.3 Post Launch Test Activities

After the second flight test of each caravan, the AWS equipment would be dismantled and packed for shipment back to Israel. Impacts would be the same as discussed in section 4.4.2.1.

4.4.2.4 Cumulative Impacts

No substantial impacts to the open ocean area and its wildlife have been identified from current and past missile test activities. Prior analysis has not identified a significant potential for cumulative impacts. It is not likely that the proposed activities, in conjunction with current or anticipated launches, would exceed the current level of activity in these areas. AWS-related tests would be discrete, short-term events, and no adverse cumulative impacts are anticipated.

4.4.3 HAZARDOUS MATERIALS AND WASTE—OPEN OCEAN

4.4.3.1 System Transportation and Launch Preparation Activities

SRALT and LRALT Launches

In preparation for the SRALT or LRALT launch, rocket motor processing and missile assembly/checkout would occur at Hill AFB, Utah, and Yuma Proving Ground, Arizona, respectively. The military cargo aircraft used to launch the SRALT and/or LRALT missile would be staged out of Yuma Proving Ground or Point Mugu.

Liquid Fueled Target System Launches/MLP

The unfueled LFTS and liquid propellant (oxidizer and initiator fuel) would be transported separately from Redstone Arsenal to ordnance storage on the MLP at Concord Naval Weapons Station. In the event of a delay, existing ordnance storage at Concord would be used. Liquid propellants are transported in DOT-certified transport/storage containers and transferred from these containers into the missile. The MLP would be loaded and the missile would be fueled while docked at explosive anchorage at Concord. The *Oil and Hazardous Substance Contingency Plan* (2003) and the *Hazardous Waste Management Plan*, Appendix A, to Weapon Station Seal Beach Detachment Concord Instruction 5090.B would be modified if necessary and implemented prior to the initiation of the action.

Although slight, there is a potential for chemical or fuel spills or mishaps during transportation operations. Because any spills or mishaps would be handled pursuant to all applicable Federal and state laws and DoD regulations, no significant impacts from hazardous materials or waste management are anticipated.

Assembly of the target missile would occur on the MLP. Proposed launch preparation operations could generate limited quantities of hazardous waste, such as unused or contaminated cleaning solvents, unused lubricants, or hydraulic fluids. These wastes are typical of those generated on board the MLP. Should emergency actions dictate the refueling of a target missile, propellants would be unloaded on a non-permeable surface and containerized within approved receptacles; any waste spills would also be collected and containerized. Prior to the initiation of the action, standard operating procedures and hazardous waste and spill contingency plans would be developed and implemented in case the fueling of a back-up missile is required onboard the MLP while at sea.

Hazardous materials used and wastes generated during the course of launches from the MLP would be managed in accordance with applicable Federal, state and maritime regulations, and DoD service guidelines. The Navy requires that, to the maximum extent practicable, ships shall retain hazardous waste aboard ship for shore disposal. If hazardous materials are discharged overboard, this must occur more than 370 kilometers (200 nautical miles) from land. Discharging hazardous materials overboard is not standard practice and would only be done as a worst case scenario.

Twenty-five liquid discharges, such as clean ballast, deck runoff and dirty ballast, from the normal operation of Armed Forces vessels are required to be controlled by installation of control technologies or use of management practices (marine pollution control devices) under the Uniform National Discharge Standards provisions of the Clean Water Act. In compliance with

Uniform National Discharge Standards, the MLP vessel would incorporate marine pollution control devices, such as keeping decks clear of debris, cleaning spills and residues and engaging in spill and pollution prevention practices, in design or routine operation.

The quantity of hazardous materials used and hazardous waste generated is not expected to significantly impact the generator status or current hazardous materials management and waste disposal practices of the MLP homeport.

4.4.3.2 Flight Testing and Test Mishaps

As a result of successful flight test operations/intercepts, debris from both the target and defensive missiles would be produced. If an in-flight malfunction occurs, the range safety officer may initiate flight termination, resulting in missile debris being deposited beneath the flight path. Additionally, launch of target missiles would require selection of drop zones, where in the case of the SRALT and LRALT targets, first-stage assemblies would land following separation from the flight systems. In each of these cases, impacts would occur within deep-water sea areas.

Hazardous materials carried aboard missile systems may include solid propellants, liquid propellants (hypergolic or cryogenic), and working fluids (hydraulic fluids, lubricants, etc.). During flight termination, pieces of unburned propellant could be dispersed over an area of ocean up to several kilometers (miles). Once in the water, ammonium perchlorate can slowly leach out and is toxic to plant life and fish. However, the toxicity is expected to be low, and toxic concentrations are expected to be located only within a few yards of the source. Most pieces of propellant would sink to the ocean floor beyond the reach of most marine life. (U.S. Department of Defense, Missile Defense Agency, 2002b)

The National Aeronautics and Space Administration has conducted an evaluation of the effects of missile systems which are deposited in sea waters. The studies determined that materials would be rapidly diluted, and except for the immediate vicinity of the debris, would not be found at concentrations identified as producing any adverse effects. This applies to debris deposited either as a result of successful or unsuccessful intercepts, or due to in-flight malfunction or flight termination along the flight corridor. (National Aeronautics and Space Administration, 1973) A launch mishap involving liquid propellant could result in the unlikely, but possible, limited emission of nitric acid through release of IRFNA. The reaction of the acid with water would initially cause violent spattering, an increase in water temperature, and substantial lowering of the pH value in the local area. However, the low levels of the emission and the natural buffering capacity of water, particularly seawater combined with the strong ocean current, would neutralize the reaction in a relatively short period of time. Eventually, all hazardous materials falling into the sea would become diluted by the water, and would cease to be of any possible concern. National Aeronautics and Space Administration studies concluded that the release of hazardous materials aboard missiles into sea waters would be not significant (National Aeronautics and Space Administration, 1973).

4.4.3.3 Post Launch Test Activities

The missile debris would most likely sink to the ocean floor at depths of thousands of meters (feet). It is not proposed that missile debris be recovered from deep sea areas; thus, there would be no collection of hazardous waste and no impact to hazardous waste management activities.

4.4.3.4 Cumulative Impacts

ASIP test flights would occur within the large open area of the Pacific Ocean. Missile intercepts in this area would result in only temporary, minor, and very localized emissions. No substantial hazardous materials and waste management impacts are expected since residual fuel and missile components/debris would fall into the ocean where it would be either diluted (fuel) or sink to the bottom as unrecoverable debris (components).

Since potentially hazardous materials released into the environment would be rapidly diluted and dispersed, cumulative impacts would be not significant.

4.4.4 HEALTH AND SAFETY—OPEN OCEAN

4.4.4.1 System Transportation and Launch Preparation Activities

SRALT and LRALT Launches

In preparation for the SRALT and LRALT launches, rocket motor processing and missile assembly/checkout would occur at Hill AFB, Utah, and Yuma Proving Ground, Arizona, respectively. The military cargo aircraft used to launch the SRALT and/or LRALT missile would be staged out of Yuma Proving Ground or Point Mugu. (U.S. Army Yuma Proving Ground, 2001; U.S. Department of Defense, Missile Defense Agency, 2002c)

Liquid Fueled Target System Launches

The liquid propellant (fuel, oxidizer, and initiator fuel) for the LFTS would be transported over road from storage facilities at Redstone Arsenal, Alabama, to the MLP at Concord Naval Weapons Station, California. The unfueled missile and propellants would be transferred to ordnance storage on the MLP. The MLP would be loaded while docked at a fixed explosive anchorage. Liquid propellants are transported in DOT-certified transport/storage containers and transferred from these containers into the missile. Prior to initiation of the action, health and safety standard operating procedures would be developed and implemented for missile fueling onboard the MLP while it is docked and for fueling of the back-up missile if required at sea.

Prelaunch storage, handling and transportation of missile components, liquid propellants, explosives and other materials represent routine activities at Concord and would not cause a significant increase in current operations or risks to health and safety. Standard operating procedures would be developed to address health and safety requirements on the MLP including spill containment, explosives handling, and fuel handling. These procedures would also take into consideration lessons learned from the Proof of Principle Test. (U.S. Department of Defense, Missile Defense Agency, 2002c) Launching of LFTS targets from the MLP for the ASIP program would be based on the analysis provided in the MLP EA. The MLP EA is being prepared by MDA to address and analyze operations of the MLP, including launching of the LFTS. The EA is scheduled to be completed in March 2004.

4.4.4.2 Flight Testing and Test Mishaps

Potential safety hazards associated with ASIP operations within the open ocean would include missile booster drop zones, missile intercepts, and intercept debris. In addition, the launching of

mobile sea launch targets and air launch targets could have airspace use or commercial shipping lane impacts that would be essentially the same as the ground launched missiles.

Appropriate health and safety standard operating procedures would be developed to protect personnel during launch events. These procedures would address platform evacuation requirements and launch mishaps, and would also consider lessons learned from the Proof of Principle Test. (U.S. Department of Defense, Missile Defense Agency, 2002c) 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 Range Safety Approval and Range Safety Operational Plans required of all programs.

Impact zones for each test flight over the open ocean area would be delineated 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.

For sea-launch target launches, 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.

The majority of international trade crossing the Pacific between Asia and North America uses routes of least distance, usually via the great circle route. Depending upon the individual scenarios, the actual debris impact area would be small.

ASIP operations would be coordinated with the FAA, Coast Guard, and other groups or agencies as appropriate, and NOTMARs and NOTAMs would be issued to warn aircraft and marine surface vessels of any launch. ASIP tests would be conducted in areas that would minimize impacts to marine transportation. Continued monitoring of testing areas for other marine vessels would take place to ensure such areas remain clear. Consequently, no adverse impacts to public health and safety are expected.

4.4.4.3 Post Launch Test Activities

After the second flight test of each caravan, the AWS equipment would be dismantled and packed for shipment back to Israel. Impacts would be the same as discussed in section 4.4.4.1.

4.4.4.4 Cumulative Impacts

The Proposed Action would result in up to four flight tests over 3 years. This would be consistent with current levels of missile activities in the open ocean area. Each launch would result in falling inert debris such as target boosters, target re-entry vehicles, interceptor missiles, target and intercept missile debris, or pallets and associated debris (metal fragments) and parachutes being deposited into the open ocean. However, each flight test is a discrete, short-

term event, and no population centers would be in the affected areas. Through adherence to DoD standards for risk criteria during the test launches over the open ocean, individuals of the general public would not be exposed to a probability of fatality greater than 1 in 10 million. Range safety officials would also issue NOTAMs and NOTMARs to warn aircraft and surface vessels of the potentially hazardous areas and allow them ample time to avoid hazards. By following established safety standards and procedures the level of risk to military personnel, contractors, and the general public is greatly reduced. As a result, no impacts to public or occupational health and safety are expected.

Other missile test programs that could potentially affect the same area as the ASIP would also be short term events and would not occur at the same time as the ASIP tests. Therefore, the potential for additive, incremental cumulative impacts from debris hazards or electromagnetic radiation exposure is extremely limited.

4.4.5 NOISE—OPEN OCEAN

The analysis in this section is concerned with human receptors; noise effects on wildlife are discussed under biological resources.

4.4.5.1 System Transportation and Launch Preparation Activities

Transportation of AWS components could be accomplished through commercial sealift; however this is not anticipated to cause noise impacts. No noise impacts are anticipated from system transportation and launch preparations.

4.4.5.2 Flight Testing and Test Mishaps

Sonic booms are possible over the open ocean from the launching of targets from Vandenberg AFB and the interceptors from San Nicolas Island. A sonic boom is a sound that resembles rolling thunder, and is produced by a shock wave that forms at the nose of a vehicle that is traveling faster than the speed of sound. Vessels potentially impacted by sonic booms would be expected to experience sound resembling mild thunder.

4.4.5.3 Post Launch Test Activities

Post-launch activities including the removal of AWS equipment would not impact noise levels. No substantial noise would be expected from post launch activities. Noise impacts would also be of a short duration. Post-launch activities would not cause or contribute to noise impacts.

4.4.5.4 Cumulative Impacts

Since the sound level generated by each launch is a short, discrete event, potential cumulative impacts to noise from AWS launches would not be substantial. The transportation of AWS components to and from the Proposed Action locations would not cause or contribute to noise impacts. It is not likely that the Proposed Action, in conjunction with current planned or anticipated launches, would result in cumulative noise impacts.

4.4.6 WATER RESOURCES—OPEN OCEAN

4.4.6.1 System Transportation and Launch Preparation Activities

Air-launched targets would be flown in by C-17 aircraft from Yuma Proving Ground or Point Mugu for release in the test area. The LFTS would be transported unfueled to the Concord Naval Weapons Station, California, from storage facilities on Redstone Arsenal, Alabama. The liquid propellant would be shipped by truck to the ordnance facility at Concord Naval Weapons Station in approved shipping containers. All transportation would be accomplished in accordance with DOT and DoD hazardous materials shipping regulations. Transportation activities would occur on routes and/or roads currently used for similar maneuvers and would follow existing applicable regulations. Prior to the initiation of the action, the *Oil and Hazardous Substance Contingency Plan* (2003) and the *Hazardous Waste Management Plan*, Appendix A, to Weapon Station Seal Beach Detachment Concord Instruction 5090.B would be modified if necessary for implementation while the MLP is docked. Hazardous waste contingency and spill prevention containment and countermeasures plans would also be developed prior to the action and implemented for fueling of the back-up missile if required at sea. No impacts to water resources are anticipated.

4.4.6.2 Flight Testing and Test Mishaps

The National Aeronautics and Space Administration conducted an evaluation of the effects of missile systems that are deposited in seawater. It concluded that the release of hazardous materials aboard missiles into seawater would not be significant. Materials would be rapidly diluted and, except for the immediate vicinity of the debris, would not be found at concentrations identified as producing any adverse effects. (National Aeronautics and Space Administration, 1973) The Pacific Ocean depth in the vicinity of the launch area is thousands of meters (feet) deep, and consequently impact from the fuel is expected to be minimal. Any area affected by the slow dissolution of the propellant would be relatively small due to the size of the rocket motor or propellant pieces relative to the quantity of seawater. (U.S. Department of Defense, Missile Defense Agency, 2002c)

Under nominal launch conditions when the relative humidity is less than 100 percent, deposition of hydrogen chloride gas on the surface of the sea would not be significant. Analyses for the most conservative case, where rain would be present soon after test firing the advanced solid rocket motor, concluded that acid deposition to surface water would not result in any impacts to larger surface water bodies in the area. This analysis was based on the buffering capacity of fresh water which is considerably lower than the buffering capacity of sea water; therefore, it is expected that even for the most conservative case condition where all of the hydrogen chloride emission falls over the open ocean area, the pH level would not be depressed by more than 0.2 standard units for more than a few minutes. (U.S. Department of Defense, Missile Defense Agency, 2002c)

Mathematical modeling results of advanced solid rocket motor tests indicated the maximum deposition of aluminum oxide would measure about 1.6 milligrams per square meter. Aluminum oxide is not considered toxic under natural conditions but may contribute potentially harmful species of soluble aluminum forms under acidic conditions. It is difficult to quantify the portion of aluminum oxide that reacts with hydrogen chloride to form additional toxic aluminum species. The most conservative approach assumes that all of the aluminum oxide deposited has reacted with hydrogen chloride. With this extremely conservative assumption, the deposition of about

1.6 milligrams per square meter of aluminum oxide equals approximately 0.0054 milligram per liter aluminum at a water depth of 0.15 meter (0.5 foot). This analysis is based on the assumption that it would not be raining at the time of the test event or within 2 hours afterwards. (U.S. Department of Defense, Missile Defense Agency, 2002c)

It is also expected that even in the most conservative scenario of an on-ship or early flight failure where all of the propellant is ignited, any toxic concentration of these products would be buffered and diluted by sea water to non-toxic levels within minutes. Consequently, any impacts from accidental release would be very transient. (U.S. Department of Defense, Missile Defense Agency, 2002c)

As discussed in section 4.4.2.2, the release of liquid propellant from the LFTS could result in limited emission of kerosene and nitric acid through release of inhibited red fuming nitric acid. The reaction of the acid with seawater would initially cause an increase in water temperature and lowering of the pH in the local area. However, the low levels of the emission and the natural buffering capacity of the seawater combined with the strong ocean current would neutralize the reaction in a relatively short period of time. Kerosene would not mix with the water, but would form a slick on the surface that would stick to surfaces it contacts.

No efforts are planned at this time to recover a missile from a failed missile intercept that falls into the ocean.

4.4.6.3 Post Launch Test Activities

After the second flight test of each caravan, the AWS equipment would be dismantled and packed for shipment back to Israel. Impacts would be the same as discussed in section 4.4.6.1.

4.4.6.4 Cumulative Impacts

Since each launch is a short, discrete event, potential cumulative impacts to water resources from AWS launches would not be substantial. The transportation of AWS components to and from the proposed action locations would not cause or contribute to water resource impacts. It is not likely that the proposed action, in conjunction with current planned or anticipated launches, would result in cumulative water resource impacts.

4.5 ENVIRONMENTAL EFFECTS OF THE NO-ACTION ALTERNATIVE

Under the No-action Alternative, the ASIP would not be established, and MDA would not proceed with integrated flight testing of the AWS as described in the Proposed Action. Commitments to Israel to cooperatively develop an effective Israeli TMD capability would not be fulfilled, and the United States would not realize any benefits to its own TMD test program from participation in the ASIP. If the No-action Alternative is selected, no environmental consequences associated with the ASIP are anticipated. San Nicolas Island, Point Mugu, and Vandenberg AFB would continue to launch missiles as analyzed in prior EAs.

4.6 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 located in or around San Nicolas Island, Point Mugu, or Vandenberg AFB. 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.

If the No-action Alternative is selected, no environmental consequences associated with the ASIP are anticipated. Present activities would continue with no change incurrent operations. The capability of the AWS would not be further developed or tested.

4.7 ADVERSE ENVIRONMENTAL EFFECTS THAT CANNOT BE AVOIDED

Adverse environmental effects that cannot be avoided include the release of small amounts of pollutants into the atmosphere; minor noise impacts on wildlife; short-term impact to vegetation; minor increased generation of hazardous materials; and increased noise levels at program-related sites. However, through implementation of the program actions described within this document, these effects would be minimized. Overall, no significant individual or cumulative adverse environmental impacts are anticipated to result from the Proposed Action.

4.8 CONFLICTS WITH FEDERAL, STATE, AND LOCAL LAND USE PLANS, POLICIES, AND CONTROLS FOR THE AREA CONCERNED

All of the proposed program activities would take place in existing facilities or locations on a DoD installation dedicated to training and testing activities. These activities would not alter the uses of the sites, which were in the past or currently are used to support missile and rocket testing. No conflicts with land use plans, policies, and controls are anticipated. Closure of state recreation areas would be short-term, episodic events.

4.9 ENERGY REQUIREMENTS AND CONSERVATION POTENTIAL

Anticipated energy requirements of the ASIP activities would be well within the energy supply capacity of all facilities. Energy requirements would be subject to any established energy conservation practices at each facility.

4.10 IRREVERSIBLE OR IRRETRIEVABLE COMMITMENT OF RESOURCES

The proposed activities would result in no loss of threatened or endangered species, and no loss of cultural resources, such as archaeological or historic sites. Moreover, there would be no changes in land use or preclusion of development of underground mineral resources that were not already precluded.

The amount of materials required for any program-related activities and energy used during the project would be small. Although the proposed activities would result in some irreversible or irretrievable commitment of resources such as various metallic materials, fossil fuels, minerals, and labor, this commitment of resources is not significantly different from that necessary for many other defense research and development programs carried out over the past several years. Proposed activities would not commit natural resources in significant quantities.

4.11 RELATIONSHIP BETWEEN SHORT-TERM USE OF THE HUMAN ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Proposed ASIP activities would take advantage of existing facilities and infrastructure. The proposed upgrades to these facilities or locations would not alter the uses of the sites, which were or are to support missile and rocket launches. Therefore, the Proposed Action does not eliminate any options for future use of the environment for the locations under consideration.

4.12 NATURAL OR DEPLETABLE RESOURCE REQUIREMENTS AND CONSERVATION POTENTIAL

Other than various structural materials and fuels, the program would require no significant natural or depletable resources.

4.13 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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ACRONYMS AND ABBREVIATIONS

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30 SW	30th Space Wing
30 SW/SE	Space Wing/Safety Office
AAQS	Ambient Air Quality Standards
AFB	Air Force Base
ALTRV	Altitude Reservation
APO	Arrow Program Office
ARTCC	Air Route Traffic Control Center
ASIP	Arrow System Improvement Program
ATS	Air Traffic Service
AWS	Arrow Weapon System
C	Celsius
CAE	Control Area Extensions
Cal/EPA	California Environmental Protection Agency
CCA	Command and Control Area
CFR	Code of Federal Regulations
dB	Decibels
dBA	A-Weighted Decibels
DNL	A-Weighted Day-Night Equivalent Sound Level
DoD	Department of Defense
DOT	U.S. Department of Transportation
EA	Environmental Assessment
EC	Expectation of Casualty
ECC	Collective Expectation of Casualty
EED	Electro-explosive Device
EIS	Environmental Impact Statement
EMMD	Environmental Materials Management Division
EMR	Electromagnetic Radiation
EPA	U.S. Environmental Protection Agency
ESQD	Explosive Safety Quantity-Distance
F	Fahrenheit
FAA	Federal Aviation Administration
FCC	Fire Control Center

FCR	Fire Control Radar
FTS	Flight Termination System
HERF	Hazards of Electromagnetic Radiation to Fuel
HERO	Hazards of Electromagnetic Radiation to Ordnance
HERP	Hazards of Electromagnetic Radiation to Personnel
HTPB	Hydroxyl Terminated Polybutadiene
HWMP	Hazardous Waste Management Plan
ICAO	International Civil Aviation Organization
IEEE	Institute of Electrical and Electronics Engineers
IFR	Instrument Flight Rules
IRFNA	Inhibited Red Fuming Nitric Acid
kV	Kilovolt
kVA	Kilovolt-Ampere
kW	Kilowatt
LCC	Launcher Control Center
L_{dn}	A-Weighted Day-Night Equivalent Sound Level
L_{max}	Maximum Sound Level
LFTS	Liquid Fueled Target Systems
LHA	Launch Hazard Area
L_{max}	Maximum Sound Level
LRALT	Long Range Air Launch Target
$\mu g/m^3$	Micrograms Per Cubic Meter
MDA	Missile Defense Agency
MLP	Mobile Launch Platform
MPEL	Maximum Permissible Exposure Level
mW/cm^2	Milliwatts Per Square Centimeter
NAAQS	National Ambient Air Quality Standards
NAVSEA	Naval Sea Systems Command
NAWCWPNSINST	Naval Air Warfare Center, Weapons Division Instruction
NEPA	National Environmental Policy Act
NOTAM	Notice to Airmen
NOTMAR	Notice to Mariners
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Level
PM-2.5	Particulate Matter with a Diameter Less Than or Equal to 2.5 Micrometers
PM-10	Particulate Matter with an Aerodynamic Diameter of Less Than or Equal to 10 Micrometers
PMRF	Pacific Missile Range Facility
POI	Probability of Impact
ppm	Parts Per Million
RCC	Range Commanders Council
RCRA	Resource Conservation and Recovery Act
RF	Radiofrequency
ROI	Region of Influence
RTS	Ronald Reagan Ballistic Missile Defense Test Site
SCORE	Southern California Offshore Range
SLAM	Standoff Land Attack Missile
SLC	Space Launch Complex
SRALT	Short Range Air Launch Target
SSI	Space Services Incorporated
TMCC	Test Mission Control Center
TMD	Terminal Missile Defense
TSD	Treatment, Storage and Disposal
TTS	Temporary Threshold Shift
USC	United States Code
USFT	United States Flight Test
VFR	Visual Flight Rules