Ground-Based Midcourse Defense (GMD) Extended Test Range (ETR)

Draft Environmental Impact Statement

Volume 2 of 2: Chapters 4-Appendices

January 2003

U.S. Army Space and Missile Defense Command
P.O. Box 1500
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Volume 2 of 2

January 2003

Missile Defense Agency

COVER SHEET
DRAFT ENVIRONMENTAL IMPACT STATEMENT
GROUND-BASED MIDCOURSE DEFENSE (GMD)
EXTENDED TEST RANGE (ETR)

a. Lead Agency: Missile Defense Organization

b. Preparing Agency: U.S. Army Space and Missile Defense Command

c. Cooperating Agencies: Federal Aviation Administration, Office of the Associate Administrator for Commercial Space Transportation

d. Proposed Action: Provide operationally realistic testing for GMD ETR.

e. Affected Jurisdictions: Kodiak Launch Complex, Kodiak Island Borough, Alaska; Vandenberg Air Force Base, Santa Barbara County, California; Reagan Test Site, United States Army Kwajalein Atoll; Pacific Missile Range Facility, Barking Sands, Kauai, Hawaii; Eareckson Air Station, Shemya Island, Alaska; Midway Atoll; King Salmon, Bristol Bay Borough, Alaska; Cordova, Valdez-Cordova Census Area, Alaska; Pillar Mountain, Kodiak Island Borough, Alaska; Pashagshak Point, Kodiak Island Borough, Alaska; Homer, Kenai Peninsula Borough, Alaska; Adak, Adak Island, Alaska; Pillar Point, San Mateo County, California; Wake Island, Oceania Atoll; Bremerton, Kitsap County, Washington; Pearl Harbor, Honolulu County, Hawaii; Port Hueneme/San Nicolas Island, Ventura County, California; Naval Station Everett, Snohomish County, Washington; Valdez, Valdez-Cordova Census Area, Alaska; Beale Air Force Base, Yuba County, California; Clear Air Force Station, Denali Borough, Alaska;

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g. Designation: Draft Environmental Impact Statement

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i. Abstract: The Missile Defense Agency is proposing to develop the capability to conduct more realistic interceptor flight tests in support of GMD. The extension of the existing GMD test range would increase the realism of GMD testing by using multiple engagement scenarios, trajectories, geometries, distances, and speeds of target and interceptors that closely resemble those in which an operational system would be required to provide an effective defense. Extended range testing would include pre-launch activities, launch of targets and Ground Based Interceptors from a number of widely separated locations, and missile intercepts over the Pacific Ocean. Target missiles would be launched from Vandenberg AFB, Kodiak Launch Complex, Pacific Missile Range Facility, Reagan Test Site (RTS), or from mobile platforms in the western Pacific Ocean. Interceptor missiles would be launched from Vandenberg AFB, Kodiak Launch Complex, or RTS. Dual target and interceptor missile launches would occur in some scenarios. Existing, modified, or new launch facilities and infrastructure would support these launch activities at the various locations.

Missile acquisition and tracking would be provided by existing test range sensors, ship-borne sensors, a Sea-Based Test X-Band Radar, and a mobile sensor (TPS-X) positioned at Vandenberg AFB, Kodiak Launch Complex, or RTS; and existing/upgraded radars at Beale AFB, California, Clear Air Force Station, and Eareckson Air Station, Alaska. In-Flight Interceptor Communications Data Terminals would be constructed near the proposed Ground-Based Interceptor launch sites and in the mid-pacific region. Commercial satellite communications terminals would be constructed at launch locations that do not have fiber optic communications links and in the mid-Pacific region.

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4.0 ENVIRONMENTAL CONSEQUENCES

4.0 ENVIRONMENTAL CONSEQUENCES

This chapter describes the potential environmental consequences associated with each location that may be affected by the Proposed Action, action alternatives, and the No Action Alternative along with the identification of potential cumulative impacts and mitigation measures. To assess the potential for and significance of environmental impacts from the proposed program activities, a list of activities was developed (sections 1.0 and 2.0) and the environmental setting was described, with emphasis placed on any special environmental sensitivities (section 3.0). Program activities were then compared 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, personal, written, and telephone contacts were made with applicable agencies.

Cumulative impacts result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of who undertakes such actions. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time. For this EIS, potential cumulative impacts are addressed for past, present, and future actions. Future actions were identified based on review of installation and regional land use plans and discussions with installation and regional planners.

Consistent with CEQ regulations, the scope of the analysis presented in this section was defined by the range of potential environmental impacts that could result. Resources that have a potential for impacts were considered in the analysis to provide the decisionmakers with sufficient evidence and analysis for evaluation of potential effects of the action. For this EIS, the environment is discussed in terms of 14 resource areas, which are discussed as applicable for each location.

Sections 4.1 through 4.11 provide discussions of the potential environmental consequences of the proposed GMD ETR program activities and the No-action Alternative. The amount of detail presented in each section is proportional to the potential for impacts. Sections 4.12 through 4.18 provide discussions of the following with regard to proposed program activities: conflicts with federal, state, and local land use plans, policies, and controls for the area concerned; energy requirements and conservation potential; natural or depletable resource requirements and conservation potential; adverse environmental effects that cannot be avoided; relationship between short-term use of the human environment and the maintenance and enhancement of long-term productivity; irreversible or irretrievable commitment of resources; Executive Order 13045, *Federal Actions to Address Protection of Children from Environmental Health Risks and Safety Risks*; and a summary of unresolved issues.

4.1 KODIAK LAUNCH COMPLEX

4.1.1 AIR QUALITY—KODIAK LAUNCH COMPLEX

This section addresses potential environmental impacts from changes in the air quality environment due to the proposed construction and operation of the GBI, target, IDT, and sensor elements of the GMD ETR at KLC, as well as the identification of potential cumulative impacts and mitigation measures. Impacts considered include potential effects from ongoing or planned activities at this site. Potential impacts were determined using the following criteria:

- Operations within attainment areas that could cause a detrimental change in attainment status of the area
- Increases in ambient air pollutant concentration that could cause exceedances of the NAAQS or state AAQS
- Increases in air pollutant concentrations greater than 1 microgram per cubic meter ($\mu g/m^3$) (averaged over 24 hours) from new or modified major stationary sources within 10 kilometers (6 miles) of a Class I area

4.1.1.1 No Action Alternative

Missile Defense Agency

Under the MDA's No Action Alternative, launches of all types covered by the launch site operator's license would continue to occur at KLC, although the GMD ETR would not be established and GBI and target launch scenarios would not be tested under more operationally realistic conditions. Missile propellant information is shown in table 4.1.1-1.

Table 4.1.1-1: Missile Propellant Information for Previous and Predicted Launches at KLC

Missile	Booster	Propellant Mass kilograms (pounds)
ait	Stage I	6,296 (13,851)
	Stage II	1,658 (3,655)
QRLV-1	Single Stage	4,705 (10,372)
QRLV-2	Single Stage	6,235 (13,748)
Athena-1	Stage I	48,876 (107,754)
	Stage II	48,876 (107,754)
	Stage III	9,766 (21,530)
Athena-2	Stage I	48,876 (107,754)
	Stage II	9,766 (21,530)
Strategic Target System	Stage I	9,422 (20,772)
	Stage II	4,025 (8,874)
	Stage III	414 (913)

Source: U.S. Department of the Air Force, 1997a; U.S. Department of the Air Force, 2001; Federal Aviation Administration, 1996; U.S. Army Space and Missile Defense Command, 2001b

The KLC EA predicted under worst-case meteorological conditions, that NAAQS, Alaska AAQS, and U.S. Air Force and Non-criteria Pollutant guidance levels would not be exceeded during up to nine launches per year of the Athena-2, using Castor 120™ motors for propulsion (Federal Aviation Administration, 1996).

Table 4.1.1-2 lists U.S. Air Force and Non-Criteria Pollutant standards for hydrogen chloride and aluminum oxide as well as their predicted levels at various distances during an Athena-2 launch. These levels were estimated by modeling an Athena-2 launch using the EPA's Gaussian Integrated PUFF (INPUFF) model, with an assumed wind speed of 1 meter per second (2.3 miles per hour) and high humidity or precipitation, which typically occurs 2 percent of the year. However, prevailing wind directions at KLC are from the northwest, which would typically transport the ground cloud produced during a launch towards the ocean and away from populated areas. (Federal Aviation Administration, 1996)

Table 4.1.1-2: Predicted Athena-2 Per Launch Pollutant Concentration Levels at KLC

Distance kilometer (mile)	Hydrogen Chloride	Aluminum Oxide
	U.S. Air Force Standard 2 ppm (for 60 minutes) or 10 ppm	**Non-criteria Pollutant Standard 150 μg/m^3**
1 (0.62)	5.61 ppm	119 μg/m^3
2 (1.24)	2.16 ppm	74.7 μg/m^3
3 (1.86)	1.18 ppm	55.3 μg/m^3
4 (2.49)	2.41 ppm	60.8 μg/m^3
5 (3.11)	8.25 ppm	146 μg/m^3
6 (3.73)	3.41 ppm	86.1 μg/m^3
7 (4.35)	3.83 ppm	93.1 μg/m^3
8 (4.97)	2.98 ppm	80.7 μg/m^3
9 (5.59)	2.40 ppm	70.9 μg/m^3
10 (6.21)	1.96 ppm	64.5 μg/m^3

Source: Federal Aviation Administration, 1996
ppm = parts per million
μg/m^3 = microgram per cubic meter

The U.S. Air Force standard for hydrogen chloride is based on measured and estimated launch emission exposure concentrations and durations in the event of normal and catastrophic launches. (National Research Council, Commission of Life Sciences, Board of Environmental Studies and Toxicology, Committee on Toxicology, Subcommittee on Rocket Emission Toxicants, 1998) Other standards for hydrogen chloride include worker National Institute for Occupational Safety and Health (NIOSH) and OSHA standards at 5 parts per million (ppm) and the Short-term Public Emergency Guidance Level of 1 ppm over a 24-hour period. Hydrogen chloride is a colorless, corrosive, nonflammable gas that can cause eye and lung irritation, and it is recommended that personnel should seek shelter or leave the area as soon as irritation is encountered. (Galoust, 2002)

The standard used in the KLC EA of 150 μg/m^3 for aluminum oxide is based upon the maximum NAAQS level of PM-10 concentrations over a 24-hour period. Other standards for aluminum oxide include worker OSHA standard of 5,000 μg/m^3 as the respirable fraction and 10,000 μg/m^3 as the American Conference of Governmental Industrial Hygienist standard. (Federal Aviation Administration, 1996)

Other operational emissions predicted at KLC include existing stationary sources. These stationary sources include three standby diesel generators operating at a maximum of 5 hours during launches, 1 hour per week for testing during non-launch periods and during commercial power outages (approximately 240 hours per year). Air quality impacts from these sources are considered to be temporary. (Federal Aviation Administration, 1996)

Upper Atmosphere

According to the KLC EA, potential contributions to the upper atmosphere include emissions from ground-level operations and exhaust emissions from launch vehicles. Launches from KLC were determined by the KLC EA to have a small impact on the levels of ozone found in the stratosphere; however, the release of chlorine (from the chemical reaction from the release of hydrogen chloride) and alumina (from the chemical reaction from the release of aluminum oxide) into the stratosphere would make a minimal contribution to the overall impact of ozone depletion. (Federal Aviation Administration, 1996)

Federal Aviation Administration

Under the FAA's No Action Alternative, the launch site operator license for KLC would not be renewed and no launches would be allowed to occur from KLC after September 2003. Therefore, no impacts to air quality would occur from launches at KLC.

4.1.1.2 Alternative 1

4.1.1.2.1 Ground-Based Interceptors

Construction

Construction at KLC, as described in section 2.3.1.1, would disturb approximately 14.4 hectares (35.5 acres). The majority of the ground disturbance would occur within 1 year, and it is projected that construction would take up to 15 months to complete. Construction emissions vary from day to day and activity to activity, with each activity having its own potential to release emissions. Because of the variability in timing and intensity of construction, estimating construction-phase pollutant emissions is difficult. Nevertheless, it is assumed that there would be PM-10 impacts from ground disturbance and other pollutants (carbon monoxide, oxides of nitrogen, volatile organic compounds, and oxides of sulfur) primarily emitted from construction equipment exhaust. These pollutants are of less concern because construction activities are generally short-term, spread over a wide area, and do not exceed regional air quality standards.

Potential construction emissions (table 4.1.1-3) were determined by using emission factors from various sources including the EPA. Conservative estimates are based on building square footage, acreage disturbed, and duration of construction, as well as general meteorological and soil information. For purposes of determining the level of fugitive dust generated, it was assumed all grading would be accomplished during the first year. Potential fugitive dust amounts were estimated using Air Quality Thresholds of Significance spreadsheets.

Approximately 68 metric tons (75 tons) of PM-10 could be produced during the construction of the facilities. This number would be reduced by half to approximately 34 metric tons (37.5 tons) using dust suppression measures such as periodically watering the areas being graded, minimizing unnecessary traffic, reducing vehicle speeds near the work areas, and wet sweeping or otherwise removing soil and mud deposits from paved roadways and parking areas. Proper tuning and preventative maintenance of construction vehicles would serve to minimize exhaust emissions and maximize vehicle performance.

Table 4.1.1-3: Potential Construction-Related Emissions (PM-10) for GBI Facilities at KLC

Source	Emission Factor kg/hectare (lb/acre)	Graded Area hectares/yr (acres/yr)	Exposed days/yr	Emissions kg/yr (lbs/yr)	Emissions metric tons/year (tons/yr)
Bulldozing	1,046 (933.1)	14.4 (35.5)	NA	15,925 (33,125)	15.0 (16.6)
Grading	1.5 (1.3)	14.4 (35.5)	NA	21 (46)	0.020 (0.023)
Vehicle Traffic	1,019 (909)	14.4 (35.5)	NA	14,637 (32,270)	14.6 (16.1)
Erosion of Soil Piles	0.17 per day (0.15 per day)	14.4 (35.5)	90	217 (479)	0.22 (0.24)
Erosion of Graded Surface	30.0 per day (26.4 per day)	14.4 (35.5)	90	38,260 (84,348)	38.3 (42.3)
	TOTAL			68,160 (150,268)	68.14 (75.26)

For conservative analytical purposes, it is assumed that 50 of the 100 additional construction personnel would utilize an existing mancamp located approximately 4 kilometers (3 miles) from the construction site. The remaining 50 were assumed to have to commute to and from the City of Kodiak or to and from accommodations in the area surrounding KLC. Commuting emissions were calculated assuming 4 persons per vehicle for 13 vehicles and 2 persons per vehicle for 25 vehicles (table 4.1.1-4). The emission levels were based upon federal primary exhaust emission standards for vehicles for an entire day of commuting (to KLC and back). If either the additional mancamp was constructed or the existing mancamp was added to, then all 100 construction personnel would be housed in close proximity to KLC, limiting the potential commuting emissions.

Table 4.1.1-4: Potential Commuting Vehicle Emissions to KLC During Construction

Number of Vehicles	Distance	Carbon Monoxide metric tons (tons) per day of commuting	Oxides of Nitrogen metric tons (tons) per day of commuting
13 Vehicles	All travel approximately 66 kilometers (41 miles)	0.0036 (0.0040)	0.00042 (0.00048)
13 Vehicles	All travel approximately 34 kilometers (21 miles)	0.0018 (0.0020)	0.00022 (0.00024)
25 Vehicles	Half travel 66 kilometers (41 miles), half travel 34 kilometers (21 miles)	0.0040 (0.0060)	0.00064 (0.00072)
25 Vehicles	All travel approximately 34 kilometers (21 miles)	0.0036 (0.0040)	0.00042 (0.00048)

Construction would be conducted in accordance with applicable federal and state regulations and permits. While the construction would cause an increase in air pollutants, the impact would be both temporary and localized. Once construction ceased, air quality would return to its former level. It is anticipated that the proposed construction would not cause exceedances of the NAAQS or state AAQS beyond the immediate construction zone and would not have a long-term impact to air quality in the area.

Operation

Pre-Launch Activities

The manufacturing of GBI vehicle components would occur offsite in existing facilities that normally perform this type of production, and emissions at these locations have not been included in the scope of this EIS. The components would arrive complete, requiring only final onsite safety and quality checks before assembly.

Pre-launch activities would include the transportation of the interceptor missile boosters, payloads, and support equipment by either air or ship. This transportation would result in some mobile exhaust emission, but these emissions would be intermittent and would not have a measurable impact on regional air quality. The interceptor could arrive at KLC with the EKV attached, or the booster may be shipped separately from the EKV. Either way, integration and assembly operations would be performed at KLC.

Onsite fueling of the interceptor or EKV would not be required; the interceptor motor would utilize pre-loaded solid propellants. Each EKV would contain pre-loaded liquid propellant and oxidizer. The propellants would be delivered to the launch site in pre-filled and sealed tanks that would be ready to be installed onto the vehicle. Installation would only require mechanical tubing connections.

During nominal propellant tank installation, the propellants remain sealed inside their tanks. The likelihood of an accidental release of the liquid fuel or oxidizer would be low. However, if such an accident were to occur, it would most likely occur during missile assembly. Table 4.1.1-5 indicates the results of analysis using the U.S. Air Force Toxic Corridor Model computer model to determine distances at which the Immediately Dangerous to Life and Health (IDLH) health standard could be exceeded assuming all 7.5 liters (2 gallons) of fuel and 5.5 liters (1.5 gallons) of oxidizer were released to the atmosphere during an accident. The IDLH is the level of exposure (not time-weighted) above which it is thought a person would suffer life-threatening or irreversible health effects or other injuries that would impair them from escaping the hazardous environment. The IDLH level was the only level of concern as others are based on time weighted averages over prolonged exposures.

Table 4.1.1-5: Potential Exceedances Due to Accidental Oxidizer or Fuel Leak at KLC

Propellant	Health Standard	Standard Limit	Exceedance Distance [b]
Hydrazine	NIOSH IDLH [a]	50 ppm (66.5 mg/m^3)	Not exceeded
Methyl Hydrazine	NIOSH IDLH [a]	20 ppm (38.4 mg/m^3)	Not exceeded
Nitrogen Tetroxide (liquid)	NIOSH IDLH [a]	20 ppm (36 mg /m^3)	60 meters (197 feet)
Nitrogen Tetroxide (gas)	NIOSH IDLH [a]	20 ppm (36 mg /m^3)	30 meters (98 feet)

Source: Center for Disease Control and Prevention, 2002a, b; Asia Pacific Space Launch Centre EIS Site, 2002.
[a] The National Institute for Occupational Safety and Health (NIOSH) Immediately Dangerous to Life and Health (IDLH) is the level of exposure (not time-weighted) above which it is anticipated a person would suffer life-threatening or irreversible health effects or other injuries that would impair them from escaping the hazardous environment.
[b] Exceedance Distance—Average of U.S. Air Force Toxic Corridor model results for 15-minute and 30-minute averaging time and multiple stability classes
ppm = parts per million by volume.
mg/m^3 = milligrams per cubic meter

Actual hazard distances would depend on the propellant released, the amount released, meteorological conditions, and emergency response measures taken. AADC's approved SOPs would be implemented and would include personal protection equipment procedures. Establishment of and adherence to these SOPs would minimize the potential hazards to personnel in the unlikely event of an unplanned propellant release. The low likelihood of such an event and the implementation of approved emergency response plans would limit the impact of such a release.

Personnel would include a combination of contractor, military, and government civilian. The largest manpower buildup at KLC would be 55 the first month, 120 the second month, and 235 the third month to support a dual interceptor launch. It is assumed that approximately 50 personnel would be housed at the existing mancamp on Kodiak Ranch. If the additional mancamp is not constructed on KLC or the existing mancamp is not added on to, then it is conservatively estimated that the remaining 185 personnel would commute daily to KLC from accommodations in the surrounding areas and within the City of Kodiak during a peak month. Commuting emissions were calculated assuming 4 persons per vehicle for 47 vehicles and 2 persons per vehicle for 93 vehicles (table 4.1.1-6). The emission levels were based upon federal primary exhaust emission standards for vehicles for an entire day of commuting (to and from KLC).

Table 4.1.1-6: Potential Commuting Vehicle Emissions to KLC During Operation

Number of Vehicles	Distance	Carbon Monoxide metric tons (tons) per day of commuting	Oxides of Nitrogen metric tons (tons) per day of commuting
47 Vehicles	All travel approximately 66 kilometers (41 miles)	0.0131 (0.0144)	0.00154 (0.00170)
47 Vehicles	All travel approximately 34 kilometers (21 miles)	0.0068 (0.0074)	0.00080 (0.00088)
93 Vehicles	Half travel 66 miles (41 miles, half travel 34 kilometers (21 miles)	0.0132 (0.0146)	0.00146 (0.00172)
93 Vehicles	All travel approximately 21 miles	0.0198 (0.0218)	0.00234 (0.00258)

Offsite power sources are planned for primary use, with emergency generators supplying backup power. The emergency backup generators would be operated under appropriate permits and restrictions. In addition to the generators themselves, appropriate ASTs would be installed adjacent to each generator. Table 4.1.1-7 lists the generator and AST sizes for each facility. Table 4.1.1-8 lists the possible emissions associated with each generator.

Table 4.1.1-7: Potential Generator and Aboveground Storage Tanks for GBI Facilities at KLC

Facility	Generator	Aboveground Storage Tanks liters (gallons)	Operation (hours/year)
Missile Assembly Building	500 kW	9,464 (2,500)	250
Oxidizer Storage	60 kW	2,082 (550)	250
Mechanical/Electrical	1,650 kW	1,893 (5,000)	250
Entry Control	60 kW	2,082 (550)	250

Table 4.1.1-8: Potential Generator Emissions at KLC

Generator	Emissions (250 hours/year) Oxides of Nitrogen metric tons (tons)/year	Hydrogen Chloride metric tons (tons)/year	Carbon Monoxide metric tons (tons)/year	PM-10 metric tons (tons)/year
GBI Facilities				
500 kW Diesel Generator	1.2 (1.3)	0.16 (0.18)	1.5 (1.6)	0.06 (0.07)
60 kW Diesel Generator	0.14 (0.15)	0.020 (0.021)	0.17 (0.19)	0.006 (0.007)
1,650 kW Diesel Generator	3.8 (4.2)	0.54 (0.59)	4.7 (5.2)	0.23 (0.25)
60 kW Diesel Generator	0.14 (0.15)	0.020 (0.021)	0.17 (0.19)	0.006 (0.007)
Target Facilities				
60 kW Diesel Generator	0.14 (0.15)	0.020 (0.021)	0.17 (0.19)	0.006 (0.007)
500 kW Diesel Generator	1.2 (1.3)	0.16 (0.18)	1.5 (1.6)	0.06 (0.07)
IDT				
275 kW Diesel Generator	0.60 (0.70)	0.09 (0.10)	0.80 (0.90)	0.03 (0.04)
Sensors				
10 kW Diesel Generator	0.077 (0.085)	0.011 (0.012)	0.096 (0.106)	0.0045 (0.0050)
10 kW Diesel Generator	0.077 (0.085)	0.011 (0.012)	0.096 (0.106)	0.0045 (0.0050)
TPS-X				
1.5 MW Diesel Generator	34.8 (38.3)	4.19 (5.42)	43.1 (47.5)	2.04 (2.25)
Total	42.17 (46.42)	5.22 (6.56)	52.30 (57.58)	2.45 (2.71)

The generators would operate as backup during launches, weekly for testing during non-launch periods, and during commercial outages. The total operating time is estimated at a maximum of 250 hours per year. Air quality impacts from the operation of the generators would be intermittent and of short duration and would generate only minor effects to the air quality.

Launch Activities

Alternative 1 includes up to a total of five missile launches (GBI and target combined) per year at KLC over the duration of the test program. Table 4.1.1-9 lists propellant information for each GBI configuration. Table 4.1.1-10 lists possible emissions from each GBI configuration.

Table 4.1.1-9: Missile Propellant Information for Proposed GBIs at KLC

Missile	Booster	Propellant Mass kilograms (pounds)
Orion 50SXLG	Stage I	15,069 (33,227)
	Stage II	3,926 (8,655)
	Stage III	772 (1,701)
BV/BV+	Stage I	11,742 (25,891)
	Stage II	415 (914)
	Stage III	415 (914)

Table 4.1.1-10: Potential GBI Exhaust Emissions (Single Launch) at KLC

Missile		Emissions							
		Aluminum Oxide	**Carbon Monoxide**	**Carbon Dioxide**	**Chlorine**	**Nitrogen**	**Hydrogen Chloride**	**Hydrogen**	**Water**
GBI (Orion 50SXLG)	Metric tons	8.14	4.82	0.59	0.062	1.89	4.79	0.49	1.89
	Tons	8.97	5.31	0.65	0.068	2.08	5.28	0.54	2.08
GBI (BV/BV+)	Metric tons	8.39	5.23	0.52	0.49	2.06	4.43	0.48	2.23
	Tons	9.25	5.77	0.58	0.54	2.27	4.89	0.53	2.47

The KLC EA analyzed the launch of an Athena-2 and determined that no adverse air quality impacts were anticipated even under worse-case meteorological conditions (high humidity or precipitation) (Federal Aviation Administration, 1996). The proposed GBI configurations have less solid rocket fuel capacity than the Athena-2 and, therefore, would likely produce lower exhaust emissions.

The emissions of oxides of nitrogen produced would further oxidize to nitrogen dioxide, due to high exhaust temperatures. According to the KLC EA, nitrogen dioxide represents only 2 to 3 percent of the exhaust products by weight. Since the NAAQS and Alaska AAQS for nitrogen dioxide are an annual average, the nitrogen dioxide would have a negligible impact on ambient air quality. (Federal Aviation Administration, 1996)

The FAA also estimated the ambient air quality impacts due to hydrogen chloride and aluminum oxide (Federal Aviation Administration, 1996). It was determined through INPUFF modeling that downwind concentrations of hydrogen chloride and aluminum oxide from an Athena-2 launch would be within applicable NAAQS and Alaska AAQS. Based on this, it is concluded that exhaust emissions from the smaller GBIs would not exceed NAAQS or state AAQS standards.

The logistics of the launch procedures would allow sufficient time between launches such that the ambient air quality would not be impacted.

In the event of dual GBI launches the exhaust products are conservatively estimated to be twice the level of a single launch. During such an event, the level of hydrogen chloride is estimated to continue to be within the U.S. Air Force exposure limit or exceed it for a short time and the level of aluminum oxide is expected to be within the non-criteria pollutant level or exceed it for only a short time. Due to the topography of the region, the highest level of hydrogen chloride would expected to be found at the uninhabited mountain, located approximately 5 kilometers (3.1 miles) from the GBI launch location. This level is anticipated to occur only during worst-case meteorological conditions, which occur 2 percent of the time. Since there would be no personnel located in areas where high concentrations of hydrogen chloride could occur, there would be no hazard to humans.

Personnel would be evacuated to a safe distance before a launch according to established launch procedures as stated in section 3.1.7, Health and Safety. Due to the mobile nature of the interceptor itself, only a small portion of the launch exhaust would be emitted near the ground.

With typical meteorological conditions, prevailing winds from the northwest, the ground-cloud of exhaust would be carried to the ocean. In all cases of weather conditions, significant air quality impacts due to missile launches are not anticipated.

If flight termination becomes necessary, the potential resulting fire would cause short-term impacts to air quality in the form of combustion byproducts and potentially hazardous fumes. Most or all of the solid propellant fuel would likely burn up before being extinguished. These combustion byproducts would be similar to those previously described for a nominal launch. In the unlikely event of a launch pad mishap or early termination, the consequences to regional air quality would be localized and of a short duration.

Post-Launch Activities

Post-launch activities would include the removal of all mobile equipment and assets brought to KLC. A negligible impact would be anticipated to air quality resulting from slightly increased vehicular emissions and localized amounts of fugitive dust (PM-10).

4.1.1.2.2 Targets

Construction

Approximately 10.5 hectares (26 acres) of land would be disturbed during the construction of target facilities. Calculation of construction emissions (table 4.1.1-11) followed the same methodology as described in section 4.1.1.2.1.

Table 4.1.1-11: Potential Construction-Related Emissions (PM-10) for Target Facilities at KLC

Source	Emission Factor kg/hectare (lb/acre)	Graded Area hectare/yr (acres/yr)	Exposed days/yr	Emissions kg/yr (lbs/yr)	Emissions metric tons/year (tons/yr)
Bulldozing	1,046 (933.1)	10.5 (26)	NA	11,004 (24,261)	11.00 (12.13)
Grading	1.5 (1.3)	10.5 (26)	NA	15 (31)	0.015 (0.017)
Vehicle Traffic	1,019 (909)	10.5 (26)	NA	10,720 (23,634)	10.7 (11.82)
Erosion of Soil Piles	0.17 per day (0.15 per day)	10.5 (26)	90	159 (351)	0.160 (0.176)
Erosion of Graded Surface	30.0 per day (26.4 per day)	10.5 (26)	90	28,021 (61,776)	28.02 (30.89)
TOTAL				49,920 (110,055)	49.97 (55.03)

Approximately 50 metric tons (55 tons) of PM-10 could be produced during the construction of the facilities. The number would be reduced by half to approximately 25 metric tons (27.5 tons) using dust suppression measures such as periodically watering the areas being graded, minimizing unnecessary traffic, reducing vehicle speeds near the work areas, and wet sweeping or otherwise removing soil and mud deposits from paved roadways and parking areas. Proper tuning and preventive maintenance of construction vehicles would serve to minimize exhaust emissions and maximize vehicle performance.

Impacts due to personnel at KLC for construction of target facilities would be the same as those described in section 4.1.1.2.1 for construction of GBI facilities.

Operation

Pre-Launch Activities

Pre-launch activities include the transportation of the target to KLC and assembly of the target at KLC. The mobile exhaust emissions resulting from transportation of the target would be intermittent and would not have a measurable impact to regional air quality. The targets would be assembled and stored in the Missile Assembly Building until launch.

The fourth stage of a Peacekeeper target could utilize a liquid propellant; however, information on the transportation, storage, and handling of the Peacekeeper target has not been defined. If the decision is made to use the Peacekeeper target at KLC then additional modeling and analysis would be required.

Emergency generators would supply backup power to target facilities with offsite commercial power sources. The emergency backup generators would be operated under appropriate permits and restrictions. In addition to the generators themselves, appropriate ASTs would be installed adjacent to each generator. Table 4.1.1-12 and table 4.1.1-8 list the generators, possible emissions, and the size of ASTs for each facility.

Table 4.1.1-12: Potential Generator and Aboveground Storage Tanks for Target Facilities at KLC

Facility	Generator	Aboveground Storage Tank liter(gallons)	Operation (hrs/yr)
Missile Assembly Building	500 kW	9,464 (2,500)	250
Movable Missile Building	500 kW	9,464 (2,500)	250
Missile Storage	60 kW	2,082 (550)	250

The generators would operate as backup during launches, weekly for testing during non-launch periods, and during commercial outages. The total time of operation is estimated at a maximum of 250 hours per year. Emissions produced during the generators' expected limited operation would not be expected to impact regional air quality.

Launch Activities

Proposed target launches would be similar to previous target launches at KLC. These land launched target missiles could consist of one of several types of missiles including Strategic Target System, Minuteman II Target, Peacekeeper Target, and Trident I (C4) Target. Table 4.1.1-13 lists missile propellant information, and table 4.1.1-14 lists potential emission constituents during Stage I for each proposed missile. A total of five missile launches (GBI and/or target) per year would be anticipated at KLC over the duration of the program.

Table 4.1.1-13: Missile Propellant Information for Proposed Targets at KLC

Missile	Booster	Propellant Mass kilograms (pounds)
Strategic Target System	Stage I	9,422 (20,772)
	Stage II	4,025 (8,874)
	Stage III	414 (913)
Minuteman II Target	Stage I	20,810 (45,879)
	Stage II	6,296 (13,851)
	Stage III	1,658 (3,655)
Peacekeeper Target	Stage I	44,661 (98,462)
	Stage II	24,556.3 (54,137.7)
	Stage III	7,068.7 (15,583.9)
	Stage IV	644 (1,420)
Trident I (C4) Target	Stage I	17,667 (38, 948)
	Stage II	7,924 (17,469)
	AKM	415 (914)

Table 4.1.1-14: Potential Target Exhaust Emissions (Single Launch) at KLC

Missile	Aluminum Oxide metric tons (tons)	Chlorine metric tons (tons)	Carbon Monoxide metric tons (tons)	Carbon Dioxide metric tons (tons)	Hydrogen metric tons (tons)	Water metric tons (tons)	Hydrogen Chloride metric tons (tons)	Nitrogen metric tons (tons)
Strategic Target System	3.56 (3.92)	0.019 (0.020)	2.35 (2.59)	0.19 (0.21)	0.22 (0.24)	0.60 (0.66)	1.58 (1.74)	0.87 (0.96)
Minuteman II Target	6.29 (6.93)	0.027 (0.030)	5.00 (5.51)	0.77 (0.85)	0.44 (0.48)	1.98 (2.18)	4.47 (4.93)	1.83 (2.02)
Peacekeeper Target	9.69 (10.68)	NA	9.95 (10.96)	1.04 (1.15)	1.00 (1.10)	3.36 (3.70)	9.46 (10.42)	3.76 (4.14)
Trident I (C4) Target	6.71 (7.40)	<0.009 (<0.010)	5.48 (6.04)	0.35 (0.39)	NA	0.72 (0.79)	0.39 (0.43)	4.06 (4.48)

NA = Not available

Each launch is a discrete event. The logistics of the launch would allow sufficient time between launches so that no exhaust from one launch would impact the ambient air quality of another launch. The conclusion presented in the KLC EA was that overall impacts to regional air quality are not expected to be adverse and would remain within NAAQS and state AAQS for a single launch of the Athena 2 missile with the Castor 120™ motor. (Federal Aviation Administration, 1996)

In the event of dual launches of target missiles, the exhaust products would conservatively be estimated to be double those for a single launch, assuming the two target missiles are the same. The largest of the proposed target vehicles is the Peacekeeper Target. The Peacekeeper Target uses a similar military version of the Castor 120™ motor that was analyzed in the KLC EA (Federal Aviation Administration, 1996). During a dual Peacekeeper Target launch, the level of hydrogen chloride is estimated to continue to be within the U.S. Air Force exposure limit (10 ppm) or exceeds it for a short duration. Due to the topography of the region, the highest level of hydrogen chloride would be expected to be found at the uninhabited mountain approximately 5 kilometers (3.1 miles) from the target launch location. This level is expected to occur during worst-case meteorological conditions, which occur 2 percent of the time. Since there would be no personnel located in areas where high concentrations of hydrogen chloride could occur, there should be no hazard to humans.

Previous analysis performed by the U.S. Air Force testing the emissions from a nominal launch of the Titan IV determined that similar concentrations (up to 30 ppm) would fall below the ceiling level in approximately 10 minutes. The Titan IV was the launch vehicle chosen by the U.S. Air Force for analysis at Vandenberg AFB. Analysis determined that similar short passages of time are also expected for the ground clouds stemming from such vehicles as Delta and Atlas rockets, Minuteman and Peacekeeper missiles. This ceiling level of 10 ppm is also considerably less than the IDLH level of 50 ppm for hydrogen chloride. (National Research Council, Commission of Life Sciences, Board of Environmental Studies and Toxicology, Committee on Toxicology, Subcommittee on Rocket Emission Toxicants, 1998)

Personnel would be evacuated to a safe distance before a launch according to established launch procedures as stated in section 3.1.7, Health and Safety. Due to the mobile nature of the target missiles, only a small portion of the launch exhaust would be emitted near the ground. With typical meteorological conditions, prevailing winds from the northwest, the ground-cloud of exhaust would be carried to the ocean. In all cases of weather conditions, significant air quality impacts due to missile launches are not anticipated.

If flight termination becomes necessary, the potential resulting fire would cause short-term impacts to air quality in the form of combustion byproducts and potentially hazardous fumes. Most or all of the solid propellant fuel would likely burn up before being extinguished. These combustion byproducts would be similar to those previously described for a nominal launch. In the unlikely event of a launch pad mishap or early termination, the consequences to regional air quality would be localized and of a short duration.

Post-Launch Activities

Post launch activities would include the removal of all mobile assets brought to KLC. This removal could result in small localized amounts of PM-10, which would have only minor impacts to air quality.

4.1.1.2.3 In-Flight Interceptor Communication System Data Terminal

Construction

Alternative 1 would require the construction of one IDT (among three alternative sites), one COMSATCOM (among four alternatives), and connecting roads. The greatest emissions would be during site preparation activities that include grubbing and clearing of vegetation, site grading and stockpiling of soil and select fill materials. The largest of the IDT sites would require approximately 2.0 hectares (4.9 acres) of land to be disturbed, and one COMSATCOM site would disturb 2.8 hectares (7.0 acres). Potential construction emissions for both the largest IDT site and one COMSATCOM are listed in table 4.1.1-15.

Table 4.1.1-15: Potential Construction-Related Emissions (PM-10) for IDT and COMSATCOM Facilities at KLC

Source	Emission Factor kg/hectare (lb/acre)	Graded Area hectare/yr (acres/yr)	Exposed days/yr	Emissions kg/yr (lbs/yr)	Emissions metric tons/year (tons/yr)
Bulldozing	1,046 (933.1)	4.8 (11.9)	NA	5,037 (11,104)	5.04 (5.55)
Grading	1.5 (1.3)	4.8 (11.9)	NA	7 (15)	0.007 (0.008)
Vehicle Traffic	1,019 (909)	4.8 (11.9)	NA	4,907 (10,817)	4.91 (5.41)
Erosion of Soil Piles	0.17 per day (0.15 per day)	4.8 (11.9)	90	73 (161)	0.073 (0.080)
Erosion of Graded Surface	30.0 per day (26.4 per day)	4.8 (11.9)	90	12,825 (28,274)	12.83 (14.14)
	TOTAL			22,848 (50,372)	22.86 (25.19)

Construction activities for IDT and COMSATCOM facilities could produce approximately 23 metric tons (25 tons) of PM-10. It is anticipated that this PM-10 volume would be reduced by half to 11.5 metric tons (12.5 tons) through implementation of Best Management Practices for dust suppression during site preparation activities. Only minor impacts would be anticipated to air quality from construction activities. Site preparation activities would be relatively short in duration affect a relatively small footprint, and would employ a variety of Best Management Practices.

Operation

Operation of the IDT and COMSATCOMs would have little effect on regional air quality. Power would be provided by off-site commercial power sources, however in the event of loss of power a 275 kW diesel generator would be utilized along with the 3,785-liter (1,000-gallon) AST for fuel. Table 4.1.1-8 lists the possible emissions from use of the generator. The generator would be tested weekly during non-launch periods and during power outages, approximately 250 hours a year.

Personnel associated with the IDT and COMSATCOMs would be included in the up to 235 personnel needed to support a dual interceptor launch and would not cause an additional air quality impact.

4.1.1.2.4 Sensors

Construction

Alternative 1 would utilize an existing gravel pad area for mobile telemetry.

Operation

Operation of the mobile telemetry would have minor adverse effect on the regional air quality. Power would be provided by two 10 kW generators for the mobile telemetry. Anticipated emissions from the use of these generators would be for a 1-week period, five times per year. Table 4.1.1-8 lists the possible emissions from use of the generators.

4.1.1.2.5 TPS-X

Construction

The installation of the TPS-X at KLC would require the construction of a pad for the 38 by 58 meter (125- by 190-foot) hardstand and disturbance of approximately 0.3 hectare (0.8 acre). Potential TPS-X locations would be the same as those described for potential IDT and COMSATCOM facilities. Table 4.1.1-16 lists PM-10 emissions associated with this construction.

Table 4.1.1-16: Potential Construction-Related Emissions (PM-10) for TPS-X at KLC

Source	Emission Factor kg/hectare (lb/acre)	Graded Area hectare/yr (acres/yr)	Exposed days/yr	Emissions kg/yr (lbs/yr)	Emissions metric tons/year (tons/yr)
Bulldozing	1,046 (933.1)	0.3 (0.8)	NA	338 (746)	0.34 (0.37)
Grading	1.5 (1.3)	0.3 (0.8)	NA	0.5 (1)	0.0004 (0.0005)
Vehicle Traffic	1,019 (909)	0.3 (0.8)	NA	380 (727)	0.33 (0.36)
Erosion of Soil Piles	0.17 per day (0.15 per day)	0.3 (0.8)	90	5.0 (11)	0.004 (0.005)
Erosion of Graded Surface	30.0 per day (26.4 per day)	0.3 (0.8)	90	862 (1,901)	0.86 (0.95)
TOTAL				1,536 (3,386)	1.53 (1.69)

It is anticipated that the volume of PM-10 produced during construction would be reduced by half through the implementation of Best Management Practices for dust suppression during site preparation activities.

Operation

The prime power unit for the TPS-X at KLC would be a 1.5 MW generator that would provide power to the radar during testing. The generator is assumed to be in operation for 3 weeks (24 hours a day, 7 days a week) five times a year during launch activities. The total time of operation is estimated at a maximum of 2,520 hours per year. Potential generator emissions for the TPS-X are listed in table 4.1.1-8.

4.1.1.3 Alternative 2

4.1.1.3.1 Targets

Target activities associated with Alternative 2 would be similar to those of Alternative 1.

Construction

Construction would include a total disturbed area of 10.5 hectares (26 acres), the same as identified for Alternative 1. Construction impacts would be as described for Alternative 1.

Operation

Operation impacts from pre-launch, launch, and post-launch activities of target launches in Alternative 2 would be similar to those described for target launches in Alternative 1 in section 4.1.1.2.2.

4.1.1.3.2 Sensors

Effects from construction and operation of a mobile telemetry at KLC for Alternative 2 would be the same as described for the sensors of Alternative 1 in section 4.1.1.2.4.

4.1.1.4 Alternative 3

Alternative 3 would include all aspects of Alternative 1. Because Alternative 1 includes GBIs, targets, and all associated facilities, the construction and launch impacts for Alternative 3 would be as described for Alternative 1.

4.1.1.5 Cumulative Impacts

Due to the limited industrialization of Kodiak Island and the surrounding environment, the potential cumulative impacts to air quality due to the proposed interceptor and target facility construction and launches would not be substantial. No other construction is anticipated to occur at the same time as the proposed construction activities. The KLC EA indicated no significant impacts to air quality as a result of nine annual launches and that impacts do not accumulate with multiple launches (Federal Aviation Administration, 1996). It is not likely that the Proposed Action of up to five launches (GBI and target) in conjunction with other currently planned or anticipated launches at KLC would exceed this level of activity. Dual launches of either interceptors or targets would produce double exhaust emissions. These levels of emissions would be expected to disperse quickly due to the island’s climatology, which includes periods of high winds and overcast skies. Combined activities would be performed at different times and locations and therefore, no significant impacts to air quality are expected.

4.1.1.6 Mitigation Measures

No air quality mitigation measures are proposed for the GMD ETR activities at KLC.

4.1.2 AIRSPACE—KODIAK LAUNCH COMPLEX

Site preparation activities for interceptor, target missiles, IDT, or the TPS-X would have no impact on controlled or uncontrolled airspace, special use airspace, en route airways and jet routes, or airfields and airports in the ROI. Since site preparation activities would not restrict a clear view of runways, helipads, taxiways, or traffic patterns from the airport air traffic control tower, decrease airport capacity or efficiency, affect future VFR or IFR, or affect the usable length of an existing or planned runway, they would also not constitute an obstruction to air navigation.

Potential impacts from flight test activities are discussed below for each alternative.

4.1.2.1 No Action Alternative

Missile Defense Agency

Under the MDA's No Action Alternative, launches would continue to occur at KLC although the GMD ETR would not be established and GBI and target launch scenarios would not be tested under more operationally realistic conditions. The use of KLC for flight preparation and launches has been analyzed in the North Pacific Targets Program EA (U.S. Army Space and Missile Defense Command, 2001b), the KLC EA (Federal Aviation Administration, 1996) and two U.S. Air Force documents (U.S. Department of the Air Force, 1997a; 2001). These documents concluded that close coordination with the FAA would result in no adverse effects to airspace from launches at KLC.

Under the MDA's No Action Alternative, KLC would continue to conduct up to nine launches per year through September 2003 as specified in the current launch site operator license. The current license is scheduled for renewal in September 2003. The new license, if issued would outline the terms under which launches would be conducted at KLC. The renewal period would be for another 5 years.

Federal Aviation Administration

Under the FAA's No Action Alternative, the launch site operator license for KLC would not be renewed and no launches would be allowed to occur from KLC after September 2003. Therefore, there would be no impacts to airspace from launches at KLC.

4.1.2.2 Alternative 1

Potential airspace impacts from implementation of the Proposed Action include the following activities:

- Potential impacts to controlled and uncontrolled airspace
- Potential impacts to existing special use airspace
- Potential impacts to en route airways and jet routes
- Potential impacts to airports and airfields

Controlled and Uncontrolled Airspace

The ROI, located in international uncontrolled class G airspace, has no formal airspace restrictions governing it. Before launching the GBI or target missile from KLC, NOTAMs would be sent in accordance with FAA protocols and DoD requirements. The U.S. NOTAM System, Sections 3-2n(1)(a) and (b) deal with operations/exercises over the high seas, host nation territory, international airspace, and bare-base locations, and specifies the International NOTAM office coordination requirements and procedures (U.S. Army Regulation 95-10, 1990).

To satisfy airspace safety requirements in accordance with DoD requirements, the KLC Range Safety Officer would obtain approval from the Administrator, FAA. Provision would be made for surveillance of the affected airspace. In addition, safety regulations dictate that launch operations would be suspended when it is known or suspected that any unauthorized aircraft have entered any part of the surface danger zone until the unauthorized entrant has been removed or a thorough check of the suspected area has been performed. When the probability is less than $1x10^{-7}$ that an aircraft would be in an unsafe proximity to the GBI or target missile, the Range Safety Office may establish segmented safety zones to allow for some unrestricted air routes under the flight path during the launch window.

If the TPS-X radar is located at KLC, EMR hazard zones would be established. The potential interference distances are shown in figure 2.3.1-8. The personnel exclusion area would extend for 150 meters (492 feet) in front of the radar. The FAA would be requested to establish a navigation warning advising aircraft to remain at least 1,500 meters (4,900 feet) from the TPS-X radar site. EEDs in the presence and shipping phase, such as a missile mounted on an aircraft, would need to be at least 800 meters (2,625 feet) from the radar. EEDs on the ground in the handling phase would need to be at least 400 meters (1,312 feet) from the radar due to potential sidelobe exposure. The interference areas are directional, and would be centered on the launch azimuth, between 135 degrees and 225 degrees.

A visual survey of the area would be conducted to verify that all personnel are outside the hazard zone prior to startup. Personnel may not enter these hazard zones while the radar is in operation. The radar is prevented from illuminating in a designated cutoff zone, in which operators and all other system elements would be located. Potential safety consequences associated with radar interference with other electronic and emitter units (flight navigation systems, tracking radars, etc.) would also examined prior to startup. Adherence to AADC, FAA and DoD safety procedures relative to radar operations would preclude significant impact to airspace.

Special Use Airspace

There is no special use airspace in the KLC ROI, and as such there would be no impact on airspace from proposed program activities.

En Route Airways and Jet Routes

Coordination between KLC and the controlling airspace agencies (Anchorage and Oakland ARTCC) would result in no impacts to the commercial air corridors entering and exiting Kodiak Airport north of KLC (figure 3.1.2-1).

Airports and Airfields

The proposed activities in Alternative 1 would not restrict access to, nor affect the use of, existing airfields and airports in the ROI.

4.1.2.3 Alternative 2

The proposed activities at KLC under Alternative 2 would be similar to those described under Alternative 1. Alternative 2 involves launching only target missiles, but the potential impacts to airspace would be the same.

4.1.2.4 Alternative 3

Alternative 3 would include all aspects of Alternatives 1 and 2. Because Alternative 1 includes GBIs, targets, and all associated facilities, the construction and flight impacts for Alternative 3 would be as described for Alternative 1.

4.1.2.5 Cumulative Impacts

There is no airspace segregation method such as a warning or restricted area to ensure that international airspace would be cleared of nonparticipating aircraft. However, missile launches are short-term, discrete events. The KLC EA concluded there would be no cumulative impact to airspace for nine annual launches (Federal Aviation Administration, 1996). The proposed activities for GMD ETR, in conjunction with current planned or anticipated launches, would use similar launch vehicles and would not exceed this level of activity and therefore, no substantial impact to airspace is anticipated at KLC. The use of the required scheduling and coordination process for international airspace and adherence to applicable DoD directives and U.S. Army regulations concerning issuance of NOTAMs and selection of missile firing areas and trajectories further reduce the potential for incremental, additive, cumulative impacts.

4.1.2.6 Mitigation Measures

The required coordination procedures with the FAA and scheduling requirements of KLC minimize any potential impacts so that no mitigation measures have been identified as necessary for the GMD ETR proposed activities. NOTAMs would be sent in accordance with FAA protocols and DoD requirements.

4.1.3 BIOLOGICAL RESOURCES—KODIAK LAUNCH COMPLEX

The biological resources analytical approach involved evaluating the potential impacts of the Proposed Action and alternatives, such as construction, site preparation activities, use of existing and new sensors, and missile launches, on vegetation, wildlife, threatened and endangered species, and sensitive habitat within the ROI. Impacts that could result from construction and other site preparation activities include disturbance and removal of vegetation and disturbance to wildlife from the accompanying noise and presence of personnel. Impacts could also result from launch-related activities such as noise, air emissions, debris impacts, and the use of radar equipment.

Criteria for assessing potential impacts to biological resources are based on (1) the number or amount of the resource that would be impacted relative to its occurrence at the project site, (2) the sensitivity of the resource to proposed activities, and (3) the duration of the impact. Impacts are considered substantial if they have the potential to result in reduction of the population size of federally listed threatened or endangered species, degradation of biologically important unique habitats, substantial long-term loss of vegetation, or reduction in capacity of a habitat to support wildlife.

All transportation of equipment and materials such as fuels would be conducted in accordance with applicable federal (DOT) and state regulations. SOPs for spill prevention, containment, and control measures while transporting equipment and materials would preclude impacts to biological resources.

GMD ETR program personnel would remove all mobile equipment/assets brought to the installation at the conclusion of its testing activities. Transportation for removal of equipment would be the same as when it was brought into the installation. 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.

4.1.3.1 No Action Alternative

Missile Defense Agency

Under the MDA's No Action Alternative, launches would continue to occur at KLC, although the GMD ETR would not be established and GBI and target launch scenarios would not be tested under more operationally realistic conditions. KLC would continue to provide ongoing support to single Strategic Target System launches from the GMD Element; however, test scenarios would be severely limited. The KLC EA (Federal Aviation Administration, 1996) indicated no significant impact to biological resources from nine annual missile launches. The North Pacific Targets Program EA (U.S. Army Space and Missile Defense Command, 2001b) determined that no significant impacts would occur to biological resources as a result of launching a Strategic Target System Missile. The Strategic Target System launches would continue to be managed within the nine launches previously analyzed in the KLC EA (Federal Aviation Administration, 1996) and no additional impacts to biological resources would be expected to occur.

Federal Aviation Administration

Under the FAA's No Action Alternative, the launch site operator license for KLC would not be renewed and no launches would be allowed to occur from KLC after September 2003. Therefore, there would be no impacts to biological resources from launches at KLC.

4.1.3.2 Alternative 1

4.1.3.2.1 Ground-Based Interceptors

Site Preparation Activities

Vegetation

The proposed activities under alternative 1 would require construction as described in section 2.3.1.1. No significant impacts to vegetation are anticipated, since new construction would occur mainly in upland areas of hairgrass-mixed forb meadow, one of the predominant vegetation types at KLC. This loss of vegetation (approximately 14 hectares [36 acres]) would represent only a small portion of the total vegetation available within KLC boundaries and the adjacent region.

Threatened and Endangered Plant Species. No federally proposed or listed candidate, threatened, or endangered plant species have been observed within the boundaries of KLC. Therefore, there would be no impacts to listed plant species.

Wildlife

Impacts from ground disturbance and equipment noise could include loss of habitat, displacement of wildlife, increased stress to wildlife, and disruption of daily or seasonal behavior. As stated above, new construction would occur mainly in upland areas of hairgrass-mixed forb meadow, one of the predominant vegetation types at KLC. Additional habitat for those species that could potentially be displaced is located adjacent to those areas proposed for disturbance. Site preparation activities would not result in impacts to Essential Fish Habitat since no water bodies would be affected.

Noise rather than the sight of machines appears to cause more disturbance to wildlife. The effects of noise on wildlife vary from serious to no effect in different species and situations. Behavioral responses to noise also vary from startling to retreat from favorable habitat, 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). Since there are no absolute standards of short-term noise impacts for potentially noise-sensitive species, a short-term maximum noise exposure of 92 dB was suggested as a significant cut-off for impacts in a noise monitoring study for the HEDI I missile (U.S. Army Strategic Defense Command, 1990; 1989). This noise level is equivalent to being 1 meter (3 feet) from a power lawnmower. This noise level is similar to the range of 80 to 90 dBA defined as known to disturb waterfowl and wildlife in the KLC EA (Federal Aviation Administration, 1996).

Typical noise levels at 15 meters (50 feet) from construction equipment range from 70 to 98 dBA. Wildlife is known to exhibit a startle response when exposed to short-term noise impacts. The combination of increased noise levels and human activity would likely displace some small mammals and birds that forage, feed, nest, or have dens within this 15-meter (50-foot) radius. However, sufficient foraging and feeding habitat occurs in adjacent areas. Studies (U.S. Department of the Air Force, 1997) indicate that birds usually show signs of disturbance, such as fluttering of wings, when a noise event occurs, but quickly return to normal behavior after the event. Although construction activities could cause flushing (birds suddenly flying up), this is a common reaction to sudden natural sounds that only slightly increases the energy expenditure of individual birds. Some wildlife may leave the area permanently, while others may likely become accustomed to the increased noise and human presence. Construction is therefore not expected to have a long-term significant adverse effect on wildlife.

Threatened and Endangered Wildlife Species. Disturbance from site preparation activities would be restricted mainly to areas within 15 meters (50 feet) from the construction site. The closest federally endangered Steller sea lion haulout area, approximately 5 kilometers (3 miles) away on Ugak Island, would not be affected by site preparation noise. Federally threatened Steller's eiders and endangered short-tailed albatross offshore would also be outside the range of the highest site preparation noise levels and are not anticipated to be affected.

Environmentally Sensitive Habitat

Wetlands can be impacted both directly and indirectly. Direct impacts can result from filling, dredging, or flooding. Indirect impacts can be caused by disturbance to adjacent land that results in degradation of water quality from chemical or sedimentary runoff. In accordance with Executive Order 11990, *Protection of Wetlands*; DOT Order 5660.1A, *Order on Preservation of the Nation's Wetlands*; and FAA Order 1050.1D, *Policies and Procedures for Considering Environmental Impacts*, wetlands would be avoided when possible, and all practicable measures to minimize harm would be implemented.

Most new construction required for the Proposed Action would be located in upland areas. Construction of the GBI launch silos or launch pad and perimeter fencing around the launch area could disturb approximately 0.6 hectare (1.6 acres) of palustrine, emergent, persistent, seasonally flooded wetlands and 0.2 hectare (0.4 acre) of palustrine, scrub/shrub, broad-leaved deciduous, saturated wetlands (figure 4.1.3-1). The fence line layout is preliminary and could likely be altered before construction to avoid the wetlands. Indirect disturbance to wetlands would be minimized by implementing appropriate techniques to control runoff and other Best Management Practices discussed below.

The following examples of Best Management Practices for soil erosion control that AADC applies during construction activities would further minimize impacts to wetlands:

- 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

(Federal Aviation Administration, 1996)

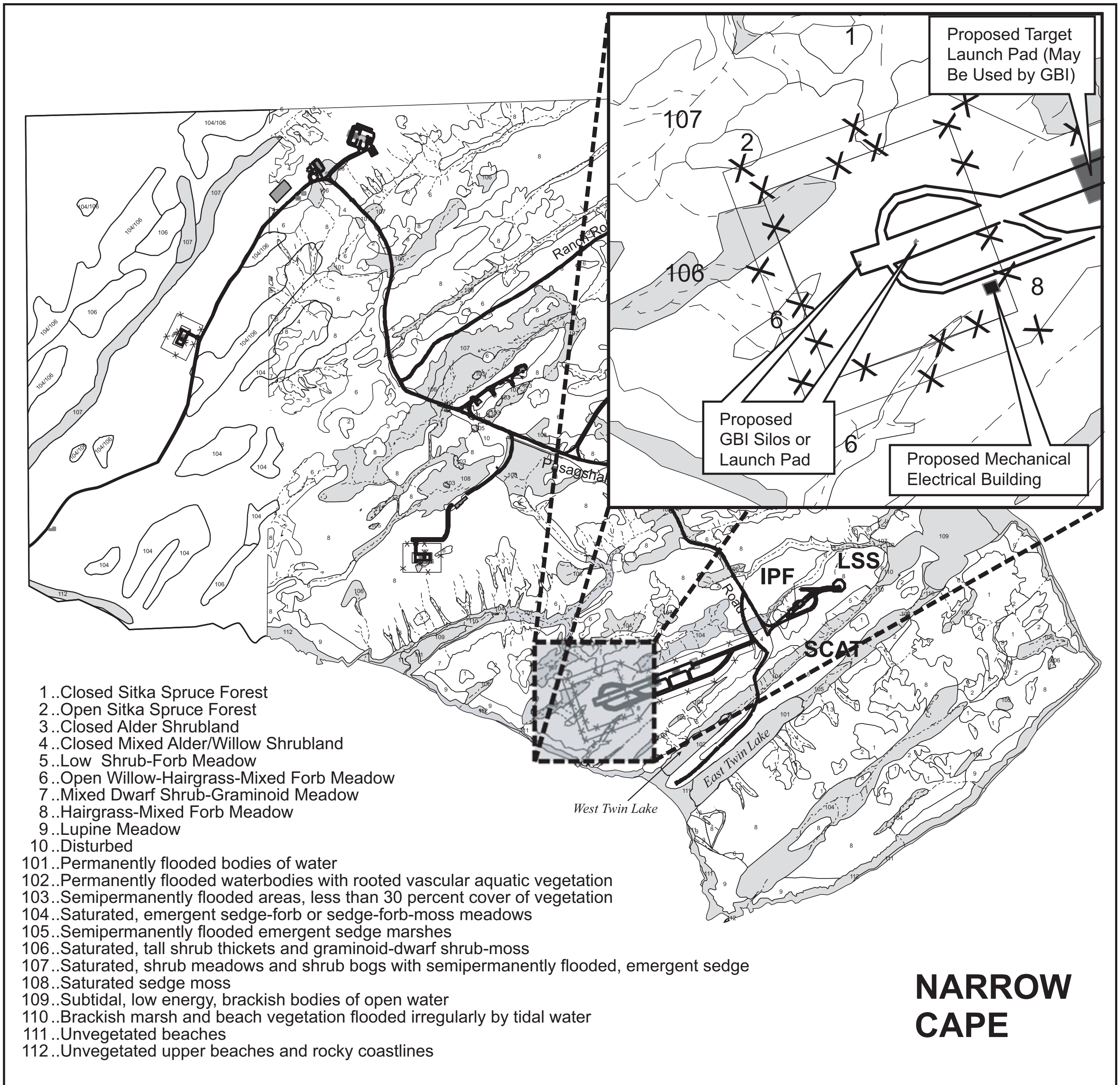
SOPs for spill prevention, containment, and control measures while transporting equipment and materials would also preclude impacts to wetlands. Steller sea lion critical habitat is outside the area that could be impacted by site preparation activities.

Launch Activities

Dual launch activities could potentially occur. Dual launches could result in a slightly larger affected area and longer duration of disturbance to wildlife. Impacts would in some cases be slightly greater than, but similar, to those analyzed below for single launches.

Vegetation

Normal GBI launch activities are not expected to significantly impact vegetation. Blast residue would be contained within the silo or close to the launch site in case of a pad GBI launch, minimizing the potential for impacts on vegetation. Launch exhaust products would include hydrogen, hydrogen chloride, aluminum oxide, carbon dioxide, carbon monoxide, nitrogen, water, and chlorine. Nominal launch activities during dry conditions could result in the deposition of very small amounts of aluminum oxide from missile exhaust. Most of this aluminum oxide would be suspended in air and dispersed over extremely large areas; the amount deposited would have little effect. As stated in the air quality section, the concentration levels of exhaust products from a dual launch would be approximately double those of a single launch (8 metric tons [9 tons]). Under natural conditions, the chemical is not a source of toxic aluminum; the EPA has determined that non-fibrous aluminum oxide as found in solid rocket



Source: Alaska Aerospace Development Corporation, 2002; Boeing Corporation, 2002b; U.S. Geological Survey, 2002 .

EXPLANATION

Wetland

Existing & Planned Roads

Fluviatile Waters

LCC Launch Control and Management Center
IPF Integration and Processing Facility
SCAT Spacecraft Assemblies Transfer
LSS Launch Service System

Scale: 0 364 728 meters; 0 1,196 2,391 feet

NORTH

12-20-02 KLC Wet-Veg

Wetlands Within the Kodiak Launch Complex and Proposed Facility Locations

Kodiak Island, Alaska

Figure 4.1.3-1

motor exhaust is nontoxic (U.S. Department of the Air Force, 1997a). Analysis of launch-related deposition of aluminum oxide after six launches from KLC has not shown it to be harmful to vegetation (Alaska Aerospace Development Corporation, 2002).

The greatest potential for impacts to vegetation comes from hydrogen chloride deposition. Direct effects could include discoloration, foliage loss, and changes in species composition.

Rain within 2 hours of a launch could cause hydrogen chloride to be deposited in small quantities. This chemical, when emitted during solid missile launches for very large flight vehicles (such as the Space Shuttle), is known to injure plant leaves and affect wildlife. However, the potential effect on vegetation from the proposed launches of the much smaller GBIs is expected to be slight. Observation of plant communities at other launch sites such as KTF, Cape Canaveral, and Vandenberg AFB indicate that vegetation continues to thrive in the immediate areas within 150 to 240 meters (492 to 787 feet) of the launch pads. Vegetation sampling conducted in the area near active launch pads at KTF has not indicated that hydrogen chloride emissions from launches conducted during the last 20 years resulted in any lasting effects (U.S. Army Space and Strategic Defense Command, 1993a). No obvious additional needle loss or browning of vegetation adjacent to the launch site was seen in photographs taken after the latest QRLV launch from KLC (Alaska Aerospace Development Corporation, 2002).

Threatened and Endangered Plant Species. No federally listed candidate, threatened, or endangered plant species have been observed within the boundaries of KLC.

Wildlife

Noise. Potential noise effects on wildlife can be categorized as auditory and non-auditory. Auditory effects would consist of direct physical changes, such as eardrum rupture or temporary threshold shift (TTS). Non-auditory effects could include stress, behavioral changes, and interference with mating or foraging success. The effects of noise on wildlife vary from serious to no effect in different species and situations. Behavioral responses to noise also vary from startling to retreat from favorable habitat. Animals can also be very sensitive to sounds in some situations and very insensitive to the same sounds in other situations. (Larkin, 1996) Informal observation at several launch facilities indicates the increased presence of personnel immediately before a launch tends to cause birds and other mobile species of wildlife to temporarily leave the area that would be subject to the highest level of launch noise. Therefore, no direct physical auditory changes are anticipated.

Wildlife is known to exhibit a startle effect when exposed to short-term noise impacts, such as the launch of a missile. Video camera observations of a wood stork colony located 0.8 kilometer (0.5 mile) south of the Space Shuttle launch pad at Kennedy Space Center showed that birds flew south away from the noise source and started returning within 2 minutes, with a majority of individuals returning within 6 minutes (National Aeronautics and Space Administration, 1997). A rookery at Kennedy Space Center used by wood storks and other species of wading birds located approximately 750 meters (2,461 feet) from a Space Shuttle launch pad continues to be used successfully, even though it has received peak noise levels of up to approximately 138 dB. (American Institute of Aeronautics and Astronautics, 1993) Birds within 250 meters (820 feet) of Titan launch complexes at Cape Canaveral Air Station have shown no mortality or reduction in habitat use. Titan IV vehicles produce noise levels of approximately 170 dB in the immediate vicinity of the launch pad. This attenuates to 125 dB at a distance of 3 kilometers (2 miles) within about 30 seconds following launch. (U.S. Department of the Air Force, 1990) Noise from Minuteman launches ranges from 98 dBA approximately 4.2 kilometers (2.6 miles) from the launch site to 80 dBA approximately 13 kilometers (8 miles) from the launch site (U.S. Department of the Air Force, 1999). The level of noise for the GBI missile during launch and flight is expected to be less (similar to the 94 dB at 3.0 kilometers [2 miles] from the launch site analyzed in the KLC EA for the Castor 120™) and relatively short in duration.

The KLC EA concluded that, although birds within a 9.7-kilometer (6-mile) radius of the launch pad could be exposed to noise levels above 83 dBA, impacts to birds from launch-related noise would not be severe and would be limited to startle reactions (Federal Aviation Administration, 1996). Peak noise levels in the vicinity of Narrow Cape would be nearly instantaneous, and the entire noise event would last less than 60 seconds. According to monitoring results from the prior five KLC launches, bald eagle habitat use appears to have been unaffected. The Narrow Cape bald eagle nest, which is downrange of the current launch pad, was seasonally occupied and productive during the monitoring period. (Alaska Aerospace Development Corporation, 2002) Pre- and post-launch bald eagle surveys would be conducted as necessary to comply with regulatory requirements imposed on AADC. Any indication of disturbance to eagle nesting or nesting behavior would be reported immediately to the KLC launch point of contact as specified in the Natural Resources Management Plan.

Interceptor launches would be infrequent, up to five per year over a period of 10 years. A Biological Assessment (Federal Aviation Administration, 1998) prepared for the FAA and AADC as part of the construction and operation EA determined that launches from KLC are not likely to adversely affect listed species, such as the Steller's eider and short-tailed albatross, or critical habitat. Five annual GBI launches would fall within the parameters analyzed for KLC and are also not likely to adversely affect listed species. Disturbance to wildlife from single or dual GBI 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).

No evidence has indicated that serious injuries to wildlife have resulted from prior launches, and no long-term adverse effects are anticipated. The brief noise peaks produced by the GBI are comparable to levels produced by close range thunder (120 dB to 140 dB peak). There is no species known to be susceptible to hearing damage following exposure to this noise source (U.S. Department of the Air Force, 2001).

Emissions. The KLC area has a high level of rainfall and short steep streams, and small amounts of deposition from launches would be quickly flushed from stream drainages. No long-term impacts to fish in streams or Essential Fish Habitat within the ROI are expected.

Hydrogen chloride, which is emitted during missile launches, is known to affect wildlife. Birds flying through the exhaust plume may be exposed to concentrations that could irritate eye and respiratory systems (Federal Aviation Administration, 1996). However, results of a monitoring program conducted following a Strategic Target System launch from KTF in Hawaii indicated little effect upon wildlife due to the low-level, short-term hydrogen chloride emissions (U.S. Army

Space and Strategic Defense Command, 1993a). The program included marine surveys of representative birds and mammals for both pre-launch and post-launch conditions. Studies on representative birds and mammals reviewed in the Final EIS for the Strategic Target System (U.S. Army Strategic Defense Command, 1992) also indicated that low-level, short-term exposure to hydrogen chloride would not adversely affect threatened or endangered species or other wildlife. Aluminum oxide and hydrogen chloride do not bioaccumulate; therefore, no indirect effects to the food chain are anticipated.

Debris. In the unlikely event of a launch mishap during single or dual launches, scattered pieces of burning propellant could enter coastal water and potentially affect seabirds, Essential Fish Habitat, and pinnipeds hauled out along the adjacent coastline. 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 contaminant 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, 2000) 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. The results are presented in the KLC Water Resources section, table 4.1.14-2. As shown in the table, 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.

The potential impact to Essential Fish Habitat from nominal launch activities (single and dual) would mainly be from missile debris to waters off the coast. Although debris could affect individuals close to the surface, overall species' population would not be substantially impacted. The Pasagshak River would not be affected by nominal launch activities and is outside the area likely to be affected by a launch anomaly. Anadromous and marine fisheries would not be affected by proposed launch activities. 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. The number of individuals injured or killed would not likely affect overall species' populations. (U.S. Department of the Air Force, 2001)

Debris impact and booster drops in the BOA off the coast are not expected to adversely affect marine mammal species protected by the Marine Mammal Protection Act of 1972. An early flight termination or mishap could result in debris impact along the flight corridor. Early flight termination could result in widely scattered debris, but the probability of this debris hitting wildlife is remote.

Fire from an early flight termination could impact terrestrial wildlife near the launch site. However, emergency fire-fighting personnel would be on stand-by status for all launch activities as a protective measure.

Threatened and Endangered Wildlife Species. The closest Steller sea lion haul-out sites are at Ugak Island, approximately 5 kilometers (3 miles) southeast of KLC, and Gull Point, approximately 16 kilometers (10 miles) southwest of KLC. Ugak Island is used seasonally by the Steller sea lion during the late summer to early fall postbreeding period (Alaska Aerospace Development Corporation, 1999). As addressed in the KLC EA, studies have indicated that launches are likely to produce some level of alarm response in the sea lions using Ugak Island (Federal Aviation Administration, 1996). These responses could range from a heightened state of alertness to total flight of all sea lions from the haulout site.

According to the U.S. Air Force's QRLV Program EA (U.S. Department of the Air Force, 2001), while it is expected that Steller sea lions hauled out on Ugak Island would react to a launch by entering the water, there is no biologically significant consequence of this behavior because sea lions routinely spend long hours in the water and have been observed returning to land hours later. Since the sea lions do not breed on Ugak Island, there would be no effect on mother–pup bonding. The National Marine Fisheries Service has concurred with the U.S. Air Force's opinion that predicted launch and overflight noise would have no significant impact on marine mammals. However, AADC has requested a Letter of Authorization from the National Marine Fisheries Service for the incidental harassment take of marine mammals. The USFWS also concurred that no adverse effects would occur to listed species in the ROI of an ait-2 launch. The predicted launch noise level for the GBI would be similar to or less than the level predicted and measured for ait and QRLV launches and as such, no substantial adverse impacts to listed species are expected.

Foraging shorebirds would be subjected to increased energy demands if flushed by the noise, but this should be a short-term, minimal effect. Waterfowl generally show a pronounced startle effect when exposed to noise levels of 95 to 105 dB. It is unlikely that the short-tailed albatross would be impacted by a GBI missile in flight since the trajectory is almost vertical and the missile would reach an altitude of approximately 3,048 meters (10,000 feet) while still over land, approximately 20 seconds after launch.

Although Steller's eiders rafting off Narrow Cape may be disturbed by the Proposed Action, since they do not breed within the ROI and the disturbance would be minor and infrequent, GBI launches from KLC are not expected to impact breeding or the nesting success of this species.

According to protocol of the KLC Environmental Monitoring Plan, five pre-launch and five post-launch aerial surveys for Steller's eiders were supposed to be performed for the first five missile launches at KLC. Inclement weather adversely affected this task during all five KLC launches. However, the data collected were sufficient to show that rocket launches were not adversely affecting either species numbers or habitat use patterns of either the eider, or of its designated surrogate for monitoring, the Harlequin duck (Environment and Natural Resources Institute and Alaska Aerospace Development Corporation, 2002). Steller's eiders overwinter in the area from mid-October to March. Since it was not known when the launches would take place and if Steller's eiders would be in the vicinity, the harlequin duck was used as a surrogate during surveys when the eider was not observed in the area. Steller's eiders were observed during the 1998 ait-1 and 2001 QRLV launches from KLC. No eiders were observed before the ait-1 launch, but 30 were seen minutes after about 0.40 kilometer (0.25 mile) south of Lone Point. The number fluctuated widely during the QRLV monitoring periods. Harlequin ducks were observed during all monitoring periods with no significant differences between pre- and post-launch time periods. Steller's eider and harlequin duck numbers and use of habitat appeared unaffected by the five prior launches at KLC. Any further USFWS monitoring recommendations for KLC launches will be reviewed and coordinated with AADC and if agreed to, will be conducted (Environment and Natural Resources Institute and Alaska Aerospace Development Corporation, 2002). (Alaska Aerospace Development Corporation, 2002)

Environmentally Sensitive Habitat

Nominal GBI launches are not expected to result in impacts to wetlands on KLC. SOPs for spill prevention, containment, and control measures while transporting equipment and materials would also preclude impacts to wetlands.

4.1.3.2.2 Target Missiles

Site Preparation Activities

Vegetation

Alternative 1 would require construction of additional facilities as discussed in section 2.3.1.1. These new facilities would be located adjacent to the proposed GBI silos or launch pad and included within the same fenced area. Existing facilities, such as the existing launch pad, would be modified. No significant impacts to vegetation are anticipated since new construction would occur mainly in upland areas of hairgrass-mixed forb meadow, one of the predominant vegetation types at KLC. This loss of vegetation (approximately 10.5 hectares [26 acres]) would represent only a small portion of the total vegetation available within KLC boundaries.

Threatened and Endangered Plant Species. No federally proposed or listed candidate, threatened, or endangered plant species have been observed within the boundaries of KLC.

Wildlife

Impacts to wildlife from site preparation activities described above under vegetation would be the same as those discussed above for the GBI site preparation.

Threatened and Endangered Wildlife Species. Impacts to threatened and endangered wildlife species from site preparation activities would be the same as those discussed above for the GBI site preparation.

Environmentally Sensitive Habitat

Impacts to environmentally sensitive habitat would be the same as those discussed above for GBI site preparation.

Launch Activities

Dual target launches could potentially occur. Dual launches could result in a slightly larger affected area and longer duration of disturbance to wildlife. Impacts would in some cases be slightly greater than, but similar, to those analyzed below for single launches.

Vegetation

As discussed above for GBI launches, observation of plant communities at other launch sites such as KTF, Cape Canaveral, and Vandenberg AFB indicate that vegetation continues to thrive in the immediate areas surrounding launch pads. Vegetation sampling conducted in the area near active launch pads at KTF has not indicated that hydrogen chloride emissions from launches conducted during the last 20 years resulted in any lasting effects (U.S. Army Space and Strategic Defense Command, 1993a). Further studies at KLC have shown no adverse effects to sensitive vegetation following the first six launches (Environment and Natural Resources Institute and Alaska Aerospace Development Corporation, 2002).

Threatened and Endangered Plant Species. No federally proposed or listed candidate, threatened, or endangered plant species have been observed within the boundaries of KLC.

Wildlife

Target missile launches would be infrequent, up to five per year over a period of 10 years. The potential impacts to wildlife from single or dual launches would be similar to those discussed above for GBI launch activities. A Biological Assessment (Federal Aviation Administration, 1998) prepared for the FAA and AADC as part of the construction and operation EA determined that launches of missiles similar to ait, QRLV, and Castor 120™ from KLC are not likely to adversely affect listed species, such as the Steller's eider and short-tailed albatross, or critical habitat. Five annual launches of the proposed target missiles would fall within the parameters analyzed for KLC and are also not likely to adversely affect listed species.

Using noise contours obtained from the monitoring of actual launches at PMRF and superimposing them on the launch site at Kodiak Island, a noise level of 54 dBA at 10,699 meters (35,000 feet) is projected for a Strategic Target System launch. However, this information was obtained by noise monitoring in Hawaii (22 degrees North). Air temperature and humidity affect the propagation of noise. The rate of propagation depends on factors such as distance attenuation, ground attenuation, atmospheric absorption, barrier attenuation, wind effects, and temperature gradient effects. Given atmospheric attenuation with correction for temperature and relative humidity, the actual noise impacts, particularly at the longer distances away from the launch site, might be quite different. Inclement weather precluded the use of a helicopter to set up sound monitors on Ugak Island and thus no sound data was gathered during the Strategic Target System launch from KLC in 2001. However, the monitoring report (Alaska Aerospace Development Corporation, 2002) for the Strategic Target System launch concluded that the noise would likely be similar to ait, QRLV, and Athena missile levels of 80 to 90 dB, which would be audible to pinnipeds. The Peacekeeper missile, which would result in the highest noise levels, uses a military version of the Castor 120™ motor that was analyzed in the KLC EA (Federal Aviation Administration, 1990).

Threatened and Endangered Wildlife Species. As addressed in the KLC EA, alarm response in the sea lions using Ugak Island could range from a heightened state of alertness to total flight of all sea lions from the haulout site (Federal Aviation Administration, 1996). Using the noise levels modeled for the Strategic Target System launches at PMRF, the maximum noise levels at the haulout sites on Ugak Island would be approximately 81 dBA, which would be below levels known to disturb waterfowl and wildlife. The monitored noise levels at PMRF indicate a level of 54 dBA at 10,668 meters (35,000 feet). This is significantly less than the 69 dBA indicated by modeling. As such, it is possible, although not assumed that actual sound levels at the haulouts would be less than those indicated by modeling.

No evidence has indicated that serious injuries would result, and no long-term adverse effects are anticipated. The brief noise peaks produced by the Strategic Target System and other proposed target missiles are comparable to levels produced by close range thunder (120 dB to 140 dB peak). There is no species known to be susceptible to hearing damage following exposure to this noise (U.S. Department of the Air Force, 2001). The predicted launch noise level for the Strategic Target System of 81 dBA would be less than the level predicted and measured for the QRLV-1 (87.2 dBA at Ugak Island) launch and, as such, no substantial adverse impacts to listed species are expected.

To date, no indications of disturbance to the sea lions from survey activities on Ugak Island, which are done in full view of beached sea lions, have been identified. Safety crews and other personnel are briefed on the survey procedures as well as harassment guidelines established by the National Marine Fisheries Service to minimize harassment. The GMD ETR program would adhere to the terms and conditions imposed on AADC by these future National Marine Fisheries Service recommendations.

Environmentally Sensitive Habitat

Impacts to environmentally sensitive habitat would be similar to those discussed above for GBI launches.

4.1.3.2.3 In-Flight Interceptor Communication System Data Terminal

Site Preparation Activities

Vegetation

The IDT and road at Sites 1 and 2 would require disturbance of approximately 0.4 hectare (0.9 acre) within a fenced area of approximately 2 hectares (5 acres). Construction of the IDT and road at Site 3 would require approximately 0.7 hectare (1.8 acres) to be disturbed within a 2-hectare (5-acre) fenced area. The COMSATCOM (figure 2.1.3-2) would require a footprint of approximately 0.10 hectare (0.25 acre) within a fenced area of approximately 2.8 hectares (7 acres) to accommodate the COMSATCOM and equipment. The minimal requirements include a concrete base for the COMSATCOM, an all-weather road to the site, and a prepared surface around the site at least 4.6 meters (15 feet) wide.

Construction would occur mainly in upland areas of hairgrass-mixed forb meadow, one of the predominant vegetation types at KLC. This loss of vegetation would represent only a small portion of the total vegetation available within KLC boundaries.

Threatened and Endangered Plant Species. No federally proposed or listed candidate, threatened, or endangered plant species have been observed within the boundaries of KLC.

Wildlife

Impacts to wildlife from ground disturbance and equipment noise would be similar to those discussed above for GBI site preparation.

Threatened and Endangered Wildlife Species. No impacts to threatened and endangered seabirds or marine mammals are anticipated from construction activities at the inland sites proposed for use for the IDT or COMSATCOM.

Environmentally Sensitive Habitat

No wetlands or other sensitive habitat would be disturbed during construction and installation of the IDT.

Operation

Vegetation

No impacts to vegetation would result from operation of the IDT or COMSATCOM.

Threatened and Endangered Plant Species. No federally proposed or listed candidate, threatened, or endangered plant species have been observed within the boundaries of KLC.

Wildlife

During normal operations, the IDT would not transmit except for a few minutes during annual testing of the equipment and during the GBI flight tests. Given the short duration of transmission, no adverse impacts to biological resources are anticipated. Most operational impacts to wildlife from the IDT would come from security lighting and noise from electrical generators required for the site. The lighting and noise could encourage species less tolerant of these disturbances to avoid the area. Generator noise could range from 80 to 85 dBA at up to 105 meters (344 feet). These noise levels would only occur a couple of hours a week during maintenance activities required for backup generators or continuously if no commercial power is available.

COMSATCOM primary power is from a commercial source with backup power provided by generator. Communication cable to the Launch Control Center would be required. Equipment would be housed in a military van, a small building, or an existing adjacent facility if available.

Threatened and Endangered Wildlife Species. No adverse impacts to threatened and endangered wildlife species are anticipated. As stated above, most operational impacts to wildlife from the IDT would come from security lighting and noise from electrical generators required for the site. Generator noise could range from 80 to 85 dBA at up to 105 meters (344 feet), which would not adversely affect species offshore.

Environmentally Sensitive Habitat

No adverse impacts to environmentally sensitive habitat are anticipated from security lighting or generator noise due to operation of the IDT and COMSATCOM.

4.1.3.2.4 Sensors

There are currently no sensors permanently located at KLC. Proposed sensor use at one location on KLC and at one out of seven alternate sites throughout south-central or southwest Alaska would require that sensors be transported to these locations. An existing disturbed area would be used to minimize the potential for impacts. Mobile sensors necessary to support GMD ETR activities would also be located on existing disturbed areas. No impacts to biological resources are anticipated.

4.1.3.2.5 TPS-X Radar

Site Preparation Activities

Vegetation

Installation of the TPS-X radar would require disturbance to 0.3 hectare (0.8 acre) of land on KLC for placement of a concrete pad. Construction would occur mainly in upland areas of hairgrass-mixed forb meadow, one of the predominant vegetation types at KLC. This loss of vegetation would represent only a small portion of the total hairgrass-mixed forb meadow habitat available within KLC boundaries.

Threatened and Endangered Plant Species. No federally proposed or listed candidate, threatened, or endangered plant species have been observed within the boundaries of KLC. Thus no impacts to threatened or endangered species would result from installation of the TPS-X radar.

Wildlife

Impacts from ground disturbance and equipment noise could temporarily displace terrestrial wildlife as discussed for GBI site preparation. Additional similar habitat is available on KLC to accommodate roosting, nesting, and feeding needs.

Threatened and Endangered Wildlife Species. No impacts to threatened and endangered seabirds or marine mammals are anticipated from construction activities at the inland sites proposed for use for the TPS-X radar.

Environmentally Sensitive Habitat

No wetlands or other sensitive habitat would be disturbed during construction and installation of the TPS-X radar.

Operation

Vegetation

Operation of the Prime Power Unit would require refueling operations. The fuel tank would be filled from a fuel truck, as necessary. Impermeable ground covering material and spill containment berms would be placed for containment of fuel during fueling operations. Spill control procedures would be established using KLC's approved SOPs, and spill control kits would be present at the site in the unlikely event of a fuel leak or spill.

The Cooling Equipment Unit is a closed system, and no emissions of the ethylene glycol solution are planned. However, because of the remote potential for leaks or spills during system hook-up, or the possibility of ruptured hoses or accidental disconnection, impermeable ground cover would be in place as was described for the Prime Power Unit.

Operation of the TPS-X radar would not result in impacts to vegetation since impermeable ground covering material and spill containment berms would be placed for containment of fuel during fueling operations.

Threatened and Endangered Plant Species. No federally proposed or listed candidate, threatened, or endangered plant species have been observed within the boundaries of KLC. Thus no impacts to threatened or endangered species would result from operation of the TPS-X radar.

Wildlife

The Prime Power Unit is a self-contained trailer with a noise-dampening shroud that would minimize the potential for diesel generator noise impacts.

In terms of the potential for EMR impacts to wildlife, the power densities emitted from the TPS-X radar are unlikely to cause any biological effects in animals or birds. The TPS-X radar is not expected to radiate lower than 5 degrees above horizontal, which would preclude EMR impacts to terrestrial species from either operation of the TPS-X radar during flight tests or later during proposed tactical testing.

The potential for main-beam (airborne) exposure thermal effects to birds exists. In terms of the potential for EMR impacts on wildlife, the Ground-Based Radar Family of Radars EA (U.S. Army Program Executive Office, Global Protection, 1993) analyzed potential impacts on wildlife from EMR. This EA determined that several factors significantly reduce the potential EMR exposure for birds and other wildlife. The radar main beam would normally be located at least 2 degrees above horizontal, which limits the probability of energy absorption by surface-oriented wildlife. The radar beam would normally be in motion, making it extremely unlikely that a bird would remain within the most intense area of the beam for any considerable length of time. The size of the beam is relatively small, which further reduces the probability of bird species remaining within this limited region of space, even if the beam were still. (Ballistic Missile Defense Organization, 2000)

The analysis methods used to evaluate potential effects of RF radiation on birds is the Maximum Permissible Exposure Level, which defines the maximum time-averaged radio frequency power density allowed for uncontrolled human exposure (and by extrapolation, to birds and other species). The Maximum Permissible Exposure Level method is independent of body size or tissue density being exposed. Analysis conducted during preparation of the GBR EA (U.S. Army Program Executive Office Missile Defense, 1993) was based on a conservative approach of limiting the microwave energy absorption rate on the Aplomado falcon (*Falco femoralis*), a bird listed as endangered by the USFWS and the State of New Mexico. The energy absorption rate was based on the falcon remaining continuously within the main beam of the ground-based radar. The absorption rate was then compared to the bird's resting metabolic rate. The analysis indicated power densities would have to exceed 42 mW/cm^2 to affect the falcon. Power densities of 38 to 61 mW/cm^2 have been determined necessary to affect other birds weighing up to 3.5 kilograms (7.7 pounds).

The analyses were 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 may pose a potential for an adverse effect. Birds in general typically expend energy at up to 20 times their resting metabolic rates during flight. Since birds are not likely to remain continuously within the radar beam and the power density is not expected to exceed levels stated above that could impact birds, the likelihood of harmful exposure is remote. (Ballistic Missile Defense Organization, 2000)

Threatened and Endangered Wildlife Species. The potential for impacts to threatened and endangered seabirds would be the same as that discussed above for wildlife. The TPS-X radar is not expected to radiate lower than 5 degrees above horizontal, and since marine mammals would normally be found below the surface of the water, this signal height would be safely above any surfacing mammals. RF radiation does not penetrate the surface of water to any great degree. The power density level just below the surface of the ocean would not exceed the permissible exposure level for uncontrolled environments. (U.S. Department of the Navy, 2002a) No adverse impacts would occur to whales, other marine mammals, or sea turtles at least 1.3 centimeters (0.5 inch) below the surface. It is also highly unlikely that an individual would be on or substantially above the surface of the water for a significant amount of time within the main beam or side lobe areas when the TPS-X radar would be operating. No impacts to marine mammals offshore are expected as a result of proposed radar operation on KLC since these species would normally be found in the ocean outside the 400-meter (1,312-foot) exclusion zone. For these reasons, no effects are anticipated on the humpback whale, other marine mammals, or sea turtles that might be present in the vicinity of the homeport and transit locations. Therefore, no further action regarding whales is required pursuant to the Endangered Species Act and the Marine Mammal Protection Act.

Environmentally Sensitive Habitat

No wetlands or other sensitive habitat would be adversely affected during operation of the TPS-X radar.

4.1.3.3 Alternative 2

No GBI-related construction would be required at KLC under Alternative 2 since GBI launches would occur from Vandenberg AFB and RTS instead of KLC and RTS. Target launch-related impacts would be identical to those described under Alternative 1. As discussed in Alternative 1, proposed sensor use at one location on KLC and at one out of seven alternate sites throughout south-central or southwest Alaska would require that sensors be transported to these locations. Mobile sensors necessary to support GMD ETR activities would be located on existing disturbed areas. No impacts to biological resources are anticipated.

4.1.3.4 Alternative 3

For the purposes of the discussion at KLC, the construction and flight impacts for Alternative 3 would be as described above for Alternative 1.

4.1.3.5 Cumulative Impacts

Construction associated with the GMD ETR program would result in the cumulative loss of up to approximately 31 hectares (76 acres) of meadow and shrubland within KLC boundaries. This represents approximately 2.5 percent of the total available acreage of KLC. Similar habitat is available adjacent to the proposed locations and no federally threatened or endangered plants have been identified within KLC boundaries. No cumulative changes in plant community composition or structure have been identified at other active launch locations such as Vandenberg AFB and Kennedy Space Center.

The KLC EA indicated no significant impact to biological resources from nine annual launches (Federal Aviation Administration, 1996). It is not likely that the Proposed Action, in conjunction with current planned or anticipated launches, would exceed this level of activity. According to the Quick Reaction Launch Vehicle EA (U.S. Air Force, 2001), multiple failures at the same point in flight during launches would be required to cumulatively affect Essential Fish Habitat or other sensitive biological resources. This scenario is highly unlikely. Combined activities would be performed at different times and locations. No cumulative impacts from launches proposed for the GMD ETR program are anticipated.

4.1.3.6 Mitigation Measures

No biology mitigation measures are proposed for the GMD ETR activities at KLC. GMD ETR proposed activities would adhere to the terms and conditions imposed by the National Marine Fisheries Service on AADC.

4.1.4 CULTURAL RESOURCES—KODIAK LAUNCH COMPLEX

Potential impacts on archaeological and historic resources may result from construction; ground-clearing; off-road traffic activities; sound pressure damage; increased human presence in archaeologically sensitive areas; and/or alteration, modification, renovation, or demolition of existing potentially significant facilities and other activities.

Only those cultural resources determined to be potentially significant under existing legislation are subject to protection from adverse impacts resulting from the Proposed Action or its alternatives. 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. The term eligible for inclusion includes both properties formally determined as such and all other properties that meet the listing criteria. Sites which have not yet been formally evaluated are considered potentially eligible and, as such, are afforded the same consideration as formally nominated properties. Prehistoric (usually referred to as archaeological), historic, or traditional significant cultural resources are referred to as historic properties.

An undertaking is considered to have an effect on a historic property when it may alter characteristics of the property that may otherwise qualify the property for inclusion in the National Register. An effect is considered to be adverse when it diminishes the integrity of the property’s location, design, setting, materials, workmanship, feeling, or association. Adverse effects on historic properties include but are not limited to:

- The physical destruction, damage, or alteration of all or part of the property
- Isolation of the property from, or alteration of the character of, the property’s setting when that character contributes to the property’s qualification for the National Register

- Introduction of visual, audible, or atmospheric elements that are out of character with the property or alter its setting
- Neglect of a property resulting in its deterioration or destruction
- Transfer, lease, or sale of the property

4.1.4.1 No Action Alternative

Missile Defense Agency

Under the MDA's No Action Alternative, launches would continue to occur at KLC although the GMD ETR would not be established and GBI and target launch scenarios would not be tested under more operationally realistic conditions. These launches could include missions in support of the GMD program. KLC would continue to operate as a licensed launch facility, and, as concluded in the KLC EA (Federal Aviation Administration, 1996), no cultural impacts would be anticipated.

Federal Aviation Administration

Under the FAA's No Action Alternative, the launch site operator license for KLC would not be renewed and no launches would be allowed to occur from KLC after September 2003. Therefore, there would be no impacts to cultural resources from launches at KLC.

4.1.4.2 Alternative 1

4.1.4.2.1 Ground-Based Interceptors

Construction

The proposed activities under Alternative 1 would require construction of numerous facilities as described in section 2.3.1.1. Potential total disturbed areas due to construction are identified in table 2.3.1-3.

Prehistoric and Historic Archaeological Resources

Previous archaeological surveys have indicated that cultural resources are not present in the upland areas occupied by KLC. As project details are further delineated, additional archaeological surveys may be required to verify the absence of sites within the area of potential effect. Should cultural resources be found during the course of any GMD ETR activity, all activities would cease in the area and the proper authorities would be notified. Subsequent actions would follow the guidance provided, therefore, no impacts to archaeological resources are anticipated.

Historic Buildings and Structures

There are no structures in the area currently occupied by KLC infrastructure that are listed on the National Register of Historic Places. No construction activities or building modifications are expected to have an effect on any historic properties.

Native Populations/Traditional Resources

The 1994 survey of the KLC area showed no signs of traditional resources within the ROI. Therefore, no impacts to traditional resources are anticipated. As mentioned above, should cultural resources be found during the course of any GMD ETR activity, all activities would cease in the area and the proper authorities would be notified. Subsequent actions would follow the guidance provided.

Large GBI components may need to be brought into KLC by barge as described in section 2.3.1. The proposed barge landing sites are shown in figure 2.3.1-1. If it is determined that a barge landing is required, one of the three potential sites would be selected for use. At that time an archaeological survey would be conducted to verify the presence of the reported sites described in section 3.1.4.2 and to determine if there are previously unreported sites within the area of potential effect.

Operation

Proposed GBI operations for Alternative 1 at KLC would consist of single and dual interceptor launches.

Flight Activities

Personnel would be informed of the sensitivity of cultural resources and the types of penalties that could be incurred if sites are damaged or destroyed. The only potential impacts to cultural resources would be as a result of debris generated by a test failure. However, the possibility of this occurring is extremely remote.

Post-Flight Activities

Debris recovery from unsuccessful launches at KLC is the responsibility of the user and is closely monitored by AADC. 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 KLC procedures. If the potential exists to disturb cultural resources during debris recovery activities, recovery efforts would be coordinated with KLC range representatives and agencies to develop appropriate mitigation measures to avoid impact to sensitive resources and to restore natural areas as necessary following debris recovery efforts.

4.1.4.2.2 Target

Construction

Under Alternative 1, site preparation activities overlap somewhat with GBI facilities. Since no cultural resources have been identified within the construction footprint, there would be no adverse effects to cultural resources due to target facility construction.

Operation

Proposed target operations for Alternative 1 at KLC would include single and dual target launches.

Flight Activities

Target launches, from a cultural resources standpoint, would be similar to an interceptor launch. Personnel would be informed of the sensitivity of cultural resources and the types of penalties that could be incurred if sites are damaged or destroyed. The only potential impacts to cultural resources would be as a result of debris generated by a test failure. However, the possibility of this occurring is extremely remote.

Post-Flight 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 KLC procedures. If the potential exists to disturb cultural resources during debris recovery activities, recovery efforts would be coordinated with KLC range representatives and agencies to develop appropriate mitigation measures to avoid impact to sensitive resources and to restore natural areas as necessary following debris recovery efforts.

4.1.4.2.3 In-Flight Interceptor Communication System Data Terminal

Construction

Under Alternative 1, proposed construction would include disturbance of 4.8 hectares (11.9 acres) for an IDT and COMSATCOM. Cultural resources have not been identified within the area and therefore there would be no adverse effects to cultural resources from IDT and COMSATCOM construction.

Operation

Proposed activities for Alternative 1 at KLC include IDT and COMSATCOM operations.

Flight Activities

IDT and COMSATCOM operations are not expected to adversely impact cultural resources. The nature of the operation of these systems combined with the lack of existing cultural resources would result in no impacts.

4.1.4.2.4 Sensors

Proposed sensor use at one location on KLC and at one or more out of seven alternate sites throughout south-central or southwest Alaska would require that sensors be transported to these locations. Mobile Systems would likely be parked at pre-existing parking areas and no ground disturbance would be required. Therefore, impacts to cultural resources are not anticipated.

Flight Activities

Operation of sensors of this nature is not expected to produce any short- or long-term effects to cultural resources. Personnel would be informed of the sensitivity of cultural resources and the types of penalties that could be incurred if sites are damaged or destroyed.

4.1.4.2.5 TPS-X

Construction

The installation of the TPS-X at KLC would require the construction of a pad for the 38- by 58-meter (125- by 190-foot) hardstand and disturbance of approximately 0.3 hectare (0.8 acre). Potential TPS-X locations would be the same as those described for potential IDT and COMSATCOM facilities. Previous archaeological surveys have indicated that cultural resources are not present within the upland areas occupied by KLC. As project details are further delineated, additional archaeological surveys may be required to verify the absence of sites within the area of potential effect. Should any culturally related resources be found during the construction of the TPS-X radar, all construction activities would cease and the proper authorities would be notified. Therefore, impacts to cultural resources are not anticipated.

Operation

Operation of the Prime Power Unit would require refueling operations. The fuel tank would be filled from a fuel truck, as necessary. Impermeable ground covering material and spill containment berms would be placed for containment of fuel during fueling operations. Spill control procedures would be established in accordance with KLC's approved SPCC SOPs, and spill control kits would be present at the site in the unlikely event of a fuel leak or spill.

The Cooling Equipment Unit is a closed system, and no emissions of the ethylene glycol solution are planned. However, because of the remote potential for leaks or spills during system hook-up, or the possibility of ruptured hoses or accidental disconnection, impermeable ground cover would be in place as was described for the Prime Power Unit.

Because impermeable ground covering and spill containment berms would be employed and due to the lack of located resources in the area, impacts to cultural resources are not anticipated from the refueling of the Prime Power Unit.

In terms of the potential for EMR impacts to cultural resources, the power densities emitted from the TPS-X radar are unlikely to cause any damaging effects to cultural resources. The TPS-X radar is not expected to radiate lower than 5 degrees, which would preclude EMR impacts to terrestrial artifacts from either operation of the TPS-X radar during flight tests or later during proposed tactical testing. Therefore, the operation of the TPS-X radar is not expected to have any adverse impacts to cultural resources.

4.1.4.3 Alternative 2

4.1.4.3.1 Target

Construction

Proposed target construction for Alternative 2 at KLC is identical to that described in Alternative 1.

Operation

Potential impacts from proposed target operations for Alternative 2 at KLC would be identical to that described in Alternative 1.

4.1.4.3.2 Sensors

Construction

The mobilization and setup activities for mobile telemetry systems at remote locations throughout Alaska would be identical to that described for Alternative 1 and would have negligible adverse impacts.

Operation

The operation of mobile telemetry system would be identical to activities described under Alternative 1; however, the system would be operated for target launches only. No operational aspect of the system poses the potential for adverse effects to cultural resources.

4.1.4.4 Alternative 3

Alternative 3 would be identical to Alternative 1 at KLC. Because Alternative 1 includes GBIs, targets, and all associated facilities, the construction and flight impacts for Alternative 3 would be as described for Alternative 1.

4.1.4.5 Cumulative Impacts

The KLC EA indicated no significant impact to cultural resources for nine annual launches (Federal Aviation Administration, 1996). It is not likely that the Proposed Action, in conjunction with current planned or anticipated launches, or construction activities, would exceed this level of activity. Combined activities would be performed at different times and locations and therefore, no significant impact to cultural resources is anticipated at KLC.

4.1.4.6 Mitigation Measures

No cultural resources mitigation measures are proposed for the GMD ETR activities at KLC at this time. As project details are further delineated, coordination would occur with the Alaska SHPO to ensure that cultural resources would be protected.

4.1.5 GEOLOGY AND SOILS—KODIAK LAUNCH COMPLEX

The proposed program activities have the potential to increase soil erosion due to construction and vehicle traffic on unpaved roads. GBI and target missile launches could affect the chemical composition of site soils. Construction activities could have a direct short-term affect on the availability of selected geologic resources, such as aggregate for road base and high-strength concrete. Program support facilities, IDT, sensors, radar, and other critical equipment would be potentially subject to strong vibratory ground motions from earthquakes and volcanic ash falls. Active fault segments could potentially result in surface ruptures during large earthquakes resulting potentially damaging facilities and infrastructure along the trace.

4.1.5.1 No Action Alternative

Missile Defense Agency

Under the MDA's No Action Alternative, launches would continue to occur at KLC, although the GMD ETR would not be established and GBI and target launch scenarios would not be tested under more operationally realistic conditions. Maintenance or construction projects proposed by AADC at KLC which would result in ground disturbance would be subject to environmental review by the FAA if that action were a modification to the facilities, facility layout, and operations described in the launch site operator license. KLC is located within a seismically active area, but existing facilities have been designed and constructed to Seismic Zone IV standards (Uniform Building Code, 1994) and should withstand probable levels of vibratory ground motion at the site (appendix D). Further, KLC existing facilities are situated at elevations that are greater than the limits of maximum wave run-up from a probable tsunami event (seismic generated sea wave).

KLC would continue to conduct launches as specified in the KLC launch site operator license. The KLC EA concluded that there would be no measurable long-term changes in the pH of soils from the exhaust deposition of up to nine launches of the Athena-2, using a Castor 120™ motor for propulsion, per year (Federal Aviation Administration, 1996). Environmental monitoring efforts to date have not indicated any adverse changes in soil chemistry resulting from launches. No adverse changes to soil chemistry would be anticipated under the MDA's No Action Alternative at KLC.

Federal Aviation Administration

Under the FAA's No Action Alternative, the launch site operator license for KLC would not be renewed and no launches would be allowed to occur from KLC. Therefore, there would be no impacts to geology and soils from launches at KLC.

4.1.5.2 Alternative 1

4.1.5.2.1 Ground-Based Interceptors

Construction

Alternative 1 would require construction of numerous facilities as described in section 2.3.1.1. Fiber optic cable would be pulled through existing conduit in the fiber-optic cable network, however, additional trenching would be required for selected facilities that are proposed outside of the established backbone. The probable area of soil disturbance for all GBI-related facilities and roads would be approximately 14.4 hectares (35.5 acres), owing largely to grubbing and clearing of vegetation within the perimeter fencing, foundation excavation, stockpile, and equipment maneuver areas.

Minor effects to soils are likely to occur because of the proposed site preparation and construction activities. Most proposed facilities and service roads would be situated at or near local topographic highs in mildly sloping terrain, with little potential for sheet flooding or uncontrolled surface water runoff from higher elevations. The upland soils are generally well drained and not considered to be sensitive to erosion on slopes of less than 7 percent (U.S. Department of the Air Force, 2001). AADC will obtain and review necessary definitive information on surface faulting in the vicinity of the proposed GBI facilities. In making final siting and design determinations, AADC will incorporate additional design standards as advised by its design engineer and geotechnical consultant. The KLC Natural Resource Management Plan (Alaska Aerospace Development Corporation, 1998) would be referred to for managing laydown areas and topsoil piles before construction, and after construction for providing direction on the disposition of excess topsoil and the selection of plants for revegetation. Best management practices would be used for erosion and sediment control. Such Best Management Practices could include storm water diversions, sediment barriers, stream protection, dust palliatives, and other stabilization treatments.

Alternative 1 would not significantly deplete sources of construction material in the region. Tertiary bedrock (the Narrow Cape Formation) underlies most of the KLC property and is suitable as general construction fill material and is readily available (Alaska Aerospace Development Corporation, 1995). Surface aggregates have previously been hauled from Pasagshak Point to provide surface course materials over the local sandstone. Sources of structural fill material may need to be imported from existing commercial source areas near the City of Kodiak. Indirect short-term impacts could be created from increased dust and traffic.

Operation

Alternative 1 would result in up to five missile launches per year from KLC over the duration of the test program. GBI launch activities may present minor adverse impacts to local soils due primarily to booster stage exhaust emissions during a nominal test launch, or from unburned or partially burned propellant fuels in the event of a terminated flight. Each EKV would contain approximately 7.5 liters (2.0 gallons) of liquid fuel (monomethylhydrazine) and 5.5 liters (1.5 gallons) of liquid oxidizer (nitrogen tetroxide). Preloaded fuel and oxidizer tanks would be installed on the EKV, so there would be no need for onsite fueling of the GBI and thus no anticipated adverse effect from direct contamination of soils from spills at the Missile Assembly Building, GBI silo, or launch pad.

During a nominal launch, the GBI booster would primarily emit hydrogen chloride, aluminum oxide, chlorine, carbon monoxide, carbon dioxide, hydrogen, nitrogen, oxygen, and water. Most hazardous constituents of the propellant would be completely consumed during the launch. Under this scenario, only small amounts of hydrogen chloride and aluminum oxide emissions would be anticipated to directly contact the soil adjacent to the launch pad and downwind of the flight corridor.

No adverse changes to soil chemistry are predicted to occur as a result of hydrogen chloride or aluminum oxide deposition from interceptor launches. As described in section 4.1.1, soil deposition of hydrogen chloride is expected to be minimal because relatively small amounts of hydrogen chloride are released in the booster ground cloud and the emissions disperse rapidly. Because KLC is near the ocean, a significant fraction of the gas phase hydrogen chloride would condense in the marine aerosol (U.S. Air Force, 1997). This would lower the gas phase concentrations, but would also retard the ground deposition and would re-evaporate in several minutes, leaving downwind concentrations unchanged (Brady, 1997). Deposition of hydrogen chloride was analyzed for the Athena-2 launch vehicle and it was concluded that there would be no measurable increase in soil pH for up to nine launches (Federal Aviation Administration, 1996). The Athena-2 (figure 2.1.2-1) uses a Castor 120™ first stage that is larger than the GBI. The proposed GBI configurations (table 4.1.1-10) have less solid rocket fuel capacity than the Athena-2 and, therefore, would likely produce lower exhaust emissions.

Ground deposition of aluminum oxide is expected to be small and result in minor impacts. Soil deposition of measurable levels of aluminum oxide from a moving exhaust cloud is predicted to be negligible (Pacific Missile Range Facility, Barking Sands, 1998). Typically, no solid propellant missile launches would occur during rain, and the launch system would not use a water deluge system for cooling and noise suppression (a deluge system could increase the potential for ground deposition). The EPA has determined that nonfibrous aluminum oxide as found in SRM exhaust, is nontoxic. (U.S. Army Space and Strategic Defense Command, 1994)

For analysis of dual GBI launches, the exhaust products from a nominal launch are conservatively estimated to be twice the level of a single launch. The analysis of dual launches under air quality (section 4.1.1.2.1) concluded that hydrogen chloride emissions would possibly exceed U.S. Air Force exposure limits for possibly a short duration and that the level of aluminum oxide would be expected to remain within the non-criteria pollutant level. Therefore, it is not expected that dual launches would result in significant ground deposition of either pollutant.

In the unlikely event of an on-pad fire or catastrophic missile failure over land, most or all of the solid propellant fuel would likely burn up before being extinguished. Any remaining fuel would be collected and disposed of as a hazardous waste. Small quantities of hydrazine in the EKV could also be released. Hydrazine is heavier than air and, if not oxidized when airborne, would react and/or possibly ignite with the porous earth or would form dimethylamine and oxides of nitrogen. All of these substances are soluble in water. Airborne nitrogen dioxide would return to earth as nitric acid rains in precipitation events. (U.S. Army Space and Strategic Defense Command, 1995)

Likewise, the nitrogen tetroxide that reached the ground would also react with calcium carbonate soil to form calcium nitrates. Calcium nitrate, a strong oxidizer, is a dangerous fire risk in contact with organic materials. Therefore, depending on the amount of the propellant and/or oxidizer released, soils contaminated with these liquid propellants may require removal to prevent subsequent fires or explosions. The relatively small amount of nitrogen tetroxide on the EKV (5.5 liters [1.5 gallons]) would indicate that such a release would pose a relative minor adverse affect on the site and vicinity soils. Calcium nitrate is also water soluble, so it is anticipated that any residual material or unreacted fuel would be washed into surface drainages and directly out to sea.

4.1.5.2.2 Target

Construction

Alternative 1 would require construction of new facilities as described in section 2.3.1.1. In addition, there would be an addition/alteration to an existing launch pad (LP-1). Most of the adversely affected soil area related to target facilities would be encompassed by GBI site preparation activities.

The environmental considerations and consequences of constructing target facilities at KLC are similar to those discussed for GBI facilities in section 4.1.5.2.1.

Operation

Alternative 1 could result in up to five target land launches per year from KLC over the duration of the test program. Unlike GBI, land launched target missiles could consist of several different missile types and configurations including Strategic Target System, Minuteman II Target, Peacekeeper Target, and Trident I (C4) Target. All target missiles noted use solid propellants for the booster stage and, as such, during nominal launch scenarios would emit exhaust products from solid fuels at the launch pad and along the flight path. The minor effects to KLC soils anticipated from solid fuel emissions are discussed in section 4.1.5.2.1.

The Peacekeeper Target is the largest of these target vehicles and consists of both solid and liquid fueled stages. For purposes of analysis, Peacekeeper Target also represents the most difficult of the target missiles to handle, store, and refuel. Target missiles would be stored and assembled in missile storage facilities, and liquid fuels and oxidizers would be stored in separate fuel storage facilities. Each of these facilities would have the capability to contain unanticipated releases of liquid fuels, as well as procedures for reacting to such spills to ensure that local soils are not contaminated.

In the event of an on-pad fire or terminated launch, the Peacekeeper Target could potentially release 76,848 kilograms (169,420 pounds) of solid propellant. As discussed in section 4.1.5.2.1, most of the solid propellant would be expected to burn upon impact with the ground. Unburned components of the fuel would be removed and treated as hazardous waste.

4.1.5.2.3 In-Flight Interceptor Communication System Data Terminal

Construction

Alternative 1 would require construction of an IDT (one of three optional sites), COMSATCOMs (one of four optional sites), and connecting roads and cables. The probable disturbed area from site preparation would be approximately 2.1 hectares (5.3 acres). Soil disturbance from site preparation activities would be relatively minor and short in duration. Site preparation and construction activities would follow established procedures and Best Management Practices as previously described in section 4.1.5.2.1. AADC will obtain and review necessary definitive information on surface faulting in the vicinity of the proposed IDT facilities. In making final siting and design determinations, AADC will incorporate additional design standards as advised by its design engineer and geotechnical consultant. All IDT facilities would be constructed outside of existing 100-year floodplains and beyond established limits for tsunami wave run-up for a maximum probable tsunami event. Except for localized soil compaction in the construction area, indirect and long-term impacts to the soils resulting from IDT construction would not be anticipated.

Operation

Operation of the IDT would have no direct, short- or long-term effect on surrounding geology or soils. Long-term indirect effects, primarily from vehicle traffic for support and maintenance, would result in very minor soil compaction and dust generation on gravel access roads.

4.1.5.2.4 Sensors

Construction

Alternative 1 would require a single gravel pad area out of seven alternate locations for mobile telemetry. An existing disturbed area would be utilized, and therefore soil disturbance from site preparation activities would be relatively minor and short in duration. Site preparation activities would follow Best Management Practices for soil management and erosion control (see section 4.1.5.2.1).

Operation

Operation of the sensors would have no direct or indirect, short- or long-term effect on surrounding geology or soils. Long-term indirect effects, primarily from vehicle traffic for operational support and maintenance, would result in very minor soil compaction and dust generation on gravel access roads and pads.

4.1.5.2.5 TPS-X Radar

The TPS-X construction and operation requirements and potential impacts to geology and soils would be similar to that described above for the IDT. The alternative locations are the same and the potential impacts would be similar.

4.1.5.3 Alternative 2

4.1.5.3.1 Target

Construction

Under Alternative 2, potential adverse effects to site soils from the construction of new target facilities would be similar to that described for Alternative 1 (see section 4.1.5.2.2).

Operation

Under Alternative 2, target launch operations would be the same as Alternative 1 and would not result in any direct adverse effects on geology and soils at KLC over the short- or long-term.

4.1.5.3.2 Sensors

Construction

Under Alternative 2, potential adverse effects to site soils from the construction of new sensor facilities would be identical to that described for Alternative 1 (see section 4.1.5.2.4).

Operation

Under Alternative 2, sensor operations would be the same as Alternative 1 and would not result in any direct adverse effect on geology or soils at KLC over the short- or long-term.

4.1.5.4 Alternative 3

Alternative 3 would include all aspects of Alternatives 1 and 2. Because Alternative 1 includes GBIs, targets, and all associated facilities, the construction and flight impacts for Alternative 3 would be as described for Alternative 1.

4.1.5.5 Cumulative Impacts

The KLC EA indicated no significant impact to geology and soils from nine annual launches (Federal Aviation Administration, 1996). It is not likely that the Proposed Action, in conjunction with current planned or anticipated launches, would exceed this level of activity. Missile launches are short-term events with months between launches. Sampling programs performed during each launch have not shown any accumulation of missile launch exhaust products and therefore, no substantial impacts are anticipated at KLC. Future operations and improvements at KLC would be similar in scope to those described in prior EAs, with the proposed five launches per year being a part of the planned launches at KLC. Minor alteration of soil chemistry and accumulation of contaminants could occur from the exhaust emissions of multiple missile launches at KLC, but such adverse effects would be highly localized and would not pose a hazard to human health. No long-term cumulative impacts are expected from construction and operation at KLC.

4.1.5.6 Mitigation Measures

Prior to determining the final site layout and design standards for ETR facilities, AADC will obtain and review definitive information bearing on seismic design and construction standards and surface faulting potential and will incorporate additional design standards as advised by its design engineer and geotechnical consultant.

4.1.6 HAZARDOUS MATERIALS AND HAZARDOUS WASTE—KODIAK LAUNCH COMPLEX

Potential impacts from hazardous materials would involve their transportation, storage and use. Potential impact from hazardous waste would be related to the generation, accumulation, transportation, and disposal of hazardous wastes used or created in program activities. Impacts relative to hazardous materials and waste are considered significant if they would: (1) increase the potential for exposure to hazardous material or waste; (2) increase the likelihood of a release to the environment; (3) result in noncompliance with applicable regulatory guidelines; or (4) increase the quantities of hazardous materials used or wastes generated beyond available management practices.

Transportation, storage, and use of hazardous materials would be conducted according to applicable OSHA, EPA, DOT, DoD and state regulations and requirements as well as established project and launch complex Standard Safety Operating Plans.

Pollution prevention, recycling, waste minimization, IRPs, USTs, ASTs, asbestos, lead-based paint and PCBs have been evaluated and no impacts were identified. Potential impacts from launch activities are addressed under each alternative as applicable.

4.1.6.1 No Action Alternative

Missile Defense Agency

Under the No Action Alternative, KLC would continue to operate as a commercial launch facility and provide ongoing support to single Strategic Target System launches. The Strategic Target System launches would be managed within the nine launches previously analyzed in the KLC EA (Federal Aviation Administration, 1996), and no hazardous materials or hazardous wastes impacts would be anticipated.

Federal Aviation Administration

There would be no impacts expected from hazardous materials and hazardous waste from the FAA's No Action Alternative because there would be no launch events from KLC.

4.1.6.2 Alternative 1

4.1.6.2.1 Ground Based Interceptors

Construction

Construction activities in support of GBI launch activities at KLC are generally discussed in section 2.3.1.1 and include GBI silo or launch pad and support facility construction as well as the IDT, COMSATCOM, TPS-X radar, mobile telemetry and C-band radar gravel pad construction, maintenance storage building and Launch Control Complex additions, addition to the existing Narrow Cape Lodge, construction of a new mancamp and utilities/ communication installation. Construction activities would be centralized to the greatest extent possible at the selected project site and on specific construction laydown areas and access roads. Hazardous materials and waste management would be performed in accordance with ongoing KLC procedures, as described in the KLC User's Manual (Alaska Aerospace Development Corporation, 2001) as well as applicable Federal, state and local regulations.

The construction of the GBI launch support infrastructure would use small quantities of hazardous materials, which would result in the generation of some hazardous and nonhazardous wastes (Halliburton NUS Environmental Corporation, 1993). The hazardous materials that are expected to be used are common to construction activities and may include diesel fuel, anti-freeze, hydraulic fluid, lubricating oils, welding gases, and small amounts of paints, thinners, and adhesives.

Substantial impacts to the environment are not expected from the presence of potentially hazardous materials and the generation of wastes during the GBI construction activities. Best practices, lessons learned and expectations indicated in the interim guidance DoD 5000.2R would be incorporated into design and construction plans. The following hazardous materials management techniques may be used during the construction period to minimize (1) the amount of hazardous materials stored, (2) the threat of their accidental and unplanned release into the environment, and (3) the quantity of hazardous waste generated.

- Structures may be prefabricated by manufacturers and shipped for final assembly at the site using bolts to minimize the need for welding, painting, and other activities involving hazardous materials.
- No underground tanks exist at KLC and none would be installed as a result of this activity. Diesel fuel would be stored in ASTs with secondary containment and inspected daily in accordance with the provisions of the KLC Spill Prevention, Control, and Countermeasures Plan (as appropriate). ASTs may be removed after tests are complete or put in standby condition at KLC to support future activities. Fueling would follow existing procedures to minimize the potential for fuel spills.
- Bulk hazardous materials [e.g., 210-liter (55-gallon) drums of anti-freeze, hydraulic fluid, compressed welding gasses] would be stored in approved containers that meet National Fire Protection Association industrial fire protection codes and required containment systems.

- Spill response materials (e.g., sorbents, drain covers, mops, brooms, shovels, drum repair materials and tools, warning signs and tapes, and personal protective equipment) would be readily available for use in the event of an unplanned release.
- Storage of hazardous materials would be in protected and controlled areas designed to comply with site-specific SPCC plans.
- Hazardous materials would be inspected before accepting a shipment (e.g., to validate container integrity, expiration date, etc.).
- Hazardous materials would be purchased in appropriately sized containers (e.g., if the material is used by the can, it would be purchased by the can rather than in bulk-sized containers).
- Over-purchasing of hazardous materials would be avoided.
- Hazardous material containers would be appropriately labeled.
- At the completion of the construction period, unused amounts of hazardous materials would be the responsibility of the construction contractors and would be safely removed from the site.

Nonhazardous and hazardous waste generated during construction activities include construction debris, empty containers, spent solvents, waste oil and anti-freeze, spill cleanup materials (if necessary), and lead-acid batteries from construction equipment. Hazardous waste would be containerized and properly disposed of by individual contractors in accordance with Alaska Administrative Code, Title 18 - Environmental Conservation, Chapter 16 and KLC requirements. Only licensed hazardous waste transporters would transport hazardous wastes offsite.

The volume of nonhazardous, construction generated waste is expected to be small based on past experience. The construction schedule for the facility is approximately one year, with approximately 100 individuals involved in the construction process. Buildings may be constructed of prefabricated metal resulting in relatively small volumes of non-recyclable construction waste. Debris resulting from site preparation such as tree stumps would be burned onsite, and soil excavated during construction activities would be stockpiled for later on-site use.

Operation

Pre-Launch Activities

Missile components would be transported to KLC for temporary storage, pre-launch assembly and checkout, and launch preparation. Like the target missiles, the GBI components would be shipped to KLC as finished products that required only final assembly onsite. The hazardous materials contained within the missiles include solid fuel for the rocket and fuel and oxidizer for the EKV's Divert and Attitude Control System propellant system. No separate fueling would occur; therefore, the likelihood of release and environmental effect would be small.

The handling and use of hazardous and toxic materials at the launch site during and between launch operations would be limited. Potentially hazardous materials used for maintenance, grounds keeping, and housekeeping activities would normally consist of fuel (external to those preloaded into the missiles) required for emergency power and heat, various solvents and cleaners, paints and primers, adhesives, and lubricants. It is expected that no more than 4 liters (1 gallon) of each of the solvents, cleaners, paints, adhesives, and lubricants would be present at any one time (U.S. Department of the Air Force, 1994b), with no more than 38 liters (10 gallons) in total. Fuel for the emergency generators would be stored in dedicated ASTs with secondary containment. The ASTs would be routinely inspected. The hazardous material and waste management techniques described for construction would also be followed during prelaunch operations. Again, substantial impacts to the environment are not expected from the use of potentially hazardous materials and generation of wastes during launch operations.

Launch Activities

GBI launch activity considerations include the Launch Hazard Area, flight corridor clearance, missile launch, and missile impact.

Emergency response would be required in the event of a pre-launch or post-launch event which resulted in the partial destruction of a missile. Such an event could result in the rupture of a rocket engine and exposure of the solid fuel. In the event of such mishap, spillage of the propellants could occur. The incident would be handled as an explosive ordnance event, and remaining potentially hazardous materials would be regarded as hazardous waste for management purposes. Removal and disposal of nonhazardous and hazardous waste from KLC will be in accordance with applicable state and federal requirements.

One piece of equipment used on the EKV consists of a klystron tube which contains small quantities of beryllium. Beryllium is listed on the Toxic Substance Control Act Inventory. If maintenance were required, a new tube would be brought onsite and the replaced tube would be returned to the manufacturer for repair.

Post-Launch Activities

Following test activities, the GBI facilities would be readied for the next use or placed in standby mode. Post-launch activities would generally occur as discussed under the No Action Alternative target launch operations.

4.1.6.2.2 Targets

Construction

Construction activities would include target access roads, target launch pad, Movable Missile Building, Missile Assembly Building, Motor Storage Building and access road, Existing Narrow Cape Lodge expansion, new mancamp construction, and utilities/communications installation. Generation of potential hazardous waste (e.g., corrosion control coatings, adhesives, and sealants) would be minimal. Management of hazardous materials and hazardous waste would be performed in accordance with AADC requirements, and would not significantly impact existing KLC hazardous materials and hazardous waste management procedures.

Operation

Pre-Launch Activities

Potential target missiles are described in section 2.1.2. Pre-launch activities include transportation of target missiles to KLC, temporary storage, pre-launch assembly and checkout and preparation of the missiles for launch. Missiles would be transported to KLC as ready-to-use components and assembled onsite. The launch operator would be responsible for transporting the fuel in accordance with DOT requirements. Because of the sealed nature of this mode of transport, the likelihood of release and environmental effect is small. No separate fuel transportation, onsite storage or fueling operations would be performed.

The handling and use of potentially hazardous materials at the launch site during and between launch operations would be limited. Hazardous materials used for maintenance, grounds keeping, and housekeeping activities would normally consist of various solvents and cleaners, paints and primers, adhesives, and lubricants. It is expected that no more than 4 liters (1 gallon) of each of these types of materials would be present at any one time (U.S. Department of the Air Force, 1994b), with no more than 38 liters (10 gallons) in total.

Onsite waste management practices would include:

- The containerization of waste to prevent discharges of waste or leachate
- The prevention of litter
- Controlling access by wildlife or disease vectors
- Keeping the premises free of solid waste
- The use of best available management practices for the control and prevention of runoff and erosion

Launch Activities

During a normal launch there would be minimal to no hazardous materials or hazardous waste impacts. However, safety procedures would be followed.

Potentially hazardous substances such as hydrogen chloride, aluminum oxide, carbon monoxide and oxides of nitrogen would be generated from combustion of the solid rocket propellant during launch or in the event of a launch failure or abort. For a nominal launch, propellant would burn to completion. Although unlikely, it is possible that a rocket's flight could be terminated early. In the event of an on-pad or in-flight launch failure, solid propellant could be expected to scatter over a wide area. The missile debris would impact inside the Launch Hazard Area. In such an impact, the rocket would contain a varying level of propellant that would depend on the flight time. If scattered on the ground, potential pollutant concentrations downwind are expected to be less than with a normal launch, as the solid propellant would burn more slowly in the open air than in a rocket motor. There would be minimal to no impact to mission critical personnel or to the public from such an incident.

There is also the unlikely possibility that an errant missile could impact off target. Should an off-target impact occur, the Range safety manager would be notified immediately. The Range Safety Manager would in-turn report the incident to the appropriate public officials and initiate appropriate emergency response actions. Emergency response actions would be in accordance with the KLC User's Manual.

Post-Launch Activities

Small amounts of potentially hazardous and nonhazardous wastes are expected to be generated during launch operations. Wastes would be segregated as nonhazardous, hazardous, and possibly special wastes for collection and disposal.

Nonhazardous waste would be removed for appropriate disposal at the Kodiak Island Borough landfill or on the Alaska mainland. Removal and disposal of nonhazardous and hazardous waste from KLC would be done in accordance with applicable state and federal requirements.

Hazardous materials management would be performed in accordance with ongoing KLC procedures, as described in the KLC User's Manual (Alaska Aerospace Development Corporation, 2001) and the Alaska Hazardous Waste Management Regulations (Alaska Administrative Code, Title 18, *Environmental Conservation*, Chapter 16). Hazardous waste management at KLC would be the responsibility of the generator. Hazardous wastes would be collected for disposal in accordance with applicable federal, State of Alaska, and DoD requirements.

Since no permitted hazardous waste treatment or disposal facilities exist on Kodiak Island, all hazardous waste would be shipped to the mainland for appropriate treatment or disposal. Only licensed hazardous waste transporters would be used to transport hazardous wastes off site.

Post-launch activities would involve the release of Launch Hazard Areas, cleanup, and transportation from KLC. Following test activities, the launch facilities would be readied for the next use or placed in standby mode. Specific restoration actions would be determined on a case-by-case basis in coordination with the procedures of KLC and the Alaska Department of Environmental Conservation.

4.1.6.2.3 In-Flight Interceptor Communications Data Terminal

Construction

Alternative 1 would require the construction of one IDT (among three alternative sites), one COMSATCOM (among four alternatives), and connecting roads. Construction would include a gravel pad, concrete pad, security fencing and utilities/communications installation. Generation of potential hazardous waste (e.g., corrosion control coatings, adhesives, and sealants) would be minimal. Management of hazardous materials and hazardous waste would be performed in accordance with AADC requirements, and would not significantly impact existing KLC hazardous materials and hazardous waste management procedures.

Operation

Operation of the IDT and COMSATCOMs would have little effect on hazardous waste and hazardous materials management. A 3,785-liter (1,000-gallon) AST would be used for diesel fuel for the back-up generator.

4.1.6.2.4 Sensors

Construction

Alternative 1 would require several gravel pad areas out of seven alternate locations for mobile telemetry. An existing disturbed area would be utilized, and therefore potential impacts related to hazardous materials and hazardous waste would be minimal.

Operation

Operation of the sensors would have minimal direct or indirect, short- or long-term effect on hazardous materials and hazardous waste.

4.1.6.2.5 TPS-X Radar

The TPS-X construction and operation requirements and potential impacts to hazardous materials and hazardous waste management would be similar to that described above for the IDT. The alternative locations are the same and the potential impacts would be similar.

4.1.6.3 Alternative 2

Alternative 2 is similar to Alternative 1, except that GBI and IDT construction and operation activities would not occur and sensor operation would support only target missile launches.

4.1.6.4 Alternative 3

Because Alternative 1 includes GBIs, targets, and all associated facilities, the construction and operation impacts for Alternative 3 would be as described for Alternative 1.

4.1.6.5 Cumulative Impacts

Adherence to the existing hazardous materials and waste management systems on KLC would preclude the potential accumulation of hazardous materials or waste. The range has implemented an emergency response procedure that would aid in the evaluation and cleanup of any potentially hazardous materials released. The types of hazardous materials used and waste generated would be similar to those currently used at KLC. The proposed launch of GBI or target missiles is not expected to substantially increase the volume of hazardous materials used, or hazardous waste generated, at KLC. Therefore, proposed activities would not be expected to result in cumulative hazardous materials and hazardous waste impacts.

4.1.6.6 Mitigation Measures

No hazardous materials/hazardous waste mitigation measures are proposed for the GMD ETR activities at KLC.

4.1.7 HEALTH AND SAFETY—KODIAK LAUNCH COMPLEX

Missile launches by their very nature involve some degree of risk and it is for this reason that DoD and AADC has specific launch and range safety policies and procedures to assure that any potential risk to the public and government assets (launch support facilities) are minimized.

Potential issues related to health and safety would include the transportation of missile components, the reliability of components during handling/assembly and launch associated debris and emissions. A detailed discussion of safety policies and regulations is in Appendix B. Appendix C contains a discussion of flight test safety.

4.1.7.1 No Action Alternative

Missile Defense Agency

Under the No Action Alternative, KLC would continue to operate as a commercial launch facility and provide ongoing support to single Strategic Target System launches. The Strategic Target System launches would be managed within the nine launches previously analyzed in the KLC EA (Federal Aviation Administration, 1996). Potential health and safety risks from debris impact, toxic chemical dispersion (exhaust emissions), and noise would be associated with pre-launch, launch, and post-launch activities. Planning and execution of target launches would be in compliance with federal, state, and local health and safety requirements and regulations, as well as DoD and KLC Safety Policy. Adherence to such requirements ensures that potential risk to the general public, workers and the launch areas do not exceed acceptable limits. Therefore, no increase in potential risk to health and safety would be expected as a result of selecting this alternative.

Federal Aviation Administration

There would be no impacts expected to health and safety from the FAA's No Action Alternative because there would be no launch events from KLC.

4.1.7.2 Alternative 1

4.1.7.2.1 Ground-Based Interceptors

Construction

Construction activities in support of GBI launch activities at KLC are generally discussed in section 2.3.1.1 and include GBI silo or launch pad and support facility construction as well as the IDT, COMSATCOM, TPS-X radar, mobile telemetry and C-band radar gravel pad construction, maintenance storage building and Launch Control Complex additions, addition to the existing Narrow Cape Lodge, construction of a new mancamp and utilities/ communication installation. Construction activities would be centralized to the greatest extent possible at the selected project site and on specific construction laydown areas and access roads. All new construction or structure modification would be accomplished using the same procedures that AADC used to construct the present KLC infrastructure.

Public access would be restricted in accordance with the KLC's Interagency Land Management Agreement (ILMA) that encourages public access except in cases where safety is concerned or protection of structures is needed. A health and safety plan would be prepared by the contractor and submitted to KLC/AADC to ensure the health and safety of onsite workers. A formally trained individual would be appointed to act as safety officer. The appointed individual would be the point of contact on all problems involving job site safety. During performance of work, the contractor must comply with all provisions and procedures prescribed for the control and safety of construction team personnel and visitors to the job site. Compliance with regulations would ensure that construction or modification of facilities would not impact health and safety of workers or range personnel. No impact to public health and safety would be expected.

Operation

Pre-Launch Activities

Prelaunch activities would include transportation of boosters, liquid fuel and liquid oxidizer tanks for the EKV and missile preparation, assembly and integration testing. Missile components and support equipment would be transported to Kodiak Island by sea or air from Government storage depots or contractor facilities. The interceptor may arrive at Kodiak with the EKV attached or the booster may be shipped separately from the EKV. All components and equipment will be handled and shipped in accordance with applicable military, state and DOT regulations. Missile components would be packaged in shipping containers designed according to Alaska, DOT 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. All containers would have proper placards.

Sections 3.1.11 and 4.1.11 provide detailed discussion on Kodiak Island and KLC established air, ocean, and ground transportation systems. The primary hazard related to the transportation of missile components would be the potential for an accident involving the transport vehicle and a resulting explosion/fire of solid fuel motors and/or small explosive actuation devices (used in missile control and FTS). Operations involving the transport of explosives (including packaging and handling for movement) would require implementation of written procedures, which would be approved by KLC/AADC. Transport operations will be conducted under the supervision of an approved ordnance officer using explosive-certified personnel as necessary. Consequently, minimal health and safety impacts would be expected during transport of missile components.

Missile components transported by barge to the Port of Kodiak would likely arrive at the Lash Terminal. Lash is a privately owned terminal operated and serviced by Seaport Terminal Services, Inc. The Lash Terminal is licensed for explosive and hazardous materials handling. Lash is located south of the U.S. Coast Guard Station on the main road to KLC. Samson Tug & Barge routinely serves the Port of Kodiak from Seattle and Anchorage is familiar with aerospace transport requirements. A sealift accident during transport is considered highly unlikely. The potential for a major accident (sinking or total destruction of the seacraft) is minimal.

Once unloaded at Kodiak Island, missile components and support equipment could be shipped by tractor-trailer transport to KLC or barged to one of the following potential beach landing areas, Burton Ranch Beach (mancamp location), Boulder Beach (near Bear Paw Ranch), and Pasagshak Beach (near the Pasagshak Recreation Area). The Narrow Cape Lodge is an example of direct barge delivery to KLC. Temporary beach closure would be necessary, but would be considered routine and of short duration.

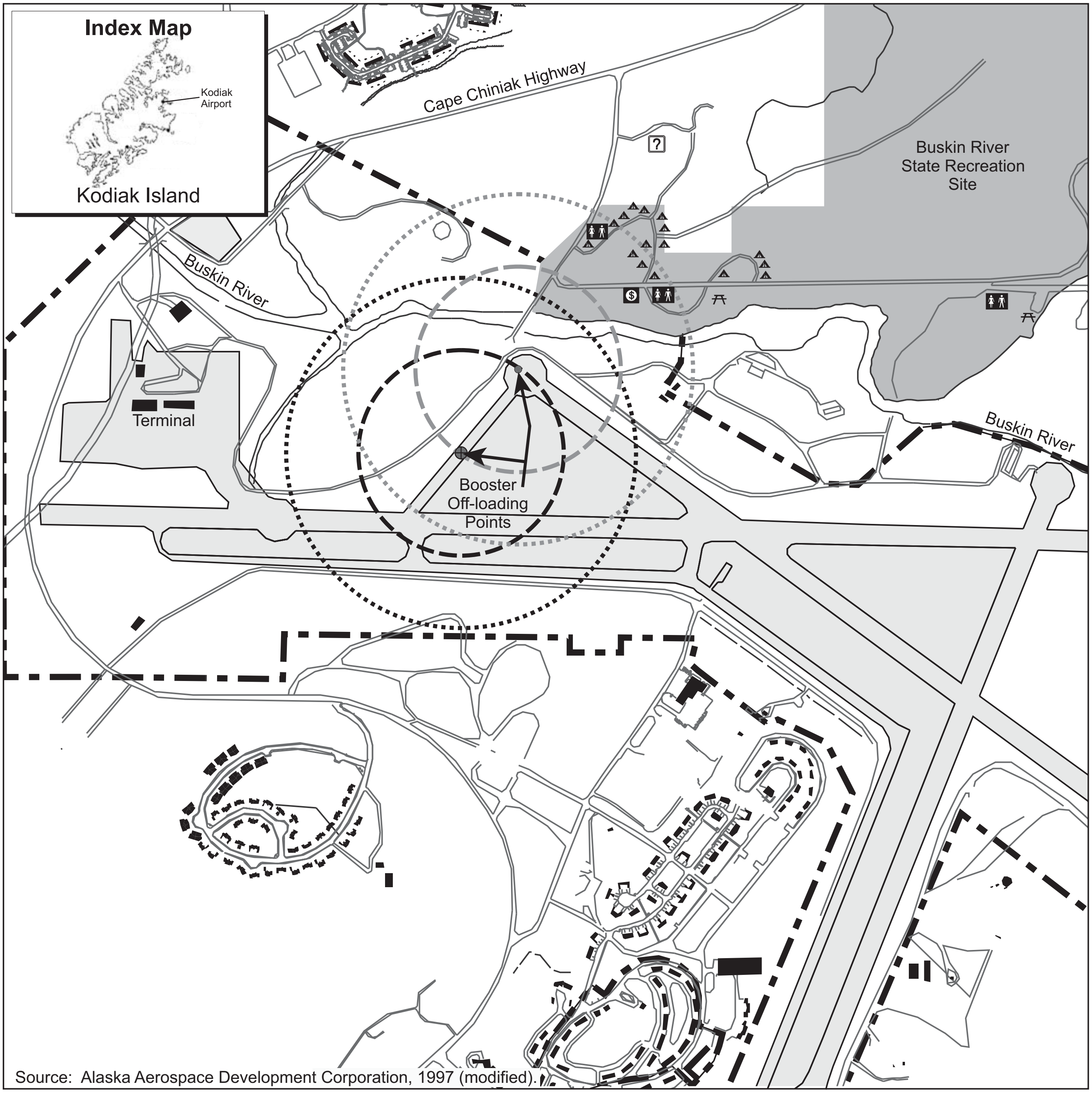
In each of the described cases, the accident probability presented reflects only the potential for an accident involving the transport vehicle. Only a small fraction of such accidents would affect missile propellants or explosives being transported due to the use of specialized shipping containers that protect the shipment. Consequently, minimal health and safety impacts would be expected during transport of missile components.

Appropriate safety measures as established by AADC would be instituted at the receiving terminals or airport. These safety measures include specified receiving and parking areas (for transport vehicles), establishment and enforcement of applicable ESQDs around receiving areas, restricting handling and transportation of missile components to specific and properly trained personnel, and using established and permitted transportation routes from the receiving terminal or airport to KLC.

Use of the Kodiak State airport shared by commercial pilots and the U.S. Coast Guard would be required to support receipt and transportation of missile components and mission personnel (figure 4.1.7-1) just as has been done for previous rocket motor shipments to KLC. A designated preferred parking/offloading area has been established at Kodiak Airport that would limit impact to the Buskin River State Recreation Site. The ESQD (1,310 feet) would affect approximately six campsites and two restrooms within the Recreation Site. Procedures are in place to only close those two areas of the Recreation Site during offloading which occurs between 11:00 p.m. and 6:00 a.m. An alternative parking/offloading area would be the location used during previous Air Force missile launches. In the event this alternate location is required, the ESQD would encroach on several campsites within Buskin River State Recreation Site and could require closure of the recreation site for one night while the boosters are at the airport. AADC would provide a 30-day advance notice to Alaska State Parks regarding the closure. Once the boosters have been removed from the area, the ESQD would no longer be in effect and the campsites would again be accessible.

There would be no effect on U.S. Coast Guard Air Station search and rescue operations. Handling and transportation of the missile components would stop, or move, to allow the Coast Guard to proceed in the event of a search and rescue operation, and would resume after the all clear is provided.

For analysis purposes, a quantity of 20,410 kilograms (45,000 pounds) of division 1.1 explosive was assumed. An inhabited building ESQD with a radius of 434 meters (1,425 feet) would be established. The public transportation route ESQD would be 855 feet. If the propellant is determined to be Division 1.3 explosive (22,700 kilograms or 50,000 pounds) then the ESQDs would be reduced to 74.7 meters (245 feet) for inhabited buildings at 74.7 meters (245 feet) from public transportation routes. The ESQD is based on information provided in Inhabited Building and Public Traffic Route Distances, DoD 6055.9-STD, *Ammunition and Explosives Safety Standards*. The ESQD determination would be based on the equivalent explosive force of all propellant and pyrotechnic materials contained in the flight vehicle. Establishment of the ESQD zone represents DoD's determination that areas outside the zone provide acceptable protection, and requires that areas inside the ESQD zone be cleared of non-mission-essential personnel for the entire period during which the explosives are present. The ESQD would keep unauthorized personnel and individuals at a safe distance until the boosters are unloaded and transported by truck to KLC. The transportation route would be in accordance with the permit application submitted to and approved by the State of Alaska Department of Transportation before shipment of missile components. Transport of missile components is not expected to be a hazard to private properties along the transportation route. The same ESQDs would be established and enforced while the missile components are at KLC.



EXPLANATION

- State Park Property
- Restroom
- Picnic Shelter
- Campsite
- Fee Station
- Visitors Center
- Class 1 Explosive, Division 1.1 Inhabited Building ESQD 399 meter (1,310 feet)
- Class 1 Explosive, Division 1.1 Public Transit ESQD 239 meter (785 feet)
- Kodiak Airport Boundary
- Primary Booster Off-loading Point
- Alternate Booster Off-loading Point

NORTH

Scale
0 167 334 Meters
0 548 1,095 Feet

Kodiak Joint Tenant Airport and Buskin River State Recreation Site

Kodiak, Alaska

Figure 4.1.7-1

12-20-02 Kodiak_airport_rec

Missile storage and launch support structures have fire suppression systems, and are equipped with portable detectors for hazardous vapors and a warning system. Access to launch support structures and hazardous materials storage areas would be limited to KLC/mission essential personnel. All personnel associated with the Proposed Action would be properly trained in compliance with applicable health and safety procedures and guidelines. All pre-flight hazardous operations would be conducted in accordance with applicable and routine safety regulations and operations plans.

The solid propellant used in the GBI missiles is very stable in the absence of an ignition source. The boosters would be grounded to help protect against lightning and static electricity. Electrostatic discharge ignition of boosters has been associated with low atmospheric moisture levels. Based on the high-moisture atmospheric conditions in Kodiak, it is unlikely that an electrostatic discharge would occur. To prevent a premature activation of the igniters or the FTS, the boosters would not be armed until just before launch.

The boosters would be processed and prepared for launch in the same manner as previous and ongoing missile launches from KLC. The major system components (boosters, in-flight destruct package, range safety equipment and missile instrumentation) would be assembled and tested in the Integration and Processing Facility. All preparation activities would be conducted in accordance with applicable safety regulations and operations plans.

The handling and assembly of missile components, accomplished within enclosed buildings, has the potential to affect worker health and safety. RCC Standard 321-02 limits those collective risks to $1x10^{-3}$ for non-mission essential personnel and to $1x10^{-2}$ for mission essential personnel. Due to design of the buildings and implementation of ESQDs, the health and safety of the general public would not be affected. Assembly of missiles is considered routine at KLC. Adherence to appropriate safety regulations and operating plans would serve to maintain health risks to mission personnel within the RCC acceptable levels.

Each GBI missile would have an EKV assumed to contain approximately 7.5 liters (2.0 gallons) of liquid fuel and 5.5 liters (1.5 gallons) of liquid oxidizer (variations of monomethyl hydrazine and nitrogen tetroxide). The transportation of the EKV tanks containing liquid fuels and oxidizers would be conducted in accordance with state and federal regulations (49 CFR 106-180, University of Alaska, Fairbanks (UAF) Policy 902, Bureau of Explosives Tariff No. BOE 6000-1). The tanks would protect against releases in the unlikely event of a transportation accident and therefore would meet DOT requirements. The EKV would have proper placards and only military or commercial carriers licensed to handle or transport hazardous materials would be utilized.

There is the potential of ignition in an accident because the liquid propellants are sensitive to heat. However, the DoD has considerable experience with shipment of missiles and sensitive missile components, including liquid propellants.

On arrival at KLC, the pre-loaded EKV fuel tanks would be stored in the Integration and Processing Facility or would be placed in the existing hypergol fuel storage building and/or the proposed oxidizer storage building until needed for installation on the EKV. The facility would use appropriate placards, and access would be limited to KLC and authorized mission personnel. All personnel associated with the handling of the tanks and installation on the EKV would be properly trained in compliance with UAF 601 and 29 CFR 1910 procedures and guidelines. Safety zones and personal protective equipment would be available based on the U.S. Air Force Toxic Dispersion Model spill model. Copies of MSDSs would be available. The facility would have fire protection equipment and would be inspected and maintained according to IFC 2000, 40 CFR 264, NSS 1740.12, UAF Document 601 and other applicable standards.

There is the potential of spill or release from damaged or leaking tanks; however, minimal health and safety impacts would be expected due to the small quantity of liquid propellant as well as storage and containment protocol and worker training.

Launch Activities

Before each launch at KLC, the Range Integrator and the Missile Flight Safety Officer must approve all flight plans and trajectories and planned impact areas. The Missile Flight Safety Officer would issue range clearance and surveillance for the following designated areas: safety exclusion zone, Launch Hazard Area, flight termination lines and flight safety corridor. Refer to figure 4.1.7-2.

Safety Exclusion Zone

The duration and size of the actual exclusion zone would be defined for each test and would vary depending on the missile size, altitude and direction and meteorological conditions (wind velocities) at the time of launch.

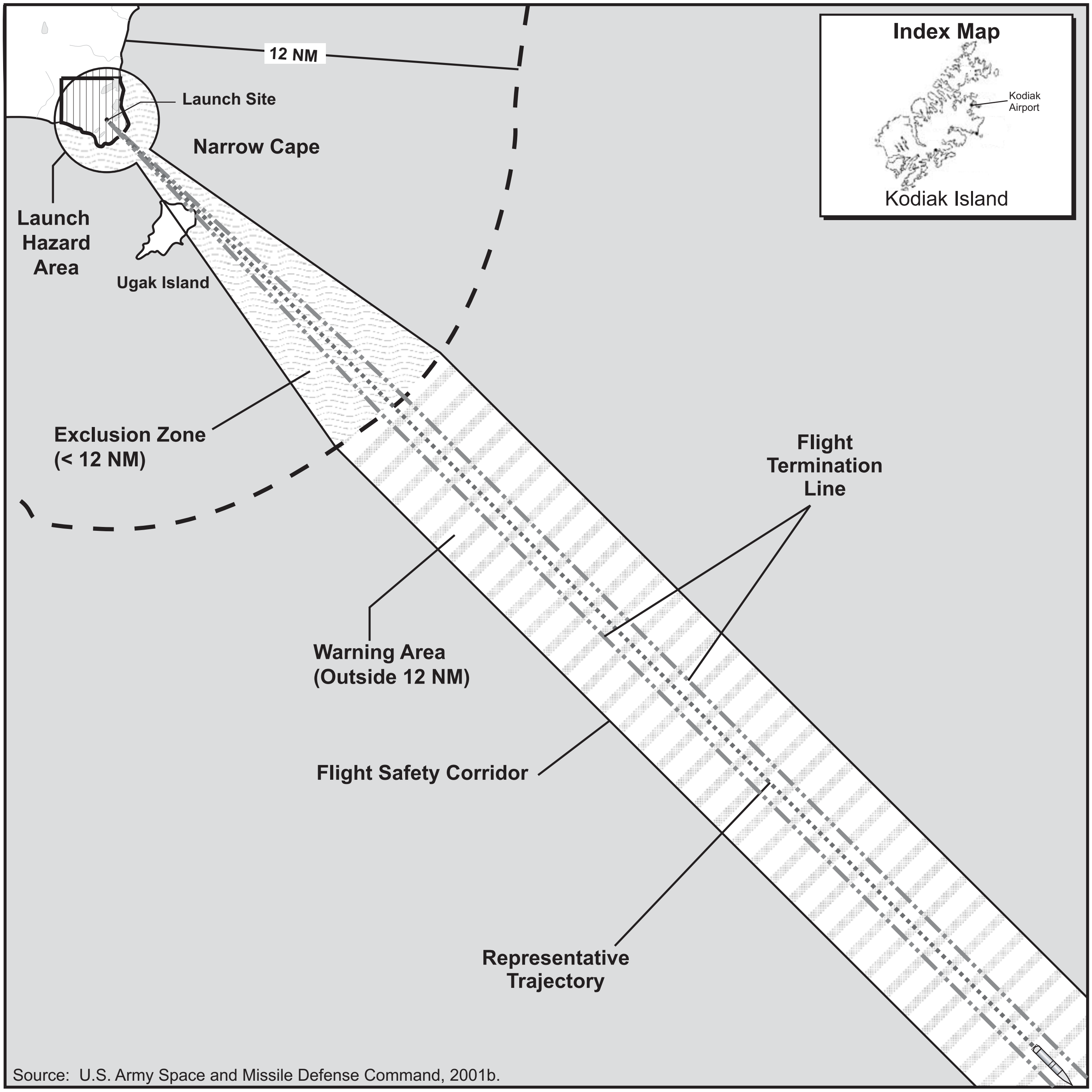
Launch Hazard Area

A launch-site malfunction would potentially result in the scattering of the resulting missile debris anywhere within the Launch Hazard Area. The Launch Hazard Area includes those areas within and adjacent to the site within and up to a 2,743-meter (9,000-foot) radius of the launch pad. The public would be excluded well outside the Launch Hazard Area shown.

Flight Termination Line

The flight termination line defines the limit/boundary at which flight termination would be initiated in order to contain the vehicle and its fragments within predetermined hazard and warning areas, such that the risk to personnel and non-mission aircraft and ships is within the RCC Standard 321-02 limits of $1x10^{-7}$, $1x10^{-7}$ and $1x10^{-6}$, respectively. Warning areas are regions along the vehicle flight corridor where a possible hazard to aircraft and sea vessels exists because of missile flight operations. Figure 4.1.7-2 shows a flight termination line, including the representative exclusion and warning areas.

Failure of a missile guidance system that would cause debris to fall outside the termination line would be detected by the Range Safety Officer, who would terminate the missile flight before it could cross the flight hazard area. The range safety program includes redundant airborne command destruct systems that would permit in-flight tracking of the test missile. Remote area safety aircraft would be used for real-time monitoring of missile performance and evaluation of flight termination criteria. The termination system provides a mechanism by which impact lines would not be violated in the unlikely event of a malfunction during flight. Therefore, potential impacts to health and safety would not be significant.



EXPLANATION

Land

Ground Hazard Area (2,987-meter/9,800-foot Radius)

Territorial Limit

Representative Trajectory

Flight Termination Lines

NM = Nautical Miles

Scale

0 4.4 8.6 Kilometers

0 2.8 5.4 Miles

NORTH

Representative Exclusion and Warning Areas

Kodiak Launch Complex, Alaska

Figure 4.1.7-2

12-20-02 Warning Areas

Flight Safety Corridor

A probabilistic risk analysis would be performed before each flight test to determine that the individual risk to the general public is less than the RCC Standard 321-02 criteria of 1×10^{-7} per launch. The probabilistic risk assessment would also predict the risk to all areas near the vehicle ground track, both inside and outside the Launch Hazard Area. Debris from booster drops, an in-flight malfunction and termination would potentially impact within the flight corridor footprint shown in figure 4.1.7-3. Additionally, regions within U.S. territorial waters where the hazard exceeds the limits stipulated in RCC Standard 321-02 (the warning area around KLC and the area along the missile trajectory) would be cleared of ships and aircraft before launch. KLC would coordinate launch operations with the FAA, U.S. Coast Guard, Alaska Department of Fish and Game and issue NOTAMs and NOTMARs before launches.

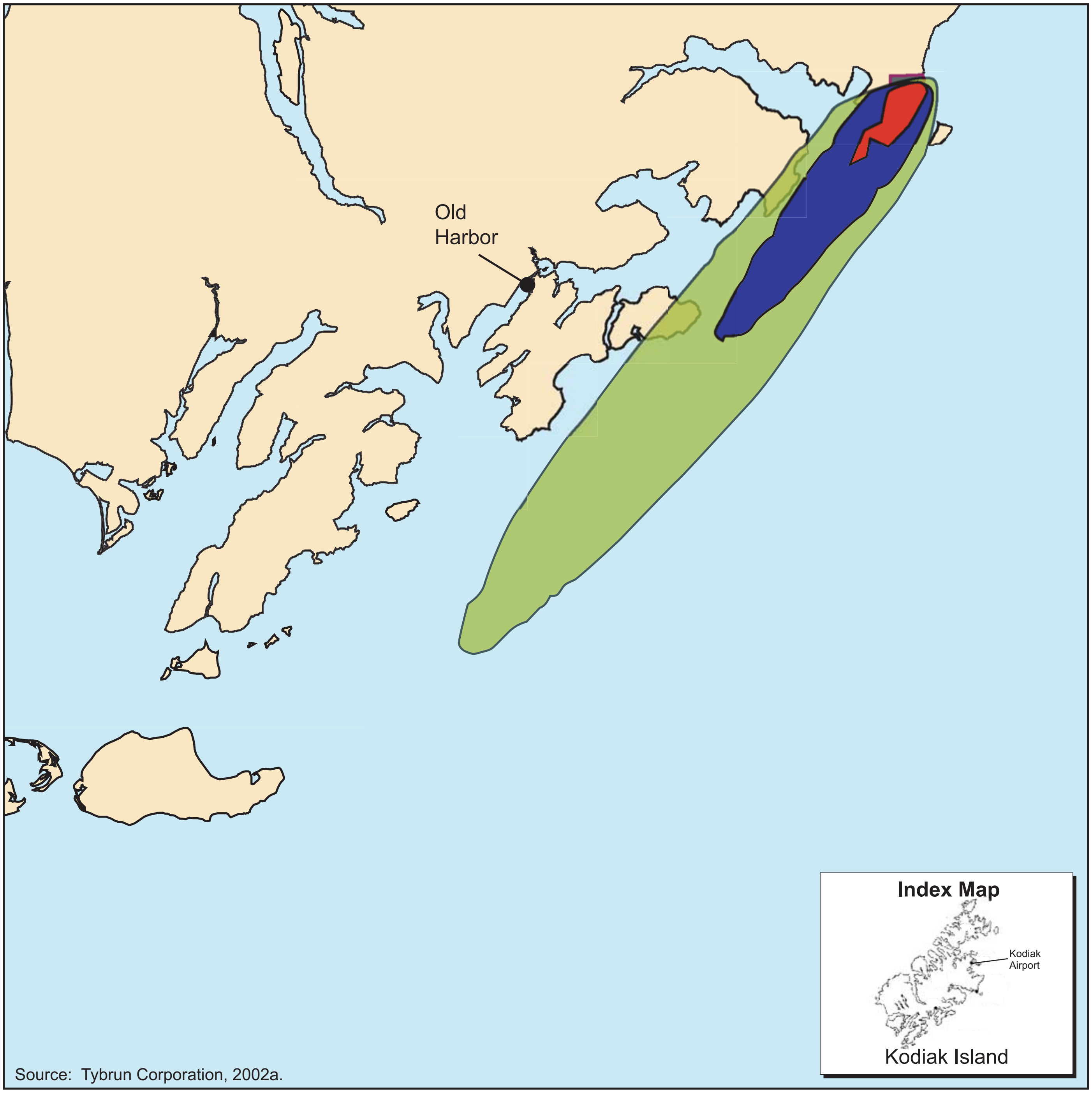
The proposed launches at KLC would utilize launch azimuths between 125 and 225 degrees. Figure 4.1.7-3 indicates the major inhabited area near the westernmost (225 degree) launch profiles would be Old Harbor. Nominal flight profile data indicates that debris from launches would not reach this area. This risk would be evaluated on a launch-specific basis for each mission and events would be controlled so that the risk would remain below 1×10^{-6}. Launch azimuths of 125 to 225 degrees were previously analyzed in the KLC EA (Federal Aviation Administration, 1996). This document concluded that KLC takes every reasonable precaution during the planning and execution of these launch operations to prevent injury to human life or property and no increased risk to health and safety is expected as a result of implementing this alternative.

The Range Safety Officer would establish the safety zones around the launch site and along the missile flight path no less than 4 hours before each launch. This area would be cleared of non-mission participating aircraft and ships by establishing warning and restricted areas, publishing NOTMARs and NOTAMs and by maintaining close liaison and coordination with agencies controlling both air and surface traffic. The Range Safety Officer would then ensure the safety exclusion zone is verified clear of non-mission essential personnel and vessels out to the territorial limit approximately 20 minutes before launch.

The area of Kodiak Borough in the vicinity of KLC is sparsely populated. The flight corridor, including the booster drop zone, would be mostly over open water. Therefore, proposed flight activities would pose minimal threat to the general public. Personnel inside the safety exclusion zone would be limited to mission essential personnel. Mission essential personnel (specifically those required to be within the evacuation area to conduct the launch) would remain within facilities, such as the Launch Control and Management Center, rated to provide adequate blast and debris protection and to which positive communications would be maintained at all times.

Flight testing evacuations, clearances, and road closures are expressly intended to ensure both worker and public health and safety. Evacuation includes conducting appropriate ground, open ocean, and air surveillance sweeps to ensure that all areas are evacuated.

The implementation of AADC's safety programs and practices at KLC before and during launch activities would limit the number of personnel exposed to increased hazards and, as a result, no significant health and safety impacts are expected.



EXPLANATION

- Water
- Land
- Individual Risk for Debris Impact ($1x10^{-5}$ Flight Hazard Area)
- Individual Risk for Debris Impact ($1x10^{-6}$ Flight Hazard Area)
- Individual Risk for Debris Impact ($1x10^{-7}$ Flight Hazard Area)

NORTH

Scale
0 10.5 21 kilometers
0 6.5 13 miles

12-20-02 40sec Risk

Flight Safety Corridor Through Forty Seconds of Flight on Flight Corridor 225 Degrees

Kodiak Island, Alaska

Figure 4.1.7-3

The potential effect of launch emissions and noise are discussed in sections 4.1.1 and 4.1.9 respectively.

Post-Launch Activities

Safety exclusion zones would be released or cleared for re-entering when the Missile Flight Safety Officer is assured that missile flight tests are completed and any residual gases, debris, or similar hazardous concerns are no longer a potential threat to worker or public health and safety. Debris would primarily consist of metal fragments. Much of any hazardous material in the missile would be consumed in the case of launch anomaly. If necessary, debris recovery activities would be conducted in accordance with DoD regulations and KLC safety plans and procedures and would not be expected to effect public health and safety.

Any potentially hazardous concerns remaining after a flight or flight termination would be handled in accordance with the KLC Safety Policy and Explosive Ordnance Disposal Plan. Disposal activities would be in accordance with KLC Explosive Ordnance Disposal Plan, NPD 600.1 Transportation Management Guidelines and applicable state and federal regulations. Implementation of these regulations and procedures would to prevent risks to the general public, KLC and program personnel.

Any necessary launch site restoration and maintenance operations would also be considered routine activities on KLC. Restoration and maintenance activities at the proposed launch sites would not have a significant impact on health and safety at KLC.

4.1.7.2.2 Target

Construction

Construction of several new facilities would occur as described in section 2.3.1.1. All construction and structure/infrastructure modification would be accomplished in accordance with the safety plans and procedures and regulations as described in section 4.1.7.2.

Operation

Launch of target missiles would occur as described in section 4.1.7.1.

4.1.7.2.3 In-Flight Interceptor Communication System Data Terminal

Implementation of Alternative 1 would include modification of existing support facilities and structures to increase current communications capability.

Construction

Alternative 1 would require the construction of one IDT (among three alternative sites), one COMSATCOM (among four alternatives), and connecting roads. Construction activities would be accomplished in accordance with the safety plans and procedures described in section 4.1.7.2. No adverse effects to health and safety are expected from IDT and COMSATCOM construction.

Operation

For communication link equipment, associated radio frequency emissions are considered to be of sufficiently low power so that there would be no exposure hazard. All sensor systems would be sited before operation to ensure that no occupied structures or accessible travel areas would be within any hazard area necessitated by radio frequency emissions. Through the use of these procedures, it has been previously determined that proper exposure control would be achieved, and that operation of these systems would not present a significant health and safety hazard (U.S. Army Space and Strategic Defense Command, 1993).

Security measures, such as fencing, would prohibit public access to the IDT site and keep the area free from any equipment that could cause electronic interference with the IDT receiving band.

Maintenance of the IDT would require occasional testing of the diesel powered electrical generators and replacement of the Klystron tube, which contains small quantities of beryllium. No hazardous materials or wastes would be generated as a result of generator testing. Potentially hazardous operations such as fueling of the generators would be conducted in compliance with the safety standards of OSHA, the Kodiak Safety Plan and applicable range operating procedures. Adherence to these regulations and procedures would minimize the potential for health and safety impacts.

Exposure to beryllium particles, dust, or fumes can cause chronic beryllium disease, a serious lung disease that can be disabling and even fatal. The current OSHA PELs for beryllium allow exposure to 2 $\mu g/m^3$ of air as an 8-hour time-weighted average, between 5 $\mu g/m^3$ and 25 $\mu g/m^3$ exposure for up to 30 minutes at a time, and 25 $\mu g/m^3$ as a maximum peak limit that can never be exceeded. Handling and replacement of the tube would not likely result in direct exposure of workers to beryllium, since the beryllium would be contained and any necessary repairs to the tube would be done off range by the tube's manufacturer. Personal protective equipment would be available. Work practices, worker training and engineering controls, such as ventilation, would be used to further reduce the potential of beryllium exposure. No impact to public health and safety from IDT operation and maintenance would be expected.

4.1.7.2.4 Sensors

Construction

Proposed sensor use at one location on KLC and at one out of seven alternate sites throughout south-central or southwest Alaska would require that sensors be transported to these locations. Mobile systems would likely be parked at pre-existing parking areas. Construction activities would be accomplished in accordance with the safety plans and procedures described in section 4.1.7.2. No adverse effects to health and safety are expected.

Operation

For communication link equipment, associated radio frequency emissions are considered to be of sufficiently low power so that there is no exposure hazard. All sensor systems would be sited before operation to ensure that no occupied structures or accessible travel areas are within any hazard area necessitated by radio frequency emissions. Through the use of these procedures, it has been previously determined that proper exposure control would be achieved, and that operation of these systems would not present a significant health and safety hazard (U.S. Army Space and Strategic Defense Command, 1993b).

4.1.7.2.5 TPS-X

Construction

Potential TPS-X locations would be the same as those described for potential IDT and COMSATCOM facilities. Construction activities would be accomplished in accordance with the safety plans and procedures described in section 4.1.7.2. No adverse effects to health and safety are expected from construction of the TPS-X pad.

Operation

EMR hazard zones would be established within the beam's tracking space and near emitter equipment. The potential interference distances are shown in figure 2.3.1-8. A visual survey of the area would be conducted to verify that all personnel are outside the hazard zone prior to startup. Personnel may not enter these hazard zones while the radar is in operation. The radar is prevented from illuminating in a designated cutoff zone, in which operators and all other system elements would be located. Potential safety consequences associated with radar interference with other electronic and emitter units (flight navigation systems, tracking radars, etc.) would also examined prior to startup. Adherence to AADC, FAA, and DoD safety procedures relative to radar operations would preclude significant impact to health and safety.

4.1.7.3 Alternative 2

Alternative 2 is similar to Alternative 1, except that GBI and IDT construction and operation activities would not occur and sensor operation would support only target missile launches.

4.1.7.4 Alternative 3

Because Alternative 1 includes GBIs, targets, and all associated facilities, the construction and flight impacts for Alternative 3 would be as described for Alternative 1.

4.1.7.5 Cumulative Impacts

There have been six launches as part of various DoD and NASA programs at KLC. Under these programs, the safety procedures at KLC have developed and matured. The discontinuous launches preclude cumulative health and safety impacts (Department of Energy, 1991c; Strategic Defense Initiative Organization, 1991; U.S. Army Strategic Defense Command, 1991b). The KLC EA indicated no significant impact to health and safety of personnel and the public from nine annual launches (Federal Aviation Administration, 1996). It is not likely that the Proposed Action, in conjunction with current planned or anticipated launches, would exceed this level of activity. The maximum number of launches that could occur from KLC will be determined by the FAA and will be mandated in the launch site operator license. Safety and health planning would be done at the earliest stages of each missile test program. Implementation of DoD and range safety and health plans and procedures during all phases of operation would avoid or reduce the probability of potential impact to health and safety. Minor impacts from the Proposed Action, when added to other activities in the area, would not likely result in cumulative impacts to public health and safety.

4.1.7.6 Mitigation Measures

No health and safety mitigation measures are proposed for the GMD ETR activities at KLC.

4.1.8 LAND USE—KODIAK LAUNCH COMPLEX

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. The purpose of the Land Use Resource section is to addresses potential affects of the proposed action upon the use of land and the compatibility of the proposal and its alternatives with respect to the neighboring land uses and activities within a ROI.

4.1.8.1 No Action Alternative

Missile Defense Agency

Under the MDA's No Action Alternative, current operations at KLC with respect to land use would not change. Launches would continue from KLC subject to the terms and conditions of the FAA's launch site operator license. KLC's activities would continue to involve the launching of single target missiles from existing facilities and would not result in any significant impacts to land use. The continuation of launches from KLC would not result in any significant impacts to land use. The AADC will apply for a renewal of their current launch site operator license, which ends in September of 2003. The renewal period would be for another 5 years. This license must be renewed for launch operations to continue at KLC.

The Narrow Cape area is primarily undeveloped and utilized for a number of recreational activities. Since less than 1 percent of Narrow Cape is occupied by KLC and its location is more than 40 kilometers (25 miles) from the Kodiak National Wildlife Refuge, the potential for land use conflicts caused by the existence of KLC is minimized.

Recreational activities along KLC's coast are available to the public during all times except during a launch or hazardous operations. These short-duration closures of Narrow Cape would not have an appreciable impact on recreation. Under the No Action Alternative, times of non-availability of KLC's beaches and access to its coastline would continue to be publicized to further minimize the potential for land use conflict.

AADC preserves the coastlines around KLC property in their natural condition. Under the MDA's No Action Alternative, the continuation of activities at KLC would be compatible with the Alaska Coastal Zone Management Program.

Federal Aviation Administration

Under the FAA's No Action Alternative, the launch site operator license for KLC would not be renewed and no launches would be allowed to occur from KLC after September 2003. If the FAA's No Action Alternative is selected, the land at Narrow Cape may become available for other uses. Therefore, no impacts to land use would occur from launches at KLC.

4.1.8.2 Alternative 1

Under the Proposed Action of Alternative 1, several facilities would be constructed as discussed in section 2.3.1.1. Prior to construction, a Memorandum of Agreement would be required between AADC and MDA regarding construction, operation, and final disposition of MDA facilities on KLC. The draft Memorandum of Agreement, when available, will be reviewed and then summarized in the Final EIS.

4.1.8.2.1 Ground-Based Interceptors

Construction

The construction of two GBI silos or a GBI launch pad, and a Mechanical Electrical Building would be confined to and contribute to the development of the ridge site along the northern boundary of KLC. In addition, necessary access roads, and an Entry Control building would occur along the corridor yielding access to the northern ridge. Although the proposed construction would result in a change in land use within the immediate project area and restrict access to a small portion of the total grazing lands, such activity would be compatible with KLC's general use of land and would not decrease land utilization or produce any further land use conflicts outside KLC's boundary. Furthermore, ample grazing lands are not exclusive to the northern ridge area and are available throughout KLC.

Construction could also add an additional 465 square meters (5,000 square feet) to the existing Launch Control Center and 1,394 square meters (15,000 square feet) to the nearby Maintenance and Storage Building. Modifications and additions would be considered routinely accomplished operations occurring within a compatible and already existing locale for such use. Likewise, no conflicts with land use would occur within or outside the boundaries of KLC.

Construction of an Oxidizer Storage Building would be located within the vicinity of the existing Hypergolic Storage Building and would not alter the overall land use and management of the surrounding facilities. The siting and use of this area would take into account ESQDs and applicable safety criteria preventing incompatible activities or land use conflicts.

Modifications to the Integration and Processing Facility, to serve as the Missile Assembly Building, would require some interior modifications. Since modifications would be confined within the already utilized Missile Assembly Building, neither changes nor impact to land use would occur. Furthermore, ESQDs and other appropriate safety measures would serve to prevent extending hazards areas.

Necessary housing for additional operation personnel may be provided by a mancamp near the Launch Control Center, or at the Narrow Cape Lodge or nearby hotels. Although the possible construction of a mancamp and additions to the Narrow Cape Lodge would alter the land use, such activity would be completely compatible with KLC's general land use. Furthermore, changes in the use of land would be confined within the immediate project area and would not impact any of the overall grazing activities of wildlife.

Maximum use would be made of KLC's existing infrastructure and facilities. General infrastructure improvements may also be required, such as fencing, road improvements, electrical service, and telephone and data transmission line installation. The decision to accomplish general improvements would be decided as need be and considered minor and routine maintenance activities as described under the No Action Alternative.

A Coastal Project Questionnaire for GMD ETR activities would be submitted to the State of Alaska to confirm that construction activities would be consistent with the Alaskan Coastal Zone Management Program and the Kodiak Island Borough Coastal Management Program. Submission of the Coastal Project Questionnaire would be coordinated between AADC, the U.S. Army Corps of Engineers, and MDA.

Operation

Pre-Launch Activities

All pre-launch activity would consist of all activities required to transport missile boosters, payloads, support equipment, and essential construction materials to KLC and to assemble the major components before flight. All necessary equipment and missile components could be transported to KLC from U.S. Government storage depots or contractor facilities by air and or barge using the Kodiak Airport and Port Facilities as the prime delivery points.

The Alternate Strategic Target System Booster Off-loading Point or the original Booster Off-loading Point would be used as a parking area utilized by military transport aircraft transporting missile payloads and/or boosters (figure 4.1.7-1). The original booster off-loading point would require the establishment and enforcement of ESQDs from the plane 434 meters (1,425 feet) to any inhabited buildings, and 260 meters (855 feet) to public traffic routes. Impacts to recreational land use would be significantly reduced by coordination with the Alaska State Parks, Kodiak Division at least 30 days before the arrival of the missile payloads and/or missile boosters to ensure the campsites within the ESQD at Buskin River State Recreation Site would be vacated. Once the boosters and payloads are removed from the immediate vicinity, ESQDs would no longer be in effect and campsites would again be accessible.

The Primary Booster Off-loading Point would be considered the preferred parking area utilized by military transport aircraft transporting missile payloads and/or boosters (figure 4.1.7-1). Although such activity would also require the establishment and enforcement of ESQDs as mentioned above, land use conflicts involving evacuation would be minimal since inhabited buildings and public traffic routes are not within the ESQD.

In an effort to transport large, extremely heavy, or over dimensional items and reduce any safety and security concerns involving the use of roads from the town of Kodiak, a beach landing could be performed as a secondary delivery point for barge traffic. All three barge landing sites (shown in figure 2.3.1-1) have ample water depth to allow near shore operation and direct access to roadways that will yield immediate access to KLC. Transportation across the beach would occur over temporary 1-inch thick steel plates placed on the beach. This would help preserve the existing condition of the land and prevent erosion. Changes in land use would be due to restricting access to beach landing areas and road closures during unloading and along roadway transportation routes. Such temporary closures would not significantly affect land use. Furthermore, barge beach landings would comply completely with the standards of the Alaskan Coastal Management Program.

Storage of missiles could occur in the Integration and Processing Facility at KLC. The storage of missile propellants would occur in storage areas designed for such use in accordance with all accepted governing standards. An ESQD area would be established and maintained around facilities where ordnance is stored or handled. These operations would be considered regular actions approved by the DOD Explosive Safety Board and consistent with KLC's land use and adjacent land use. The inhabited building ESQD for the GBI silos or launch pad of 434 meters (1,425 feet) would overlap the northern portion of Fossil Beach. However, public access to the beach would not be restricted due to the ESQDs and land use would not be impacted.

Flight Activities

Launch preparations scheduled at KLC would follow standard evacuation procedures of the launch vicinity. The Range Safety Officer would develop a Launch Hazard Area around the proposed launch site established by AADC in accord with the ILMA for the property. All civilian, nonessential contractor, personnel, and general public would be cleared from the Launch Hazard Area several hours before launch. Agencies that would enforce the clearance of land areas would be notified in preparation for the procedures once a test event is officially scheduled. A notice of intent to clear hazardous areas would be published in the local newspaper and broadcast in local media approximately 1 week in advance. The boundaries of the Launch Hazard Area would also be posted with notifications. Flight safety corridors would be determined for each missile flight and would be verified clear according to range safety requirements.

The availability of recreational opportunities of Narrow Cape would not be significantly impacted by the GMD ETR activities. Only temporary closures during the transportation of missile components to the launch facilities and full day closures on launch days would occur to the Pasagshak Point Road at the site boundary. Public access through KLC to Fossil Beach would be limited or denied for each launch day. For the proposed 5 launches per year, the closure would be less than 2 percent of the year. Although safety and security closures would restrict beach combing, bird and whale watching, and fishing on these days, such temporary clearances would not be considered to have an appreciable impact. Furthermore, any activities that could possibly restrict access to any recreational areas would be in the newspaper and announced on the local radio. Submission of a Coastal Project Questionnaire would be coordinated among AADC, the U.S. Army Corps of Engineers, and MDA. The Coastal Project Questionnaire would be submitted to the State of Alaska to confirm that actions would be consistent with the Alaskan Coastal Zone Management Program and the Kodiak Island Borough Coastal Management Program.

Post-Flight Activities

As soon as the Range Safety Officer concludes that all hazardous areas are safe, all persons would be allowed to return. Only a preflight or early flight malfunction resulting in flight termination within the ROI would have any impact on surrounding land use by prolonging closures until hazardous conditions are cleared. Security requirements could require some areas to remain closed for several days following a launch.

Post-flight activities would also include removal of blast residue from the silos and/or launch pads and minor facility maintenance. These activities would have no affect on land use.

4.1.8.2.2 Target

Construction

The construction of target missile facilities is described in section 2.1.2. The immediate vicinity of the construction zone would be temporarily affected by limiting access to only necessary personnel. Nevertheless, such activity is consistent with KLC's general land use, and would not cause any change in any use of land within or outside of KLC. The only minor conflict to land use would be the limiting of access to small portions of grazing land where the new facilities would be constructed. Therefore, no significant impacts are expected.

Under Alternative 1, internal modification would be made to the already existing Launch Pad 1's launch service structure. Modifications would be confined to the existing Launch Pad, minimizing any possible land use changes or conflicts to land use.

Possible construction of a new Missile Storage facility, and access roads north of Launch Pad 1, and a Missile Assembly building, new target pad, and Movable Missile Building would occur in the vicinity of the northern ridge. Both construction areas would occur upon undisturbed natural grasslands and alter the land use within the immediate vicinity during construction and operation. However, such activity would not greatly reduce grazing lands and comply with the general land use and would not produce any land use conflicts within the immediate or adjacent vicinity.

Additional general infrastructure improvements such as: fencing, minor road improvements, electrical service, and telephone and data transmission line installation may also be required within the construction area. Portions of such activity could be supported by barge landings and would be considered under individual site construction or general facility maintenance activities.

Operation

Operation of target missiles concerning land use would be similar to the operation of GBI missiles in section 4.1.8.2.1.

4.1.8.2.3 In-Flight Interceptor Communication System Data Terminal

Construction

The construction and operation of a fixed or relocatable IDT at KLC would require approximately 13,490 square meters (145,201 square feet) and require a concrete pad, commercial electrical power, site backup electrical generation, fiber optic circuits, all-weather access roads, security fencing, water and sewer services. Construction involved in either type of IDT would be typical construction activity. The proposed IDT construction and operation locations (figures 2.3.1-2 to 2.3.1-4) would be routinely accomplished and occur within a locale compliant with KLC overall general land use. Likewise, no conflicts with land use would occur. Furthermore, safety precautions would be followed during operation to prevent any unidentified land use conflicts from arising.

Construction of the COMSATCOM would require a 2.8-hectare (7-acre) site surrounded by a security fence, a concrete footprint covering 0.14 hectare (0.34 acre) to accommodate the COMSATCOM and equipment, the installation of a communications cable using new and previously installed conduit, and all weather access roads. Each of the proposed locations would be compatible and related to nearby IDT facilities. Similarly, no conflicts with land use would occur.

Operation

Pre-Launch Activities

IDT components would be transported to the operation site from U.S. Government storage depots or contractor facilities by air, sea, or over land by trucks. Delivery would be conducted under routine procedures in accordance with applicable FAA and DOT safety standards to minimize any possible impacts to land use.

Flight Activities

Although operation of IDT and COMSATCOM facilities would only function during times of GMD exercises, installation would immediately be established and secured after delivery, limiting the access to the surrounding area. This would result in a temporary change in land use within the immediate operation area by restricting access to unauthorized personnel. However, all impacts to land use were considered in the facilities site selection and would not represent a significant impact to land use by decreasing the utilization of land nor change the general land use within or outside the boundaries of KLC.

Post-Flight Activities

Post-flight operation would include the standard maintenance procedures to secure the IDT and COMSATCOM facilities and preparation for possible relocation of the relocatable IDT. Procedures would be confined to areas already used for the establishment of such facilities and would not change or introduce a conflicting use of land within the vicinity.

A Coastal Project Questionnaire for GMD ETR activities would be submitted to the State of Alaska to confirm that construction and operation activities would be consistent with the Alaskan Coastal Zone Management Program and the Kodiak Island Borough Coastal Management Program. Submission of the Coastal Project Questionnaire would be coordinated between AADC, the U.S. Army Corps of Engineers, and the MDA.

4.1.8.2.4 Sensors

Construction

No construction associated with sensory equipment would be required for pre-launch, flight, or post flight of missiles.

Operation

Pre-Launch Activities

Pre-launch activities would include the transportation and arrangement of four Mobile Telemetry Systems, two inside the boundaries of KLC and two others in appropriate locations on Kodiak Island. Positioning and operation would occur on a preexisting 61 meters (200 feet) by 61 meters (200 feet) level gravel area. Although an exact location of the Mobile Telemetry Systems has yet to be determined, the positioning would occur in a compatible land use area within and outside the boundaries of KLC.

Flight Activities

Operation of Telemetry Systems would be contained within the operational trailers and only occur during times of GMD exercises. Change in land use would be confined to the gravel area necessary for telemetry operations. Access to the telemetry would be limited to authorized telemetry personnel. Adjacent lands would not experience any changes or decrease in land utilization.

Post-Flight Activities

Post-Flight activities would involve routine maintenance procedures in preparation for transport and possible relocation. Telemetry System components would be contained within trailers and shipped to suitable U.S. Government storage depots or contractor facilities.

4.1.8.2.5 TPS-X Radar

Construction

Alternative 1 construction would involve minor site preparations to position and create a concrete support pad for the transportable TPS-X radar and its operational components. Although exact location of radar siting has yet to be determined, potential TPS-X locations would be the same as those described for potential IDT and COMSATCOM facilities. Necessary EMR hazard exclusion areas would be observed in accordance with DoD and U.S. Air Force standards, and the proposed locations would not produce a land use conflict

Operation

Pre-Launch Activities

TPS-X components would be transported to the operation site from U.S. Government storage depots or contractor facilities by air, sea, or over land by trucks. Delivery would be conducted under routine procedures in accordance with applicable FAA, and DOT safety standards minimizing any possible impacts to land use.

Flight Activities

The operation of the each sensor during flight activities would only occur during times of GMD exercises. Access to the radar 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 TPS-X radar 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.

Post-Flight Activities

Post-Flight activities would involve routine maintenance procedures to secure the TPS-X radar equipment. The TPS-X components would be contained within its operational self contained trailers and shipped to suitable U.S. Government storage depots or contractor facilities. Such activity would be confined to and not affect the previously disturbed location.

4.1.8.3 Alternative 2

Alternative 2 would be similar to Alternative 1 without GBI, IDT, and TPS-X facilities.

4.1.8.3.1 Targets

Under Alternative 2, GMD activities and potential impacts involved in the construction and operation of target missile facilities would be the same as described under Alternative 1 in section 4.1.8.2.2.

4.1.8.3.2 Sensors

Under the Proposed Action of Alternative 2, GMD activities and possible impacts involved in the operation of sensory equipment within and outside the boundaries of KLC would be the same as described under Alternative 1 in section 4.1.8.2.4.

4.1.8.4 Alternative 3

Land use impacts due to construction and operation of GBI, target, IDT, and sensors, and their accompanying facilities for Alternative 3 would be as described for Alternative 1.

4.1.8.5 Cumulative Impacts

The KLC EA indicated no significant impact to land use from nine annual launches (Federal Aviation Administration, 1996). It is not likely that the Proposed Action, in conjunction with current planned or anticipated launches, would exceed this level of activity. Site preparation and new construction on KLC would limit access to portions of land currently available for livestock grazing. Nevertheless, site construction and reduction of grazing land would not change the overall general land use of KLC and the areas affected represent a small fraction of the total land available.

4.1.8.6 Mitigation Measures

No land use mitigation measures are proposed for the GMD ETR activities at KLC.

4.1.9 NOISE—KODIAK LAUNCH COMPLEX

This section addresses the potential impacts to the noise environment due to the construction and operation of the GBI, target, IDT, and sensor elements of the ETR at KLC, as well as the identification of potential cumulative impacts and mitigation measures.

The analysis in this section is concerned with human receptors; noise effects on wildlife are discussed under Biological Resources.

4.1.9.1 No Action Alternative

Missile Defense Agency

Under the MDA's No Action Alternative launches would continue to occur at KLC, although the GMD ETR would not be established there would be no change to noise at KLC. The GMD ETR would not be established and GBI and target launch scenarios would not be tested under more operationally realistic conditions. Current activities of single target and commercial launches would continue.

Under the KLC site license an Environmental Monitoring Plan was required as part of the KLC launch site operator license and called for the monitoring of at least the first five launches from KLC. Results from noise monitoring are shown in table 4.1.9-1 for the ait-1, ait-2, QRLV, and Athena (data were not gathered for the fifth launch, Strategic Target System, due to adverse weather conditions). These levels were recorded at Ugak Island, approximately 5.6 kilometers (3.5 miles) from the launch pad.

Table 4.1.9-1: Noise Levels at KLC from Previous Launches

	Rockets Launched			
Noise Metric (dBA)	ait-1	ait-2	QRLV	Athena-2
Lmax	78.2	81.5	73.3	90.8

Source: Alaska Aerospace Development Corporation, 2002

It was determined that these levels would be audible for only short periods of time and would not be expected to interfere with the area's fishing, camping, or other recreational uses. (U.S. Department of the Air Force, 2001)

Federal Aviation Administration

Under the FAA's No Action Alternative, the launch site operator license for KLC would not be renewed and no launches would be allowed to occur from KLC after September 2003. Therefore, no impacts from noise from launches would occur at KLC.

4.1.9.2 Alternative 1

Alternative 1 includes the construction of numerous facilities as described in section 2.3.1.1. Construction at KLC would be temporary in nature and similar to any commercial construction site. Noise generated during construction should have minimal impact to offsite areas.

4.1.9.2.1 Ground-Based Interceptors

Construction

Construction would result in intermittent, short-term noise effects that would be temporary, lasting for the duration of the noise generating construction activities. Noise-generating construction activities would include excavation and grading, utility construction and paving, and frame building.

The specific types of equipment that would be used during these construction phases are not known at this time. Excavation and grading would normally involve the use of bulldozers, scrapers, backhoes, and trucks. The construction of buildings would likely involve the use of pile drivers, concrete mixers, pumps, saws, hammers, cranes, and forklifts. Typical sound levels from construction equipment are listed in table 4.1.9-2.

Table 4.1.9-2: Possible Construction Noises (dBA) at KLC

Source	Noise level (peak)	Distance from Source			
		50 feet	100 feet	200 feet	400 feet
Heavy Trucks	95	84-89	78-83	72-77	66-71
Dump Trucks	108	88	82	76	70
Concrete mixer	105	85	79	73	67
Jackhammer	108	88	82	76	70
Scraper	93	80-89	74-82	68-77	60-71
Dozer	107	87-102	81-96	75-90	69-84
Generator	96	76	70	64	58
Crane	104	75-88	69-82	63-76	55-70
Loader	104	73-86	67-80	61-74	55-68
Grader	108	88-91	82-85	76-79	70-73
Dragline	105	85	79	73	67
Pile driver	105	95	89	83	77
Fork Lift	100	95	89	83	77

Source: Federal Aviation Administration, 1996

It is assumed that construction would take place 24 hours per day during the summer due to the shortened construction season in Alaska. Therefore, due to the 10 dBA penalty added to nighttime noise, the 65 dBA and 75 dBA contours are estimated to occur within approximately 152 meters (500 feet) and 122 meters (400 feet) from the construction site respectively. Therefore no impacts to the noise environment would be expected from construction equipment noise.

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

Operation

Pre-Launch Activities

Noises produced during pre-launch activities include noise from mechanical equipment such as worker vehicles, trucks, and by the use of the public address systems. Transportation noise would increase, as up to 235 launch support personnel drive to the site and additional trucks bring material to the site. However this increase is expected to be reduced as some personnel are expected to be housed onsite at the proposed mancamp and at the existing mancamp at Kodiak Ranch. The remainder would commute from accommodations elsewhere on Kodiak. The increase in traffic noise levels due to launch support personnel would be considered temporary and would not permanently impact the aesthetic quality of the surrounding area.

Launch Activities

Noise during launch activities includes the GBI launch itself, which is a result of the interaction of the exhaust jet with the atmosphere and the combustion of the fuel. The sound pressure from a missile is related to the engine's thrust level and other design features.

Personnel would normally be at the Launch Control Center during launches. At approximately 3 kilometers (2 miles) from the launch pad, they would be exposed to approximately 118 dBA. This value is within the OSHA standard of 118 dBA over 9.6 minutes (U.S. Department of Labor, 2002). Although no standards exist for single-event noise exposure, a time-weighted average of 90 dBA is established as a limit for an 8-hour exposure. However, workers exposed to excessive launch noise would be required to wear hearing protection.

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, GBI launches would be in a southerly direction and a sonic boom would not occur over land. They are not expected to impact Kodiak Island or Ugak Island. Vessels impacted by sonic booms would be expected to experience sound resembling mild thunder.

All public, civilian, and nonessential personnel would be required to be outside of the Ground Hazard Area where the expected noise levels would be below the 115 dBA limit for short-term exposure. Given the infrequency of the launches, the short duration of the launch, and similar to that of previous launches, adverse noise impacts from launch activities are not anticipated.

It is anticipated that dual GBI launches would not occur simultaneously. Therefore, it is expected that noise impacts for these dual launches would the same as for a single GBI launch.

Post-Launch Activities

Noise generated during the removal of all mobile equipment and assets during post-launch activities should have minimal impact to the noise environment on or off of KLC.

4.1.9.2.2 Targets

Construction

Noise caused by construction of target facilities would be similar to that described in section 4.1.9.2.1 for GBI facility construction.

Operation

Pre-Launch Activities

Pre-launch activities would include noise from mechanical equipment and the increase in vehicles for transportation of personnel to KLC. Personnel transportation noise is expected to be moderate due to some personnel being located on-site at the proposed mancamp and the existing mancamp at Kodiak Ranch. The increase in traffic noise levels due to target launch support personnel would be considered temporary and would not permanently impact the aesthetic quality of the surrounding area.

Launch Activities

The launch vehicle boosters are the major source of target operational noises. Based on the duration of a launch, an A-weighted scale is used and dBA measurements are used to adequately characterize the operational noise. Lmax is used to compare noise levels due to its ability to cover the entire sound spectrum, especially sounds audible to humans. Table 4.1.9-3 lists previous launch L_{max} levels as well as predicted levels for proposed targets. Also listed in the table 4.1.9-3 are L_{max} levels for the Castor 120™ motor. The Castor 120™ motor was analyzed in the KLC EA and found to not produce adverse noise levels.

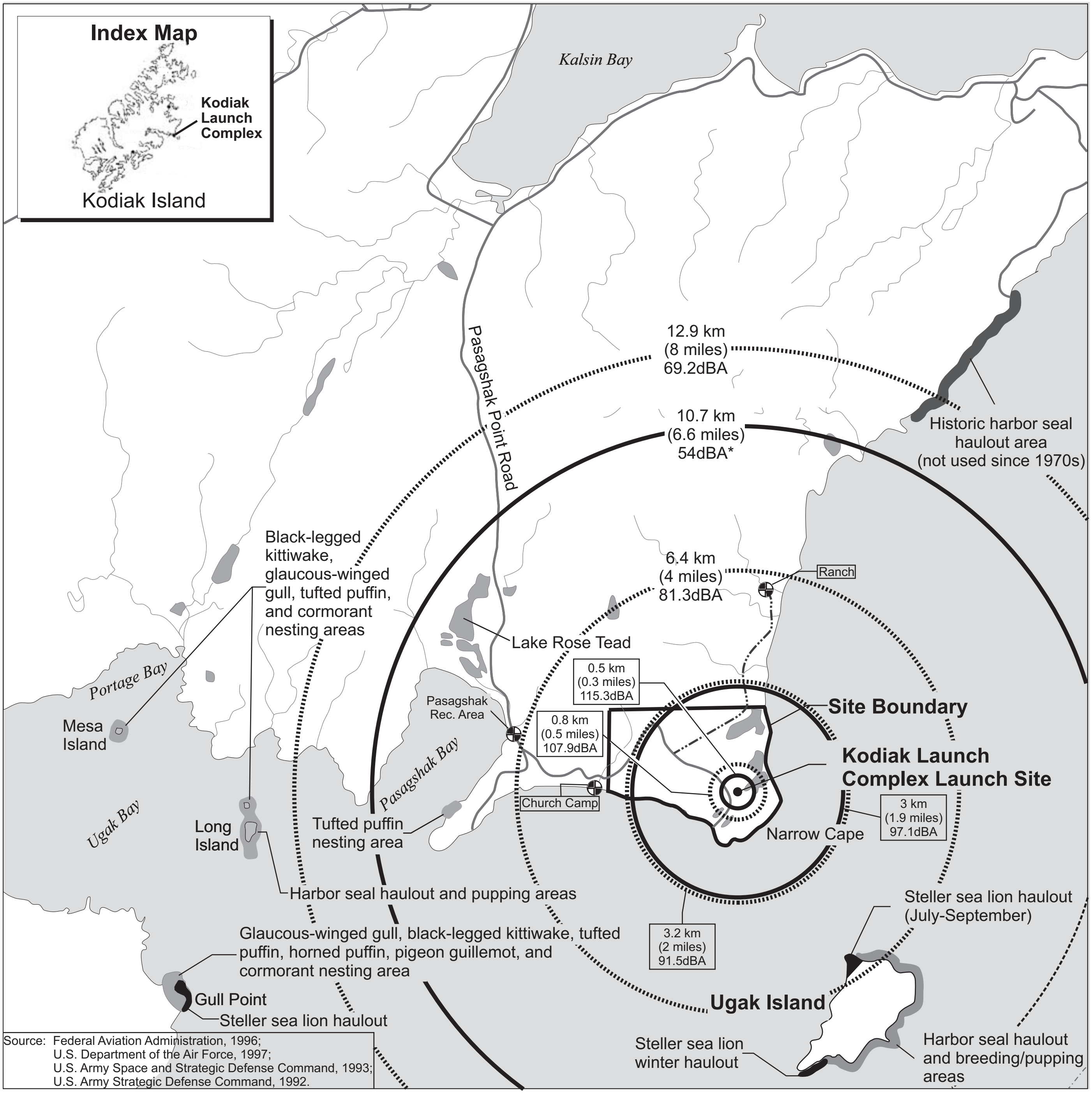
Figure 4.1.9-1 shows predicted Strategic Target Systems launch noise levels.

Table 4.1.9-3: Predicted Noise Levels for Target Launches at KLC

Target	L_{max} (dBA)	Distance (kilometers [miles])
ait-1	78.2	5.6 (3.5)
ait-2	81.5	5.6 (3.5)
QRLV	73.3	5.6 (3.5)
Athena	90.8	5.6 (3.5)
Strategic Target System	107.9	0.8 (0.5)
	91.5	3.2 (2.0)
	81.3	6.4 (4.0)
	69.2	12.9 (8.0)
Minuteman II Target	114.7	1.3 (0.8)
Peacekeeper	123.7	1.3 (0.8)
Castor 120 ™	108	1.3 (0.8)
	94	3.0 (1.9)
	88	5.6 (3.5)

It is expected that these noise levels for single target launches would be audible for only short periods of time and would not be expected to interfere with the area's fishing, camping, or other recreational uses. Dual target launches are not expected to occur simultaneously. Therefore, it is anticipated that noise impacts for dual launches would be the same as a single target launch.

All public, civilian, and nonessential personnel would be required to be outside of the Ground Hazard Area where the expected noise levels would be below the 115 dBA limit for short-term exposure. Given the infrequency of the launches, the short duration of the launch, and similar to that of previous launches, adverse public impacts from launch activities are not anticipated.



EXPLANATION

*54 dBA sound levels may be low due to sound damping from buildings, walls, and environmental factors at the time of monitoring. (U.S. Army Space and Strategic Defense Command, 1993)

Sound levels monitored during 26 Feb 93 Strategic Target System launch at PMRF.

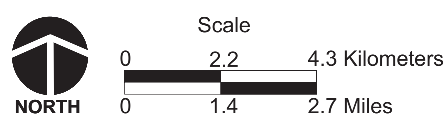
Sound levels predicted for Strategic Target System launch using NASA noise model.

Noise Receptor: Pasagshak Rec. Ctr.

Noise Receptor: Church Camp

Noise Receptor: Ranch

Note: Data depicted are maximum peak sound levels (L_{max})



Strategic Target System Noise Levels

Kodiak Island, Alaska

Figure 4.1.9-1

12-20-02 Kodiak noise 4

Post-Launch Activities

Noise generated during the removal of all mobile equipment and assets should have minimal impact to the noise environment on or off of KLC.

4.1.9.2.3 In-Flight Interceptor Communication System Data Terminal

Construction and operation of an IDT at KLC would have minimal impact to the surrounding environment's noise levels. Construction noises would include noise from mechanical equipment. Noises involving traffic increases are included in analysis for GBI construction. Operational noise levels of an IDT are anticipated to be from the use of a 275 kW generator in the event of a loss of power. The IDT itself would produce minimal noise levels. Therefore, noise levels from the operation of an IDT would not increase the noise levels of the regional environment.

4.1.9.2.4 Sensors

Noise from the construction of two gravel pads for mobile telemetry and the Ocean Surveillance System would stem from the use of mechanical equipment. Exact types of equipment to be utilized are not known at this time. Typical sound levels from possible construction equipment are listed in table 4.1.9-2. It is expected that the two 10 kW generators to be used for mobile telemetry would produce noise levels less than that of normal speech. Noise levels from the operation of these systems would not increase the noise levels of the regional environment.

4.1.9.2.5 TPS-X

The TPS-X construction and operation requirements and potential impacts to noise levels would be similar to that described previously for sensors. Exact types of equipment to be used for construction are not known at this time; however, typical sound levels from possible construction equipment are listed in table 4.1.9-2. Operational noise levels of an IDT are expected to stem from the use of a 1.5 MW generator. Most 1.5 MW generators are equipped with attenuations equipment to reduce noise levels. Therefore, noise levels from the operation of the TPS-X would not increase the noise levels of the regional environment.

4.1.9.3 Alternative 2

4.1.9.3.1 Targets

Noise impacts due to construction and operation activities for target launches from KLC would be similar to those described in section 4.1.9.2.2 for Alternative 1.

4.1.9.3.2 Sensors

Sensor setup and operation activities would impact the surrounding noise environment as described in section 4.1.9.2.4 for Alternative 1.

4.1.9.4 Alternative 3

Noise impacts due to construction and operation of GBI, target, IDT, and sensors and their accompanying facilities for alternative 3 would be similar to those described in section 4.1.9.2 for Alternative 1.

4.1.9.5 Cumulative Impacts

Construction at KLC for GMD ETR activities would cause a short-term temporary increase in the noise levels in the immediate vicinity of the construction work. This effect would be localized, and is not anticipated to cause permanent noise level impacts.

Since the sound level generated by each launch is a short, discrete event, the potential cumulative impacts to noise from GMD ETR launches would not be substantial. The KLC EA indicated no significant noise impacts to sensitive receptors for nine annual launches (Federal Aviation Administration, 1996). The Proposed Action, in conjunction with current planned or anticipated launches, would not exceed this level of activity and therefore, no significant noise impact is anticipated at KLC.

4.1.9.6 Mitigation Measures

No noise mitigation measures are proposed for the GMD ETR activities at KLC.

4.1.10 SOCIOECONOMICS—KODIAK LAUNCH COMPLEX

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 duration and extent of displacement or modification of existing activities, and diversion or temporary suspension of access associated with the Proposed Action. Impact analysis will 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.

4.1.10.1 No Action Alternative

Missile Defense Agency

Under the MDA’s No Action Alternative, launches would continue to occur from KLC, but the GMD ETR would not be established and interceptor and target launch scenarios would not be tested under more operationally realistic conditions. No displacement of populations, residences, or businesses would occur within the Kodiak Island Borough as a result of the MDA’s No Action Alternative. Under the MDA’s No Action Alternative there would continue to be a need for local temporary accommodation of personnel associated with launches. Under the current FAA launch site operator license there could be up to nine launches per year from KLC. Given the extent of local facilities, this is not anticipated to be a significant impact.

Though limited in scope, this alternative would nonetheless have a continued limited positive effect on the local economy of the Borough by the ongoing local service-based employment opportunities and through launch personnel spending money in the local economy. The overall impact would be slight and would not be expected to cause any population growth. No significant impacts to the commercial fishing or fish processing industries, tourism, or logging industries are anticipated. No significant socioeconomic impacts would occur, and no mitigation measures are proposed.

Federal Aviation Administration

Under the FAA's No Action Alternative, the launch site operator license for KLC would not be renewed and no launches would be allowed to occur from KLC after September 2003. Any economic benefits to the Kodiak Island Borough from the periodic presence of launch-related personnel would not occur.

4.1.10.2 Alternative 1

4.1.10.2.1 Ground Based Interceptor

Construction

Implementation of Alternative 1 would result in construction of two GBI silos or one launch pad and associated support facilities and ancillary equipment and modifications to some existing facilities. Approximately 100 construction personnel would be required on Kodiak Island during the course of construction of new facilities and modification of existing facilities. Construction equipment and materials would be shipped via sea or air to Kodiak Island. Local procurement of materials and workers is expected to remain very limited, and while positive, would not represent a significant economic impact to the borough.

Construction activities related to the implementation of Alternative 1 would not cause any displacement of populations, residences, or businesses within Kodiak Island Borough. The duration of construction activities is expected to last 15 months. The accommodation needs of the additional personnel during this period would be met via local hotels and guesthouses. Given the extent of available facilities in Kodiak, this is not considered a potentially significant economic impact.

The additional construction 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 such as commercial fishing, fish processing, tourism, or logging are anticipated during construction activities. No significant socioeconomic impacts would occur through the construction activities associated with Alternative 1.

Operation

Pre-Launch, Flight, and Post-Flight Activities

Implementation of Alternative 1 would result in single and dual GBI launches from KLC. Interceptor missile boosters, payloads, and support equipment would be transported by air or ship from Government storage depots or contractor facilities to KLC. There would be a total of five GMD missile launches per year from interceptor and/or target missiles. A typical ramp up over a 3-month period would be 55, 120, and 235 personnel who would be required at KLC to support a dual interceptor launch. After an interceptor launch, the majority of these personnel would immediately depart KLC and Kodiak Island.

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

Personnel would reside offsite at local hotels and guesthouses to support a GBI launch. As outlined in section 3.1.10, Kodiak has approximately 250 hotel, motel, and guesthouse rooms. There are approximately 100 additional rooms within the Narrow Cape Lodge (56) and U.S. Coast Guard accommodation facilities (44). Additional rooms could be obtained through an addition to the Narrow Cape Lodge (additional 56 rooms) and/or constructing a mancamp on KLC (additional 35 rooms). Without the construction of additional facilities, the accommodation needs of as many as 235 additional personnel necessary to support a dual interceptor launch would represent a moderate impact during the tourist "off-season" period (from September to March) given both the current supply of rooms in Kodiak and the historically low vacancy rates during this time. The accommodations activity would represent a positive economic impact to the local economy. However, with regard to pre-launch periods occurring during tourist "high-season" (from May to September), the accommodation needs of up to 235 personnel, without the construction of additional facilities, would represent a potential significant impact to the local tourism industry by excluding repeat/returning tourist clientele from local establishments. In order to minimize these potential impacts, during these months, every effort would be made to secure as many rooms as possible at alternate facilities to those used by visiting tourists.

Generally, the additional personnel, by spending money in the local economy, mainly via accommodations and the normal procurement of goods and services would represent both a potential increase in local service-based employment opportunities and a positive economic impact to the local community for the duration of their stay. The overall impact would be moderate, and although each launch would represent a positive impact of several million dollars on the Kodiak economy, it would not cause any population growth. No population, housing or businesses would be displaced during operational activities. No significant impacts to locally significant businesses or industries such as commercial fishing, fish processing, tourism, or logging are anticipated during operational activities. Other than potential housing shortages, no significant socioeconomic impacts would occur through the operational activities associated with Alternative 1.

4.1.10.2.2 Target

Construction

Implementation of Alternative 1 would result in construction of a target launch pad and associated support facilities and ancillary equipment and modifications to some existing facilities. Approximately 100 construction personnel would be required on Kodiak Island during the course of construction of new facilities and modification of existing facilities. Construction equipment and materials would be shipped via sea or air to Kodiak Island. Local procurement of materials and workers is expected to remain limited and while positive would not represent a significant economic impact to the borough.

Construction activities related to the implementation of Alternative 1 would not cause any displacement of populations, residences, or businesses within Kodiak Island Borough. The duration of construction activities is expected to last 12 to 15 months. The accommodation needs of the additional personnel during this period would be met via local hotels and guesthouses. Given the extent of available facilities in Kodiak, this is not considered a potentially significant economic impact.

No population, housing or businesses would be displaced. An adequate supply of accommodation for construction personnel would be available and would consequentially represent a 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 Alternative 1.

Operation

Pre-Launch, Flight, and Post-Flight Activities

Implementation of Alternative 1 would result in single and dual target launches from KLC. Target missile components would be built in contractor facilities and delivered to KLC via air or boat for system assembly and checkout. When a target missile test flight is planned, the same type of land and water clearance areas that were defined for the GBI would be established and cleared for the target missile. Again, entities with an economic interest in the use of these areas such as the commercial fishing and tourist industries of Kodiak would not be significantly impacted by the proposed clearance areas.

There would be a total of five GMD missile launches per year from interceptor and/or target missiles A typical ramp up over a 3-month period for a single target missile launch would be 25, 55, and 110 personnel who would be required at KLC to support a target launch. After a target launch, the majority of these personnel would immediately depart KLC and Kodiak. Requirements for a dual target launch would be 25, 75, and 150 personnel.

Personnel would reside offsite at local hotels and guesthouses to support a target launch. Approximately 250 hotel, motel, or guesthouse rooms are in Kodiak. There are approximately 100 additional rooms within the Narrow Cape Lodge (56) and U.S. Coast Guard accommodation facilities (44). Additional rooms could be obtained through an addition to the Narrow Cape Lodge (additional 56 rooms) and/or constructing a mancamp on KLC (additional 60 rooms). Without the construction of additional facilities, the accommodation needs of up to 150 additional personnel during the tourist “off-season” (from September to March), would represent a low to moderate impact given both the current supply of rooms in Kodiak and the historically low vacancy rates during this time but would represent a positive economic impact to the local economy. However, with regard to pre-launch periods occurring during tourist “high-season” (from May to September), the accommodation needs of up to 150 personnel, without the construction of additional facilities, would represent a moderate to significant impact to the local tourism industry by excluding repeat/returning tourist clientele from local establishments. In order to minimize these potential impacts, during these months, every effort should be made to secure as many rooms as possible at alternate facilities to those used by visiting tourists.

Generally, the additional launch-related personnel, by spending money in the local economy, mainly via accommodations and the normal procurement of goods and services would represent both a potential increase in local service-based employment opportunities and a positive economic impact to the local community for the duration of their stay. The overall impact would be moderate, and although each launch would represent a positive impact of several million dollars on the Kodiak economy, it would not cause any population growth. No population, housing, or businesses would be displaced during operational activities. No significant impacts to locally significant businesses or industries such as commercial fishing, fish processing, tourism, or logging are anticipated during operational activities. Other than the potential shortage of housing, no significant socioeconomic impacts would occur through the operational activities associated with Alternative 1.

4.1.10.2.3 In-Flight Interceptor Communication System Data Terminal

Construction

Implementation of Alternative 1 would result in the construction of an IDT on KLC. The IDT would be located near the Loran Station, the Oxidizer Storage Facility, or near the entry road. Construction equipment, materials, and personnel would arrive at KLC as part of the construction of the GBI silos, and associated support equipment. The construction personnel and related construction equipment identified for GBI would be involved in the construction of the IDT.

Construction activities related to the implementation of Alternative 1 would not cause any displacement of populations, residences, or businesses within Kodiak Island Borough. The presence of the construction personnel represents 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 will however be slight and would not cause any population growth. No significant impacts to businesses or industries such as commercial fishing, fish processing, tourism, or logging, are anticipated during construction activities. No significant socioeconomic impacts would occur due to the construction activities associated with Alternative 1.

Operation

The IDT site would require three onsite support personnel when in operation. The generator would be tested weekly during non-launch periods and during power outages, approximately 250 hours a year. The personnel associated with the permanent IDT would be part of the people required to support an interceptor launch and the extent of the related economic impacts would remain the same. The proposed activities would not cause any population growth or displacement of populations, residences, or businesses within Kodiak Island Borough. Similarly, no significant impacts to businesses or industries are anticipated. No significant socioeconomic impacts would occur thorough the IDT operational activities associated with Alternative 1.

4.1.10.2.4 Sensors

Construction

These systems are mobile and would be brought to the vicinity of the launch site approximately 2 to 6 weeks before the planned launch. No construction activities would be involved and no socioeconomic impacts would occur.

Operation

Implementation of Alternative 1 would include the operation of sensors. Instrumentation associated with the launch of a target missile would include two telemetry sites, and a range control support equipment site. These systems would be transported to Kodiak and remain in position until the launch event has been complete. In most cases the equipment would be removed within days after the launch.

The personnel associated with the launch of a target missile would operate these systems therefore no personnel in addition to those already involved in target operations would be needed to operate the sensors and the extent of the related economic impacts would remain the same. The proposed activities would not cause any population growth or displacement of populations, residences, or businesses within Kodiak Island Borough. Similarly, no significant impacts to businesses or industries are anticipated. Under Alternative 1, no significant socioeconomic impacts would occur thorough the operational activities associated with Sensors.

4.1.10.2.5 TPS-X Radar

Construction

The Proposed Action would require minor site preparation to construct a single concrete support pad for the transportable TPS-X radar and its operational components. The proposed locations include the Loran Station, the EKV Oxidizer Storage facility, or near the entry road. Construction equipment, materials, and personnel would arrive at KLC as part of the construction of the GBI silos, and associated support equipment. No socioeconomic impacts would occur from such minimal construction activities.

Operation

The TPS-X would be transported to KLC by air or land and then transported to one of the potential sites by truck. The personnel associated with the launch of a target missile would operate these systems therefore, no additional personnel would be needed and the extent of the related economic impacts would remain the same. The proposed activities would not cause any population growth or displacement of populations, residences, or businesses or industries are anticipated. No significant socioeconomic impacts would occur through the operational activities associated with Alternative 1.

4.1.10.3 Alternative 2

Under Alternative 2, GBIs would be launched from Vandenberg AFB instead of KLC. Thus, there would be no construction or operations related to GBI silos and their associated support equipment as well as an IDT on KLC. However, the other components described in Alternative 1 would remain the same and the extent of the related impacts would also remain the same.

4.1.10.3.1 Target

The socioeconomic impacts to Kodiak Island from construction of a target launch pad and associated support facilities and the launch of single and dual targets from KLC would be similar to what was discussed in section 4.1.10.2.2.

4.1.10.3.2 Sensors

The socioeconomic impacts to the Kodiak Island from construction of a target launch pad and associated support facilities and the launch of single and dual targets from KLC would be similar to what was discussed in section 4.1.10.2.4.

4.1.10.4 Alternative 3

Socioeconomic impacts due to construction and operation of GBI, target, IDT, and Sensors, and their accompanying facilities for Alternative 3 would be the same as described in section 4.1.10.2 for Alternative 1.

4.1.10.4.1 Cumulative Impacts

Although the Proposed Action would represent a positive economic impact to the local economy, the accommodation needs of up to 235 personnel would represent a potential significant impact to the local tourism industry by excluding repeat/returning tourist clientele from local establishments. Other than those activities already described, no other activities have been identified that would combine with the Proposed Action and result in cumulative socioeconomic impacts.

4.1.10.4.2 Mitigation Measures

Mitigation to reduce the potential of a housing shortage would include building an addition to the existing Narrow Cape Lodge and/or the construction of an additional mancamp at KLC.

4.1.11 TRANSPORTATION—KODIAK LAUNCH COMPLEX

4.1.11.1 No Action Alternative

Missile Defense Agency

Under the MDA's No Action Alternative, launches would continue to occur from KLC but the GMD ETR would not be established and interceptor and target launch scenarios would not be tested under more operationally realistic conditions. The AADC and the Alaska Department of Transportation and Public Facilities conducted studies of the roads, bridges, and culvert crossing conditions and determined that they are adequate for motor loads as heavy as a Castor 120™ (Alaska Aerospace Development Corporation, 2001).

Federal Aviation Administration

Under the FAA's No Action Alternative, the launch site operator license for KLC would not be renewed and no launches would be allowed to occur from KLC after September 2003. Therefore, there would be no impacts to transportation from launches at KLC.

4.1.11.2 Alternative 1

4.1.11.2.1 Ground-Based Interceptors

Construction

Implementation of Alternative 1 would result in the construction of facilities as described in section 2.3.1.1. Kodiak Island and KLC have established air, ocean, and ground transportation systems. The construction equipment and materials would be brought to Kodiak Island by ocean carrier or by plane and transported over land or via barge/beach landing to KLC. Kodiak Island is already one of the leading shipping ports in southwest Alaska and as a commercial service facility is equipped to accommodate international cargo receipt and shipment. Scheduled service is in place to support the normal level of traffic; however, peak demands are anticipated and scheduled in advance. In addition, vessels serving the AMHS are rarely booked full to capacity with container vans (State of Alaska, 1998). These activities would be considered normal usage and would not result in an impact to the ocean transportation systems. Approximately 100 construction personnel would be brought to Kodiak Island via the AMHS and/or commercial airliner. Year-round service to Kodiak Island by sea and air currently exists and movement of project-related people would not impact either of these transportation systems.

Once unloaded at Kodiak Island, construction equipment and material could be shipped by tractor-trailer transport to KLC with beach landings as a possible option. Roadway access to KLC is via Rezanof Drive West. This road is narrow and, in some cases, steep. There are switchbacks and 11 bridge crossings before reaching KLC. Due to the nature of these road conditions, movement of construction equipment and material would cause temporary traffic delays; however, these delays would be minimal and infrequent. Public announcements regarding potential delays would be made, and movements during off-peak travel hours would be scheduled to the greatest extent possible.

The roadways supporting the individual facilities within KLC are designed to accommodate tractor-trailer transport vehicles as well as passenger vehicles and light trucks. Road grades range from one percent to over 15 percent. Due to the nature of these road conditions, project-related movements would also cause temporary traffic delays within KLC; however, they would not extend to local roads. Development of these new facilities would result in the construction of new roads, parking for staff vehicles and tractor trailers, and upgrades to existing roads. The approximately 100 construction personnel would either be housed in Narrow Cape Lodge, or somewhere nearby the work area. Although the local road system could experience an increase in traffic, the typically long construction schedules make commuting to and from Kodiak proper improbable, and thus the increase would only minimally change the ADT on key local roads, if at all, and the impact on Level of Service would be negligible.

Potential beach landing areas, for optional barge delivery, include Burton Ranch Beach (mancamp location), Boulder Beach (near Bear Paw Ranch), and Pasagshak Beach (near the Pasagshak Recreation Area). The Narrow Cape Lodge is an example of direct barge delivery to KLC. For the latter two locations, some modification would be necessary: Boulder Beach would require a temporary ramp; Pasagshak Beach would require widening of a turn to allow access to the main road nearby. Temporary beach closure would be necessary, but would be considered routine and of short duration.

Operation

Pre-Launch Activities

Implementation of Alternative 1 would result in single and dual GBI launches from KLC. Interceptor missile boosters, payloads, and support equipment would be transported by air or ship/barge from Government storage depots or contractor facilities to KLC. All shipping would be conducted in accordance with DOT regulations. Applicable safety regulations would be followed in the transport and handling of hazardous materials. The interceptor may arrive at Kodiak with the EKV attached or the booster may be shipped separately from the EKV. In either case, integration and assembly operations would be performed onsite. There would be up to five interceptor launches per year; however, as previously stated, Kodiak Island is one of the leading shipping ports in southwest Alaska and as a commercial service facility is equipped to accommodate this type of cargo and frequency of shipping.

Once unloaded at Kodiak Island, the interceptor missile boosters, payloads, and support equipment would be shipped by tractor-trailer transport to KLC in a manner similar to that of the construction equipment and materials or, as an option, could be barged via one of the aforementioned potential beach landing areas. The Alaska Department of Transportation and Public Facilities has evaluated all of the bridges on this road and made improvements to them to support rocket motors in transport to KLC (Alaska Aerospace Development Corporation, 2001). Due to the nature of these road conditions, movement of interceptor missile boosters, payloads, and support equipment would cause temporary traffic delays, however, these delays would be minimal and infrequent. Prior planning of these movements for off-peak travel hours would further serve to minimize these delays. Once at KLC, the interceptor would be placed in secure storage until assembly and launch preparation. Due to the nature of the road conditions within KLC, movement of these vehicles would also cause temporary traffic delays, but they would not extend to local roads. As mentioned, utilizing the beach landing/barging options would require modifications. Temporary beach closure would be necessary, but would be considered routine and of short duration.

A typical manpower build up over a 3-month period would be 55, 120, and 235 personnel who would be required at KLC to support a dual interceptor launch. They would come to Kodiak via commercial airliner or the AMHS. Interceptor and target missile contractor test personnel would be housed in Narrow Cape Lodge, a new mancamp (if constructed) on KLC, and motels or hotels in the vicinity and would commute to the launch site daily. Government and military test personnel may use military or commercial lodging if available. This would add up to approximately 60 vehicles (assuming 4 persons per vehicle) to Rezanof Drive West each day during peak hours. Although the local road system would experience an increase in traffic, the increase would only minimally change the ADT on key local roads, and the impact on Level of Service would be negligible. The use of an onsite mancamp would also help to abate any increases in automobile traffic, lowering the potential impacts even further.

Flight Activities

When a missile test flight is planned, there are certain areas where missile components and debris are expected to impact: the booster drop zone and the debris impact area. These areas are cleared of personnel as part of the test plan. There are other areas where debris may land if the test does not proceed as planned. These areas of the test event may be subject to the risk of mishap from a flight termination. Each missile flight test event would be modeled using computer predictions of the behavior of the missiles. Specific clearance areas would be defined for each flight test depending upon the profile of that test.

Once a test event is scheduled, there would be a standard sequence of notification and coordination procedures between the Range Safety Office and the agencies (Federal Aviation Administration, Coast Guard, AMHS) that would enforce the clearance of land, air, and sea areas. The date and location of scheduled flight tests or training events would be published approximately one week in advance as described below for land, air, and sea areas. Clearances are of a short duration, and effects are anticipated to be negligible.

Land areas would be cleared by KLC Security personnel approximately 4 hours before launch. A Launch Hazard Area would be established around the launch site; however, since the launch azimuth for KLC is southwest and southeast over the Pacific Ocean and would not be over any public roads, there would be no impact to road transportation.

Impacts to commercial aviation and airspace from missile launches are evaluated in section 4.1.2.

Sea-surface areas that would have to be cleared include the Launch Hazard Area that extends overwater, the predicted booster drop zones, the predicted debris impact area, and the predicted whole body miss impact point for each missile. Sea-surface areas would be cleared with the cooperation of the U.S. Coast Guard. Sea-surface areas would need to be cleared in advance of a planned test event to allow sufficient time to ensure that it is indeed clear; this would be approximately 4 hours before test launch. The U.S. Coast Guard would publish a NOTMAR to clear certain sea-surface areas for safety reasons. Notice of intent to clear certain sea-surface areas for safety reasons would be published in local newspapers, broadcast in local news media, and distributed to commercial fishing and tourist boating trade associations. Subject to the conditions of appropriate Memoranda of Agreement, Coast Guard officials would close the sea-surface area(s) up to 4 hours before the planned launch and then survey them to ensure that they are clear of ships or watercraft. Coast Guard boats and range safety aircraft would patrol the area to ensure that it is clear of ships or watercraft. The AMHS ferry route is north of Kodiak and away from the KLC launch azimuth, therefore, no impacts to vessels traveling these routes would occur. The Pacific Ocean south of Kodiak does contain commercial shipping lanes for vessels traveling from Seattle to and from Nome and Yokohama. These vessels would be required to stay clear of these areas during a launch, which could cause them to be slightly delayed. These delays would be short-term and infrequent (up to five times per year), however, and the advanced notification would serve to further minimize any impact. Commercial and recreational fishing vessels would also be required to relocate their activities during a launch event, however, they would only be required to move for a short period of time and this would only occur infrequently (up to five times per year). Section 4.1.10 includes a more detailed analysis of the impacts to commercial and recreational fishing from the implementation of this alternative.

Post-Flight Activities

After completion of a missile flight test, the clearance areas would be released, or allowed to be re-occupied. The Range Safety Officer would do this as soon as he or she was assured that any hazardous aspect of the test was completed. Such residual hazardous concerns may include the presence of hazardous debris, debris still falling after an intercept, or other potentially dangerous consequences. Notification would be by radio, telephone, or computer to aviation and maritime authorities. If required, debris recovery on land may involve the use of helicopters and off-road vehicles and the two main parachutes, if used to air-launch targets for interceptor tests, would be recovered from ocean drops. This debris cleanup would not have any impact on land, air, or sea-based transportation systems. After an interceptor launch, personnel would depart KLC and Kodiak by commercial air or sea (via the AMHS).

4.1.11.2.2 Target

Construction

Implementation of Alternative 1 would result in the construction of facilities as described in section 2.3.1.1. The construction equipment and personnel associated with the construction of the target pads and associated support facilities would be similar to the GBI construction. Construction materials for the new target launch pad and its associated support facilities would be transported to KLC via routes and in a manner similar to that utilized for transporting material for the GBI facilities. The transportation impacts from the construction of the target launch pad and its associated support facilities would be the same as for the GBI facilities.

Operation

Pre-Launch Activities

Implementation of Alternative 1 would result in single and dual target launches from KLC. Target missile components would be built in contractor facilities and delivered to KLC via air or boat for system assembly and checkout. Target missiles would not be shipped with initiators or other explosive devices. All missile components would be packaged in appropriately designed containers, labeled, and handled in accordance with applicable DOT regulations for the transport of hazardous materials. Trained personnel using only appropriately certified cranes and other materiel handling equipment would handle missile components and handling equipment in accordance with approved SOPs. There would be up to five target launches per year. As stated in section 4.1.11.2.1, Kodiak Island is one of the leading shipping ports in southwest Alaska, and as a commercial service facility, is equipped to accommodate this type of cargo and frequency of shipping; thus there would be no impacts to transportation.

Once at Kodiak, the target missiles would likely be transported via roadways to KLC in the same manner as the GBIs. The impacts from the transfer of the target missiles to KLC would be similar to what is expected with the transfer of the GBIs, though GBIs could potentially utilize barge landings. Once at KLC, the missile components would be stored in a Missile Assembly Building until they are assembled for launch. The impact of the movement of the target missiles within KLC would be similar to what is expected with the GBIs.

A maximum of approximately 150 personnel would be required to support a dual target launch. They would travel to Kodiak via commercial airliner or the AMHS. Target missile contractor test personnel would be housed in motels or hotels in the vicinity and would commute to the launch site daily. Government and military test personnel may use military or commercial lodging if available. This could increase the number of vehicles on Rezanof Drive West each day during peak hours, but due to extended work hours, workers would typically lodge closer to the worksite, lessening or even removing the need for such a commute. Although the local road system could experience an increase in traffic, the increase would only minimally change the ADT on key local roads, and the impact on Level of Service would be negligible. Another option which would reduce, if not preclude, this minor impact would be to establish a new mancamp on KLC property to the west of the Launch Control Center or use the existing lodge located near KLC.

Flight Activities

When a target missile test flight is planned, the same type of clearance areas that were defined for the GBI in section 4.1.11.2.1 would be established and cleared for the target missile. These areas would be very similar or the same as the clearance areas for the GBI.

Post-Flight Activities

After a successful test, the clearance areas would be released, or allowed to be re-occupied. Test personnel would depart via commercial airliner or sea (via the AMHS). Thus, the impacts from post-flight target missile activities would be similar to those for the GBI.

4.1.11.2.3 In-Flight Interceptor Communication System Data Terminal

Construction

Implementation of Alternative 1 would result in the construction of an IDT on KLC. The IDT would be located near the Loran Station, the Oxidizer Storage facility, or near the entry road. The IDT would require approximately 0.8 hectare (2 acres) of land with an unobstructed line-of-sight. Construction equipment, material, and personnel for the IDT would arrive at KLC as part of the construction of the GBI and/or target construction efforts. Thus, there would be no additional impact to transportation from construction of an IDT.

One additional COMSATCOM system could be constructed at KLC as part of Alternative 1. Personnel numbers for its construction are included in the GBI construction numbers, and thus no impacts to transportation are expected from construction of this additional COMSATCOM.

Operation

The IDT sites would require three onsite support personnel when in operation. When not in operation, the on-site backup generators would be tested for approximately 45 minutes every 2 months. The personnel associated with the IDT would be part of the people required to support an interceptor launch and would not be an additional impact to transportation systems.

4.1.11.2.4 Sensors

Operation

Instrumentation associated with the launch of a target missile would include mobile telemetry sites, and a range control support equipment site. Representative telemetry sites are shown in figure 2.1.5-5. Telemetry is provided through a real-time data acquisition system. The mobile telemetry systems would consist of an 11-meter (31-foot) truck, two 5.4-meter (17.7-foot) antennas, and dual 10-kW generators. Range control support equipment would include a semi-type van for FTS, meteorological, transponder, control, communications, and timing systems. Target telemetry requirements include an up-range, mid-range, and down-range telemetry systems to support launches. One site could be located in a level gravel area 200 by 200 feet (61 by 61 meters) in the vicinity of the entry road and north of the maintenance building on KLC.

Other up-range telemetry locations on Kodiak Island that may be used include Pasagshak and Pillar Mountain. Up-range telemetry locations that may be used in other parts of Alaska include: Soldotna, Kenai, and Homer on the Kenai Peninsula, in South-Central Alaska; Cordova, in Southeast Alaska; and King Salmon and Adak Island in Southwest Alaska. Examples of this equipment are shown in figure 2.1.5-4.

All of these systems are mobile and would be brought to the vicinity of the launch site approximately 1 to 2 weeks before the launch date. These systems would be transported to Kodiak by air or sea and then driven to KLC or other locations in Kodiak on the existing roads. Systems that would be located in Soldotna, Kenai, and Homer on the Kenai Peninsula would be brought in by air, land, or sea and transported to their location by motor carrier. Systems that would be located in Cordova, in Southeast Alaska; and King Salmon and Adak Island in Southwest Alaska would only be brought in by air or sea and then driven to their location on the existing roads. Once onsite, they would remain in position until the launch event has been complete. In most cases the equipment would be removed within days after the launch. The personnel associated with the launch of a target missile would operate these systems. Since these systems encompass a small number of vehicles (seven), movement of these systems to KLC or other locations in South-central, Southeastern, or Southwestern Alaska would not have a measurable impact on the air, ocean, or ground transportation systems at any of these locations.

4.1.11.2.5 TPS-X

Construction

TPS-X components could be transported to the operation site from U.S. Government storage depots or contractor facilities by aircraft, sea vessels, or over land by trucks. Delivery would be conducted under routine procedures in accordance with applicable FAA, and DOT safety standards minimizing any possible impacts to transportation. Site preparation would require construction of a gravel pad area of approximately 0.3 hectares (0.8 acre). The limited construction activities would have little to no effect on area transportation levels.

Operation

At KLC, the Prime Power Unit for the TPS-X would be a 1.5-MW generator that would provide power to the radar during testing. The generator is assumed to be in operation for 3 weeks (24 hours a day, 7 days a week) five times a year during launch activities. The total time of operation is estimated at a maximum of 2,520 hours per year. Operation of the Prime Power Unit would require refueling operations. The fuel tank would be filled from a fuel truck, as necessary. The limited trips required by the fuel truck would have no impact on current transportation systems.

4.1.11.2.6 Launch Complex Security

Security procedures will be established in accordance with AADC's ILMA for property, which permits public exclusion during times of danger and assists in protecting structures. When interceptor testing occurs it would be on a periodic basis. It is assumed that testing would be on a campaign basis and the security for these tests would be on a similar basis. It is estimated that the potential security impacts would occur for approximately 5 weeks for each campaign. Implementation of this alternative would result in 15 to 40 security personnel being brought to KLC during each campaign. The additional security personnel would travel to KLC via air or sea and would be housed onsite or offsite. Security vehicles would also be used. During the day, security vehicles would be on patrol, and at night additional vehicles would be used as needed. Since the additional security personnel would be working on site during much of the campaign, they would not measurably add to the ADT of the local roads. The addition of security vehicles would not measurably add to the ADT on KLC.

Up to three access control points would be required during a test campaign. One could be located at the entrance of KLC to record vehicles entering and leaving the site. The access control points would not disrupt the flow of traffic, however, they would be able to advise motorists on the location of Launch Hazard Areas and minimize the potential for them to gain unauthorized access. Public access through KLC to Fossil Beach would be limited or denied for each launch day. For the proposed five launches per year, the closure would be less than 2 percent of the year.

4.1.11.3 Alternative 2

Alternative 2 would have GBIs launched from Vandenberg AFB instead of KLC. There would be no construction or operations related to GBI and its associated support equipment as well as an IDT. However the other components described in Alternative 1 would remain the same.

4.1.11.3.1 Target

The impacts to transportation from construction of a target launch pad and associated support facilities and the launch of single and dual targets from KLC would be similar to those discussed in section 4.1.11.2.2.

4.1.11.3.2 Sensors

The impacts to transportation from operation of target sensors on KLC or in other parts of southwestern Alaska would be similar to what was discussed in section 4.1.11.2.4.

4.1.11.4 Alternative 3

For the purposes of the discussion at KLC, the construction and flight impacts for Alternative 3 would be as described above for Alternative 1.

4.1.11.5 Cumulative Impacts

The KLC EA indicated no significant impacts to transportation from nine annual launches (Federal Aviation Administration, 1996). The Proposed Action, in conjunction with current planned or anticipated launches would not exceed this level of activity and therefore, no substantial cumulative impacts to transportation are expected. At this time, there are no ongoing or foreseeable future programs taking place in the ROI other than those discussed previously that would have an added impact on transportation. Plans on the part of the Alaska Department of Transportation to pave some additional 40 kilometers (25 miles) between the town of Kodiak and KLC would actually have a beneficial effect, reducing risk to both personnel and equipment required to travel this roadway. Paving activities are currently underway.

4.1.11.6 Mitigation Measures

No transportation mitigation measures are proposed for the GMD ETR activities at KLC.

4.1.12 UTILITIES—KODIAK LAUNCH COMPLEX

A project may have substantial effects on infrastructure and utilities if it increases demand in excess of the utility system's capacity to the point that substantial expansion would be necessary. Environmental impacts could also result from system deterioration due to improper maintenance or extension of service beyond its useful life.

4.1.12.1 No Action Alternative

Missile Defense Agency

Under the MDA's No Action Alternative, launches would continue to occur at KLC, although the GMD ETR would not be established and GBI and target launch scenarios would not be tested under more operationally realistic conditions. These launches could include missions in support of the GMD program. KLC would continue to operate as a licensed launch facility, and, as concluded in the KLC EA (Federal Aviation Administration, 1996), no impacts to area utilities would be anticipated.

Federal Aviation Administration

Under the FAA's No Action Alternative, the launch site operator license for KLC would not be renewed and no launches would be allowed to occur from KLC. Therefore, there would be no impacts to utilities resources from launches at KLC.

There would be no impacts expected to utilities from the FAA's No Action Alternative because there would be no additional launch events from KLC.

4.1.12.2 Alternative 1

4.1.12.2.1 Ground-Based Interceptors

Construction

Implementation of Alternative 1 would result in construction of several facilities as described in section 2.3.1.1. Kodiak Island and KLC have established air, ocean, and land transportation systems. Approximately 100 construction personnel would be brought to Kodiak Island during the course of construction of new facilities and modification of existing facilities.

Construction equipment and materials would also be shipped via sea or air to Kodiak Island. Once unloaded at Kodiak Island, construction equipment and materials would either be shipped by tractor-trailer transport or via one of the three potential beach landing sites to KLC. Access to KLC is via Rezanof Drive West.

Energy

The addition of 100 construction personnel and related construction activities would not measurably increase the demand for electricity at KLC.

Water

The addition of 100 construction personnel and related construction activities would increase the demand for potable water. Given 189 liters (50 gallons) per day per worker, demand would be 18,927 liters (5,000 gallons) per day. This would be above the system capacity of 13,060 liters (3,450 gallons) per day. To allow for any additional demand, however, the utilization of portable drinking water systems would be necessary.

Some water would be pumped from East Twin Lake for temporary use at the project's cement batch plant and for emergency, fire-fighting purposes. Compared to the lake's capacity (about 57 million liters [15 million gallons]) and average recharge rate (estimated to be 871 liters [230 gallons] per minute), this temporary use of water would represent a minor impact.

Wastewater

The addition of 100 construction personnel and their related construction activities would increase the demand on existing wastewater treatment services. Given 189 liters (50 gallons) per day per worker, wastewater production would be 18,927 liters (4,500 gallons) per day. This would be above the system capacity of 13,060 liters (3,450 gallons) per day. To allow for any additional demand, however, the utilization of portable septic/toilet systems would be necessary.

Solid Waste

Construction activities and 100 construction personnel would not increase the demand for solid waste disposal services beyond the existing capacity of 11.5 cubic meters (15 cubic yards) per month. Although construction of the new facilities and modification of the existing would generate solid waste, this is not expected to exceed the existing capacity. Any increase over and above typical levels and capacity would be negotiated with and handled by the Kodiak Island Borough/Waste Management, Inc.

Operation

Pre-Launch, Flight, and Post-Flight Activities

Implementation of Alternative 1 would result in single and dual GBI launches from KLC. Interceptor missile boosters, payloads, and support equipment would be transported by air or ship from Government storage depots or contractor facilities to KLC. There would be up to five missile launches per year (target and interceptor). A maximum of approximately 235 personnel (contractor, military, and Government civilian) would be required to travel to KLC for a period of up to 2 months to support an interceptor launch. After an interceptor launch, the majority of these personnel would depart KLC and Kodiak.

As part of pre-launch and flight activities, a Launch Hazard Area would be established around the launch site in accord with the AADC ILMA has for the property, which allows public access restrictions in cases of public safety and to protect structures. The Launch Hazard Area would result in certain areas of KLC being cleared of personnel in the event of an accident during interceptor launch; however, establishing a Launch Hazard Area would not create an impact related to utility services.

Energy. An off-site commercial power supplier would be used to supply primary power to activities associated with missile flight tests, with a backup battery system and onsite backup diesel generators for emergency power. Generators for various GBI-related facilities would range in output from approximately 75 to 900 kW. Each generator would also have its own dedicated AST. Additionally, the new Missile Assembly Building would include wall mounted sodium-vapor lighting, aircraft obstruction lighting, and a 500-kW diesel generator. The integrated assemblies would be electronically tested. Therefore, compared to daily average demand for electricity at KLC of 825 kW, the total increase in demand for electricity would not exceed the existing capacity of 3,100 kW. No adverse impacts would be anticipated.

Additional electricity usage would occur as a result of up to a maximum 235 personnel residing offsite during the operational phase of the GBI. However, it is anticipated that they would be staying at existing hotels and motels. This would create negligible additional demand on electricity services and would be within existing capacity.

Water. Domestic water usage represents the water consumed by the launch personnel in the ROI. Additional water usage would occur as a result of up to a maximum of 235 personnel at KLC to support a dual launch of the GBI.

Assuming an approximate average water requirement of 189 liters (50 gallons) per person per day, the water requirements for a typical dual launch flight test build up are shown in table 4.1.12-1.

Table 4.1.12-1: Water Requirements for Dual Launch Missile Flight Tests

GBI Personnel	Month 1	Month 2	Month 3
Personnel	55	120	235
Water Usage liters/(gallons)	10,410 (2,750)	22,712 (6,000)	44,479 (11,750)
Target Personnel			
Personnel	25	75	150
Water Usage liters/(gallons)	4,732 (1,250)	14,195 (3,750)	28,390 (7,500))

As shown in table 4.1.12-1, GMD requirements would exceed existing capacity of 13,060 liters (3,450 gallons) by as much as 31,419 liters (8,300 gallons). It is anticipated that additional packaged potable water systems would be installed to meet the GMD requirements. The packaged system (well, pump, and above-ground storage tank) would be located within the construction footprint of the proposed GMD facilities. Permits would be obtained from the Alaska Department of Environmental Conservation for construction and use of the water supply systems.

Wastewater. Assuming an approximate average of 170 liters (45 gallons) per person per day of wastewater production, the launch activities would generate wastewater at the rates shown in table 4.1.12-2.

Table 4.1.12-2: Wastewater Requirements for Dual Launch Missile Flight Tests

GBI Personnel	Month 1	Month 2	Month 3
Personnel	55	120	235
Wastewater Usage liters (gallons)	9,369 (2,475)	20,441 (5,400)	40,030 (10,575)
Target Personnel			
Personnel	25	75	150
Wastewater Usage liters (gallons)	4,259 (1,125)	12,776 (3,375)	25,550 (6,750)

As shown in table 4.1.12-2, GMD requirements would exceed existing design capacity of 13,060 liters (3,450 gallons) per day by as much as 26,970 liters (7,125 gallons). It is anticipated that new facility construction and additions to existing facilities would include additional wastewater treatment systems that, as with any additional potable water systems, would meet GMD requirements. In keeping with KLC procedures, any septic systems would likely include a mounded absorption bed. Again, appropriate permits would be obtained where required.

Solid Waste. Municipal solid waste would be generated during the five GMD missile launches. However, the amount of waste is expected to be similar to previous missile launches and is not expected to exceed the existing quantity of 15 cubic yards (11.5 cubic meters), currently handled by Kodiak Island Borough/Waste Management, Inc. Were the amount of solid waste produced to increase over and above typical levels and capacity, however, this would be negotiated with and handled by the Kodiak Island Borough/Waste Management, Inc. Therefore, the total increase would not result in adverse impacts to existing services.

4.1.12.2.2 Target

Construction

Implementation of Alternative 1 would result in the construction of a new target launch pad and associated support facilities as described in section 2.3.1.1. The construction equipment and personnel associated with the target construction and associated support facilities would be similar to those used for the GBI facilities. The impacts from the construction of the target launch pad and its associated support facilities would be similar to the GBI construction impacts.

Energy

The impact to energy services from target facility construction would be similar to what would be expected for interceptor construction.

Water

The impact to potable water from target facility construction would be similar to what would be expected for interceptor construction.

Wastewater

The impact to wastewater from target facility construction would be similar to what would be expected for interceptor construction.

Solid Waste

The impact to solid waste from target facility construction would be similar to what would be expected for interceptor construction.

Operation

Pre-Launch, Flight, and Post-Flight Activities

Implementation of Alternative 1 would result in single and dual target launches from KLC. Target missile components would be built in contractor facilities and delivered to KLC via air or boat for system assembly and checkout. Trained personnel using only appropriately certified cranes and other materiel handling equipment would handle missile components and handling equipment in accordance with approved SOPs. There would be as many as 5 target launches per year.

The launch site, for target launches, would be occupied for approximately 3 months. A maximum of approximately 150 personnel (contractor, military, and government civilian) would be required to support a target launch.

Energy. An offsite commercial power supplier would be used to supply primary power to activities associated with the flight tests. Within the proposed Missile Service Structure, emergency power would be supplied from the Integration Processing Facility, and uninterrupted power supply batteries would serve critical loads. The Missile Assembly Building would include a 500-kW diesel generator. Additionally, both the Missile Assembly Building and Missile Service Structure would require wall mounted sodium-vapor lighting. Compared to the daily average demand for electricity at KLC 825 kW, the total increase in demand for electricity would not exceed the existing capacity of 3,100 kW. No adverse impacts would be anticipated.

Water. Domestic water usage represents the water consumed by the launch personnel in the ROI. Additional water usage would occur as a result of 150 personnel residing offsite during the operational phase of the target. However, it is anticipated that they would be staying at existing hotels/motels. This would not create additional demand on offsite water services, because they would not be exceeding the existing capacity of those facilities.

Table 4.1.12-1 shows water requirements for a typical target flight test buildup. As shown in the table, GMD requirements would eventually exceed existing capacity, but it is anticipated that additional packaged potable water systems would be installed to meet GMD requirements, thus negating the potential impact.

Wastewater. Assuming a proportional relationship between potable water consumption and wastewater treatment, the launch activities for targets would generate wastewater at the rates shown in table 4.1.12-2. Additionally, wastewater would be generated by the personnel residing offsite during the operational phase of the targets. However, it is anticipated that they would be staying at existing hotels/motels. This does not create additional demand on wastewater treatment services would occur, but it would not exceed the existing capacity.

Table 4.1.12-2 shows wastewater requirements for a typical target flight test buildup. As shown in the table, GMD requirements would eventually exceed existing capacity, but it is anticipated that additional septic systems would be installed to meet GMD requirements, thus negating the potential impact.

Solid Waste. Municipal solid waste would be generated during the five GMD missile launches. However, the amount of waste is expected to be similar to previous missile launches and is not expected to exceed the existing quantity of 15 cubic yards (11.5 cubic meters), currently handled by Kodiak Island Borough/Waste Management, Inc. Were the amount of solid waste produced to increase over and above typical levels and capacity, however, this would be negotiated with and handled by the Kodiak Island Borough/Waste Management, Inc. Therefore, the total increase would not result in adverse impacts to existing services.

4.1.12.2.3 In-Flight Interceptor Communication System Data Terminal

Construction

Implementation of Alternative 1 would result in the construction of an IDT on KLC. The IDT would be located near either the Loran Station, the Oxidizer Storage facility, or near the entry road. Construction equipment, material, and personnel would arrive at KLC as part of the construction of the GBI and/or target efforts. The different types of IDTs (i.e., re-locatable, mobile, and sea-based) do not require additional preparation (for construction and operation purposes) beyond what is required for land-based, IDTs.

The IDT construction personnel and related construction equipment are included in the GBI construction. Potential impacts to energy, water, wastewater, and solid waste are included in section 4.1.12.2.

Operation

The IDT site would require three onsite support personnel when in operation. When not in operation, the onsite backup generators would be tested for approximately 45 minutes every 2 months. The personnel associated with the IDT would be part of the personnel (up to a maximum of 235) required to support an interceptor launch.

4.1.12.2.4 Sensors

Construction

These systems are mobile and would be brought to the vicinity of the launch site approximately 1 to 2 weeks before the launch site. No construction would be involved.

Operation

Implementation of Alternative 1 would include operation of mobile telemetry systems. The telemetry sites would be located in a level gravel area 200 by 200 feet (61 by 61 meters) in the vicinity of the #1 entry road and southwest of the Loran Station on KLC. Other up-range telemetry locations that may be used in other parts of Alaska include Soldotna, Kenai, Cordova, and Homer on the Kenai Peninsula, in south-central Alaska; and King Salmon and Adak Island in southwest Alaska.

These systems would be transported to Kodiak. Once onsite, they would remain in position until the launch event has been complete. In most cases the equipment would be removed within days after the launch. The personnel associated with the launch of a target missile would operate these systems.

Energy

The mobile telemetry systems would include dual 10-kW generators. Operation of the sensors would not require any additional electricity. Current capacities would not be exceeded. No adverse impacts would be anticipated.

Water

Domestic water usage represents the water consumed by the operation personnel in the ROI. In this case, the target missile launch personnel would operate these systems, therefore, no additional over the 150 personnel already involved in target operations would be needed to operate the sensors.

Wastewater

The target missile launch personnel would operate these systems; therefore, no additional personnel over the 150 personnel already involved in target operations would be needed to operate the sensors.

Solid Waste

The target missile launch personnel would operate these systems; therefore, no additional personnel over the 150 personnel already involved in target operations would be needed to operate the sensors.

4.1.12.2.5 TPS-X

Construction

Installation of the TPS-X radar would require disturbance to 0.3 hectare (0.8 acre) of land on KLC for placement of a concrete pad**.** Potential impacts to energy, water, wastewater, and solid waste are included in section 4.1.12.2.

Operation

At KLC, the Prime Power Unit for the TPS-X would be a 1.5-MW generator that would provide power to the radar during testing. The generator is assumed to be in operation for 3 weeks (24 hours a day, 7 days a week) five times a year during launch activities. The total time of operation is estimated at a maximum of 2,520 hours per year. Operation of the Prime Power Unit would require refueling operations, the fuel tank being filled from a fuel truck, as necessary. Such operations are routine and would have no impact on area utilities.

4.1.12.3 Alternative 2

Under Alternative 2, GBIs would be launched from Vandenberg AFB instead of KLC. Thus, there would be no construction or operations related to GBI and its associated support. However the other components described in Alternative 1 would remain the same and the impacts would be the same.

4.1.12.3.1 Target

The impacts to utilities (energy, water, wastewater, and solid waste) from construction of a target launch pad and associated support facilities and the launch of single and dual targets from KLC would be similar to what was discussed in section 4.1.12.2.2.

4.1.12.3.2 Sensors

The impacts to utilities (energy, water, wastewater, and solid waste) from operation of target sensors on KLC or other parts of southwestern Alaska would be similar to that discussed in section 4.1.12.2.4.

4.1.12.4 Alternative 3

Implementation of Alternative 3 would combine activities proposed for Alternative 1 and Alternative 2 and would include GBI launches from both KLC and Vandenberg AFB and construction of the required facilities. Therefore, the impacts to utilities (energy, water, wastewater, and solid waste) from Alternative 3 would be similar to those found under Alternative 1.

4.1.12.5 Cumulative Impacts

The KLC EA indicated no significant impacts to utility systems from nine annual launches (Federal Aviation Administration, 1996). Although direct impacts from the Proposed Action on potable water and wastewater would eventually exceed current capacity, these impacts would be localized and this increased demand would be circumvented by the addition of potable water and septic systems to handle any increase over current capacity. The Proposed Action, involving a maximum of five launches, in conjunction with current planned or anticipated launches at KLC would not result in any cumulative impacts to KLC utilities. In addition, there are no other ongoing or foreseeable future programs taking place in the ROI that would result in cumulative impacts.

4.1.12.6 Mitigation Measures

Direct impacts to water and wastewater demand and capacity, as previously addressed, would be mitigated by the addition of new potable water and septic systems. No significant impacts to utilities systems would be anticipated and additional mitigation measures would not be required or proposed.

4.1.13 VISUAL AND AESTHETIC RESOURCES—KODIAK LAUNCH COMPLEX

4.1.13.1 No Action Alternative

Missile Defense Agency

Under the MDA's No Action Alternative, launches would continue to occur from KLC but the GMD ETR would not be established and interceptor and target launch scenarios would not be tested under more operationally realistic conditions. There would be no alternation of the existing visual setting at KLC and the adjacent area. No significant impacts to visual and aesthetic resources would occur, and no mitigation measures are proposed.

Federal Aviation Administration

Under the FAA's No Action Alternative, the launch site operator license for KLC would not be renewed and no launches would be allowed to occur from KLC. Therefore, there would be no impacts to visual and aesthetic resources from launches at KLC.

4.1.13.2 Alternative 1

Visual impacts may be associated with changes in either the built or natural environment and can be short term or long term. The presence of heavy machinery during construction of the project is considered a short-term visual impact. Large trucks, cranes, and other construction equipment would be visible within the construction zone and in surrounding areas only during the construction phase. Long-term visual changes are associated with altering the existing visual environment by constructing buildings, including one with a very high vertical profile. The focus of this analysis is those long-term physical changes that are permanent in nature.

The construction and operation of the proposed GMD facilities at KLC would affect the visual resources of Narrow Cape by introducing new structures into a relatively isolated area that has both natural and man-made elements. The proposed KLC infrastructure for launching targets and interceptors would involve the construction of new structures and facilities to support the GMD program at various locations within the launch complex. Proposed new facilities are described in section 2.3.1.1.

Construction of these facilities would place additional man-made, mostly pre-engineered buildings that are color compatible to the existing facilities, into an area that is regionally scenic, but has a somewhat disturbed local viewscape. Several of the proposed structures, including the missile assembly building (18 meters [60 feet] high), would change the view horizon. Other proposed buildings, such as the IDT, would have a noticeable horizontal presence.

Because of its relative isolation and restricted access, the Narrow Cape area has few viewers who would be considered sensitive. There are no residences in the immediate vicinity of KLC, and the nearest park is approximately 10 kilometers (6 miles) away. The existing AADC facilities along with the U.S. Coast Guard's 190-meter-high (625-foot-high) Loran-C navigation transmitter tower and associated white-colored buildings already have a visual presence that alters the natural viewscape of the area. Due to the isolation of the proposed facilities, the lack of sensitive viewers, and the existence of other man-made elements in the area, the Proposed Action would not have a significant impact on aesthetic or visual resources.

4.1.13.3 Alternative 2

The construction and operation of target facilities at KLC for Alternative 2 would be the same as that for Alternative 1. An IDT and GBI related facilities would not be constructed at KLC. As discussed under Alternative 1, the Proposed Action would not have a significant impact on aesthetic or visual resources.

4.1.13.4 Alternative 3

Alternative 3 would be identical to Alternative 1 at KLC. Because Alternative 1 includes GBIs, targets, and all associated facilities, the construction and flight impacts to visual and aesthetics from Alternative 3 would be as described for Alternative 1.

4.1.13.5 Cumulative Impacts

Although construction of new facilities would result in visual cumulative impacts, the area proposed for development is already designated as a commercial launch facility.

4.1.13.6 Mitigation Measures

No visual resources mitigation measures are proposed for the GMD ETR activities at KLC.

4.1.14 WATER RESOURCES—KODIAK LAUNCH COMPLEX

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.

A proposed alternative would cause an adverse and significant impact on water resources if it would cause:

- A violation of applicable state or federal water quality standards, or inconsistencies with related stormwater pollution prevention plans, or other applicable water quality-related plans, policies, or permit conditions
- Major changes in existing drainage and runoff patterns that alter the course of existing waterways or exceed the capacity of existing stormwater drainage systems
- An increase in the use of consumptive water supplies to the point where the capacity of existing supply systems would not be adequate and new water supply sources would be needed
- Or would otherwise substantially degrade water quality

Best Management Practices and other SOPs 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 SOPs that apply to each of the action alternatives are listed below. Mitigation commitments from previous environmental studies that are unique to a site or activity are described under the related alternative.

- 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

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

4.1.14.1 No Action Alternative

Missile Defense Agency

Under the MDA's No Action Alternative, launches would continue to occur from KLC but the GMD ETR would not be established and interceptor and target launch scenarios would not be tested under more operationally realistic conditions. Table 4.1.1-1 summarizes the propellant information associated with these launches. The primary exhaust products from launches at KLC to date include hydrogen chloride, carbon monoxide, nitrogen oxide and aluminum oxide. These products would continue to be released and dispersed over large areas, with some of the emissions landing on surface water resources, or soil where they may enter the area's water resources at a later time. The existing water quality monitoring required by KLC's 401 Water Quality Assurance Permit from the Alaska Department of Environmental Conservation, and the implementation of related components of the KLC Natural Resources Management Plan (NRMP) would continue under all of the alternatives assessed in this EIS, including the MDA's No Action Alternative. Water quality monitoring and the KLC NRMP are described further in section 4.1.14.2.

Federal Aviation Administration

Under the FAA's No Action Alternative, the launch site operator license for KLC would not be renewed and no launches would be allowed to occur from KLC. Therefore, there would be no impacts to water resources from launches at KLC.

4.1.14.2 Alternative 1

4.1.14.2.1 Ground-Based Interceptors

Construction

Construction of the new GBI related facilities as described in section 2.3.1.1 has the potential to disturb approximately 14.4 hectares (35.5 acres) and cause adverse water quality impacts to nearby surface waters. These construction-related impacts could include an increase in the discharge of sediments and turbidity levels in receiving waters. Construction crews may accidentally spill some of the material used during construction procedures or by construction vehicles, including fuel, cement, paint, anti-freeze, oil, etc. None of these construction-related impacts are expected to be significant. The SOPs discussed in the beginning of section 4.1.14 and the commitments included in the KLC NRMP (described in the next paragraph) are all 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 KLC NRMP commitments include such measures as collecting and disposing of sewage off-site, monitoring of soil conditions, periodic inspection by a designee of AADC 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 (Alaska Aerospace Development Corporation, 1998). All of the SOPs and water quality-related elements of the KLC NRMP would be reviewed with Alaska Department of Environmental Conservation staff during consultations for the project's required 401 Water Quality Assurance Permit. A related Stormwater Pollution Prevention Plan would be prepared before construction for the Alaska Department of Environmental Conservation (or the existing Plan would be amended) and would specify all of the measures to be used during construction to minimize and avoid adverse water quality impacts.

Potable water would be transported to facility sites during construction. Some water would be pumped from East Twin Lake for temporary use at the project's cement batch plant and for emergency, fire-fighting purposes. Compared to the lake's capacity (about 57 million liters [15 million gallons]) and average recharge rate (estimated to be 871 liters [230 gallons] per minute), this temporary use of water would represent a minor impact.

Operation

Pre-Launch, Flight and Post-Flight Activities

This section addresses potential impacts that could occur during any of the operational phases. The next section describes potential impacts unique to the flight operational phase.

Hazardous materials would be used during operational phases and such use has the potential to cause adverse and significant water quality impacts. As described in section 3.1.6, numerous SOPs, a spill prevention plan, and emergency response plan are currently in place and being used at KLC and would continue to be used under this alternative. These measures would minimize the risk of accidental spills to an acceptable level and significant and related water quality impacts would not occur.

The leaching of domestic sewage wastewater from septic tanks would occur as designed during operations.

Potable water used during operations would come in part from the existing water supply system. As noted in section 4.1.12.2, insufficient capacity exists in the current system to handle the increases in demand associated with this alternative. Therefore, new water supply sources would be needed. It is anticipated that packaged potable water systems, similar to the existing water systems, would be installed to meet the GMD requirements. The packaged system (well, pump, and above ground storage tank) would be located within the construction footprint of the proposed GMD facilities. Permits would be obtained from the Alaska Department of Environmental Conservation for construction and use of the water supply systems.

Flight Activities

The missiles launched from KLC under this alternative would disperse certain exhaust emission products over a large area. These emissions would not cause a significant water quality impact. The primary emission products of concern from a water quality-standpoint are hydrogen chloride (which combines with water or water vapor in the atmosphere and forms hydrochloric acid, or hydrogen chloride) and aluminum oxide. (See table 4.1.1-10 for more information regarding the amounts and type of emissions from launched rockets.) In any one area of the ROI, only small amounts of these combustion products would be present. For example, the 1996 KLC EA estimated the launching of an Athena-2 rocket would result in a maximum deposition of 0.427 grams of hydrogen chloride per square meter of surface area over a 10 square kilometer area (4 square miles) (Federal Aviation Administration, 1996). These small amounts of hydrogen chloride would be transitory given the area's hydrologic characteristics and climate. The contaminants would be quickly washed out of the area's relatively short and steep drainages during and after frequent precipitation events.

Aluminum oxide also would be emitted during missile launches and deposited in ROI surface waters. However, aluminum oxide is only a hazard to aquatic life in acidic environments when it dissolves into a free aluminum cation (Federal Aviation Administration, 1996). Aluminum oxide should not dissolve in water with pH levels between 5 and 9.5 because aluminum hydroxide, a much more soluble compound than aluminum oxide, is insoluble between pH levels 5 and 9.5 (Strumm and Morgan, 1970). As summarized in *Summary Findings of KLC Environmental Monitoring Studies 1998-2001* (Alaska Aerospace Development Administration, 2002), water quality sampling and analysis indicate there have been no discernable effects on water chemistry from KLC launches to date. Water quality was sampled before and after KLC launches, including pH level, total aluminum, and perchlorate concentration. Samples were taken at various locations as shown in figure 3.1.14-1. The levels for pH, measured in streams 2, 4 7b, and 8, ranged from 6.1 to 7.8. Table 4.1.14-1 provides results of the sampling for total aluminum and perchlorate concentration.

As shown in the table, total recoverable aluminum was detected in very low concentrations in the three water bodies sampled, but these did not exceed levels considered to be toxic to aquatic life and were comparable to values found elsewhere in Alaska. Although not shown, there was no associated decrease in pH to warrant concern from aluminum toxicity. As a result of the monitoring, the Environmental and Natural Resources Institute recommended long term pH monitoring.

Table 4.1.14-1: Total Aluminum and Perchlorate Concentration

Location	Date	Total Aluminum (microgram/L)	Perchlorate
Stream 2	8 Nov 01	6.1	Non detect
	9 Nov 01	15.0	Non detect
Stream 4	8 Nov 01	No Sample	Non detect
	9 Nov 01	No Sample	Non detect
Stream 7b	8 Nov 01	37	Non detect
	9 Nov 01	104	Non detect
Stream 8	8 Nov 01	8	Non detect
	9 Nov 01	47	Non detect

Measurable or significant impacts to ocean water quality from launches are not expected. Spent rocket cases are composed of inert materials and do not represent a threat to water quality once their propellants are burned (Federal Aviation Administration, 1996). Early termination of a flight would lead to some amount of propellant reaching the ground, surface waters, or the ocean. The propellant is an inert, solid rubber material impregnated with ammonium percholate salt. A recent study conducted for the U.S. Air Force (Lang, et al, 2000) 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. Table 4.1.14-2 presents the results.

Table 4.1.14-2: Estimated Time to Reach 90 Percent Mass Loss of Perchlorate from Propellant Sample

Water Type	Water Temperature (Celsius)	Hours	Days
Deionized water	29	4,700	196
	20	8,000	333
	5	92,000	3,833
Salt Water	29	6,500	271
	20	13,000	542
	5	160,000	6,667

The same report provided an average water temperature at a buoy in Alaska as 8.3˚C (47˚F). As shown in the table, it would take approximately 18 years for 90 percent of the perchlorate to leach out of solid propellant that lands in the ocean. For fresh water areas the temperature would be higher, and it would take about 1 year for 90 percent of the perchlorate to leach out. Even at this higher rate the perchlorate would be expected to be diluted as it mixes with the surrounding water. For an accident involving fresh water areas, larger pieces of propellant would be recovered, further minimizing the potential for perchlorate contamination.

4.1.14.2.2 Targets

Construction

Construction of the new target facilities has the potential to disturb approximately 10.5 hectares (26.0 acres) and cause the same type of construction-related water quality impacts described in section 4.1.14.2.1. Like the GBI-related construction, the SOPs and KLC NRMP commitments discussed in section 4.1.14.2.1 would prevent the target facility-related construction impacts from being significant.

Operation

Pre-Launch, Flight and Post-Flight Activities

The types of operations-related water resource impacts discussed in section 4.1.14.2.1, and common to pre-launch, flight and post-launch activities, would also be associated with the target launches included in this alternative. These impacts would be minor for the same reasons described in section 4.1.14.2.1.

Flight Activities

Target launches under this alternative would be similar to existing target launches at KLC. Table 4.1.1-10 in section 4.1.1.2.2 shows the expected emissions associated with these launches. While some deposition of these emissions would occur on freshwater and ocean surface waters, these depositions would not be a significant impact for the reasons described in section 4.1.14.2.1.

4.1.14.2.3 In-Flight Interceptor Communication System Data Terminal

Construction

Construction of the IDT, COMSATCOM and connecting roads would cause a minor increase in the discharge of sediments to receiving waters. These waters may also receive some construction-related pollutants, especially if materials are accidentally spilled by construction crews. However, the area to be disturbed is relatively small (approximately 2.1 hectares [5.3 acres]), and the SOPs and KLC NRMP-related commitments described in section 4.1.14.2.1 would prevent these impacts from being significant.

Existing water utilities are sufficient to handle the minor increase in demand for potable water during construction. Therefore, new water sources would not be needed.

Operation

Operation of the IDT and COMSATCOMs would have negligible effects on water quality. Potable water demands associated with the operation of these facilities can easily be served by existing infrastructure.

4.1.14.2.4 Sensors

Construction

The construction of two gravel pads for mobile telemetry would have very little impact on water quality. Minor amounts of sediment may enter nearby drainages, but these impacts would be minor.

Operation

Negligible amounts of motor oil or other automotive-related products may enter nearby drainages as vehicles associated with mobile units use the gravel pads and related roads. These impacts would be minor.

4.1.14.2.5 TPS-X Radar

The TPS-X construction and operation requirements and potential impacts to water resources would be similar to that described above for the IDT. The alternative locations are the same and the potential impacts would be similar.

4.1.14.3 Alternative 2

4.1.14.3.1 Targets

The impacts of target-related construction and operational activities on water resources under this alternative would be very similar to those described for Alternative 1 in section 4.1.14.2.2. The total acreage disturbed would be the same as for Alternative 1. None of the impacts would be significant.

4.1.14.3.2 Sensors

The impacts of sensor-related activities at KLC on water resources under this alternative would be the same as those described for Alternative 1 in section 4.1.14.2.4.

4.1.14.4 Alternative 3

Because Alternative 1 includes GBIs, targets, and all associated facilities, the construction and flight impacts to water resources from Alternative 3 would be as described for Alternative 1.

4.1.14.5 Cumulative Impacts

The Proposed Action and its alternatives are not expected to combine with related past, ongoing, or reasonably foreseeable actions to cause substantial cumulative impacts to water resources. Existing missile launches at KLC combined with the launches included in the Proposed Action would result in minor, short-term adverse water quality impacts in those areas where rocket emissions are deposited. For the same reasons described in section 4.1.14.2.1, such impacts would not be significant. Past construction at KLC combined with the new construction included in the Proposed Action and its alternatives would cause cumulative, but minor and temporary, increases in stormwater runoff and related discharges of sediments in affected drainages. These insignificant impacts have and would occur in drainages near paved areas or areas that are proposed to be paved. Such impacts have been and will continue to be minimized by construction SOPs and other commitments included in the related Stormwater Pollution Prevention Plan. Additional ongoing or foreseeable actions that would contribute to cumulative impacts to water resources have not been identified.

4.1.14.6 Mitigation

No water resources mitigation measures are proposed for the GMD ETR activities at KLC.

4.1.15 SUBSISTENCE—KODIAK LAUNCH COMPLEX

The subsistence resources analytical approach involved evaluating the potential impacts of the Proposed Action and alternatives, such as construction, site preparation activities, use of existing and new sensors, and missile launches, on potential subsistence harvest access within the ROI.

4.1.15.1 No Action Alternative

Missile Defense Agency

Under the MDA's No Action Alternative, launches would continue to occur from KLC but the GMD ETR would not be established and interceptor and target launch scenarios would not be tested under more operationally realistic conditions. Native Alaskans would continue to be allowed access to KLC for subsistence harvests between launches. According to the KLC EA, to ensure public safety, access to some areas would be prohibited for a day up to nine times per year before a launch, which would result in minimal impacts to subsistence harvesting.

Federal Aviation Administration

Under the FAA's No Action Alternative, the launch site operator license for KLC would not be renewed and no launches would be allowed to occur from KLC. Therefore, there would be no closure of areas to subsistence harvesting during launches at KLC.

4.1.15.2 Alternative 1

The Proposed Action would require construction at KLC as described in section 2.3.1.1. New construction would occur mainly in upland areas, which would not impact the subsistence harvest of marine species.

Limitation of access for Alternative 1 would be mainly because of safety and security precautions taken before and during a launch to ensure that no unauthorized people are within the Ground Hazard Area around the launch site. Access would be limited for 1 day for each GBI or target missile launch, approximately 5 days per year for GMD launches. Since the Narrow Cape area hosts only a limited amount of subsistence harvesting and the entire coast from Pasagshak Bay to the southern end of the island is a harvesting area, temporarily restricting public access during GMD ETR pre-launch and launch activities as part of the activities would not be significant.

4.1.15.3 Alternative 2

The Proposed Actions at KLC under Alternative 2 would be identical to those described under Alternative 1, except GBI launches would occur from Vandenberg AFB and RTS instead of KLC and RTS. Potential restricted access to KLC would be as described for Alternative 1.

4.1.15.4 Alternative 3

Alternative 3 would be identical to Alternative 1 at KLC and would include GBI launches from both KLC and Vandenberg AFB, and construction of the required support facilities. Because Alternative 1 includes GBIs, targets, and all associated facilities, the construction and flight impacts to from Alternative 3 would be as described for Alternative 1.

4.1.15.5 Cumulative Impacts

The KLC EA indicated no cumulative impact to subsistence harvest for nine annual launches (Federal Aviation Administration, 1996). It is not likely that the Proposed Action, in conjunction with current planned or anticipated launches, would exceed this level of activity. No other activities have been identified that when combined with any of the alternatives would contribute to cumulative impacts to subsistence on or near KLC.

4.1.15.6 Mitigation Measures

No subsistence mitigation measures are proposed for the GMD ETR activities at KLC.

4.2 MIDWAY

The Proposed Action in the Mid-Pacific is the same for all three Alternatives; therefore, the environmental consequences would be the same for all.

4.2.1 AIR QUALITY—MIDWAY

4.2.1.1 No Action Alternative

Under the No Action Alternative, IDT and COMSATCOM facilities would not be constructed for the GMD ETR and Midway would continue to serve as a National Wildlife Refuge under direction of the USFWS. There would be no impact to air quality.

4.2.1.2 Alternatives 1, 2, and 3

4.2.1.2.1 In-Flight Interceptor Communication System Data Terminal

Construction

Construction activities would include construction of one IDT, COMSATCOM, and fenced areas surrounding the facilities at one of the two proposed sites. Both sites are located on existing paved areas; therefore, ground disturbance would be kept to a minimum with only minimal emissions generated during construction.

Construction would be conducted in accordance with applicable federal and state regulations and permits. Construction air quality impacts would be both temporary and localized in nature. Once construction would be completed, air quality would return to its former level.

Operation

Operation of the IDT and COMSATCOM would not result in long term or permanent impacts to the regional air quality. Power would be provided by a commercial source with a 250-kW backup generator. Along with the generator, an external aboveground 3,785-liter (1,000-gallon) fuel tank would be provided. Table 4.2.1-1 lists potential emissions for the generator if it is run up to 250 hours a year for weekly testing and power outages.

Table 4.2.1-1: Potential Generator Emissions for IDT and COMSATCOM Facilities at Midway

Generator	Emissions (250 hours/year)			
	Oxides of Nitrogen metric tons (tons)	Hydrogen Chloride metric tons (tons)	Carbon Monoxide metric tons (tons)	PM-10 metric tons (tons)
275 kW Diesel Generator	0.6 (0.7)	0.09 (0.10)	0.80 (0.90)	0.03 (0.04)

4.2.1.2.2 Sensors

Construction

Mobile Telemetry would utilize an existing gravel pad or paved area.

Operation

Minor air quality impacts are expected during the operation of the mobile telemetry at Midway. Power would be provided by a 10-kW generator, which is assumed to be in operation for 3 weeks (24 hours a day, 7 days a week) five times a year during test activities. The total operating is estimated at a maximum of 2,520 hours per year. Table 4.2.1-2 lists the possible emissions that could be generated.

Table 4.2.1-2: Potential Generator Emissions for IDT and COMSATCOM Facilities at Midway

Generator	Emissions (250 hours/ year)			
	Oxides of Nitrogen metric tons (tons)/year	Hydrogen Chloride metric tons (tons)/year	Carbon Monoxide metric tons (tons)/year	PM-10 metric tons (tons)/year
10 kW Diesel Generator	0.23 (0.26)	0.036 (0.036)	0.29 (0.32)	0.01 (0.02)

4.2.1.3 Cumulative Impacts

The limited construction and operation of the IDT and COMSATCOM when combined with current activities on Midway are not expected to result in significant cumulative air quality impacts.

4.2.1.4 Mitigation Measures

No air quality mitigation measures are proposed for the GMD ETR activities at Midway.

4.2.2 BIOLOGICAL RESOURCES—MIDWAY

The Proposed Action in the Mid-Pacific is the same for all three Alternatives; therefore, the environmental consequences would be the same for all.

4.2.2.1 No Action Alternative

Under the No Action Alternative, IDT and COMSATCOM facilities would not be constructed for the GMD ETR and Midway would continue to serve as a National Wildlife Refuge under direction of the USFWS. There would be no impact to biological resources.

4.2.2.2 Alternatives 1, 2, and 3

The Proposed Action would require construction and operation of an IDT and two COMSATCOMs, and operation of mobile telemetry. Installation and operation of the IDT and COMSATCOMs, as well as operation of the sea-based IDT, would follow all applicable procedures in place at Midway to prevent the introduction of alien nuisance species.

GMD ETR program personnel would remove all mobile equipment/assets brought to the installation at the conclusion of its testing activities. Transportation for removal of equipment would be the same as when it was brought into the installation. 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.

Site Preparation Activities

Vegetation

The IDT on Midway would require construction of an IDT on an existing paved area or pad within a fenced area. The fencing would be installed in the smallest area practicable, no more than 2 hectares (5 acres). The IDT would be located in previously disturbed areas to further minimize impacts to vegetation and would avoid areas of beach strand vegetation.

The two COMSATCOMs require a footprint of approximately 0.14 hectare (0.34 acre) each within a fenced area to accommodate the COMSATCOM and equipment. The COMSATCOMs would be placed on existing previously disturbed paved areas to further minimize impacts to vegetation. They would also be located within the IDT fenced area. A communication cable to the IDT would be installed along an existing road. Minimal requirements include a concrete base for the COMSATCOMs, an all-weather road to the site, and a prepared surface around the site at least 4.6 meters (15 feet) wide.

Threatened and Endangered Plant Species. No federally proposed or listed candidate, threatened, or endangered plants are located on Midway Atoll.

Wildlife

Construction activities would occur on previously disturbed ground and would not significantly impact wildlife. Primary power would be from a commercial source with backup power provided by generator. Noise from the generator may temporarily startle adjacent wildlife, but no long-term impacts are anticipated.

Threatened and Endangered Wildlife Species. No impacts are anticipated to the short-tailed albatross, Hawaiian monk seal, or basking sea turtles, which would all be located along the beach or nearshore water. Personnel would be instructed to stay at least 31 meters (100 feet) away from monk seals on the beach in accordance with current rules.

Environmentally Sensitive Habitat

The small wetland on the island, critical habitat for the Hawaiian monk seal, which is not located on Sand Island, and established Marine Protected Areas would not be affected by site preparation activities.

Operation

Vegetation

No impacts to vegetation would result from operation of the IDT and COMSATCOMs.

Wildlife

During normal operations, the IDT would not transmit except for a few minutes during annual testing of the equipment. Given the short duration of transmission, no adverse impacts to biological resources are anticipated. Most operational impacts to wildlife from the IDT and COMSATCOMs would come from security lighting and noise from backup electrical generators required for the site. The lighting and noise could encourage species less tolerant of these disturbances to avoid the area. Generator noise could range from 80 to 85 dBA at up to 105 meters (344 feet). These noise levels would only occur a couple of hours a week during maintenance activities required for backup generators, with minimal impact to wildlife adjacent to the site. USFWS-approved lighting would be installed as required.

Threatened and Endangered Wildlife Species. No impacts are anticipated to the short-tailed albatross, Hawaiian monk seal, or basking sea turtles, which are all located along the beach or nearshore water outside of the highest noise levels. Personnel would be instructed to stay at least 31 meters (100 feet) away from monk seals on the beach in accordance with current rules.

Environmentally Sensitive Habitat

The small wetland on the island, critical habitat for the Hawaiian monk seal (which is not located on Sand Island), and established Marine Protected Areas would not be affected by site preparation activities.

4.2.2.3 Sensors

Mobile Telemetry would be set up on an existing gravel pad or paved area. Operation of a 10 kW generator would cause noise levels of 80 to 85 dBA at up to 344 feet (105 meters). These noise levels would occur 24 hours per day for up to 3 weeks, five times per year in support of missile flight tests, with minimal impact to wildlife.

4.2.2.4 Cumulative Impacts

The limited operation of the IDT and COMSATCOMs when combined with current activities on Midway is not expected to result in cumulative impacts to vegetation or wildlife.

4.2.2.5 Mitigation Measures

No biological resources mitigation measures are proposed for the GMD ETR activities at Midway.

4.2.3 HAZARDOUS MATERIALS AND HAZARDOUS WASTE—MIDWAY

A general description of impact on hazardous material and waste management is provided in the beginning of section 4.1.6. Pollution prevention, recycling, waste minimization, IRPs, USTs, ASTs, asbestos, lead-based paint, and PCBs have been considered. Potential impacts from GMD ETR activities are addressed as applicable.

4.2.3.1 No Action Alternative

Under the No Action Alternative, IDT and COMSATCOM facilities would not be constructed for the GMD ETR and Midway would continue to serve as a National Wildlife Refuge under direction of the USFWS. There would be no impact to hazardous materials and waste management practices at Midway.

4.2.3.2 Alternatives 1, 2, and 3

4.2.3.2.1 In-Flight Interceptor Communication System Data Terminal

Installation and operation of an IDT and COMSATCOMs, in and of itself, would have minimal impact on the atoll with respect to hazardous materials use or hazardous waste generation. In accordance with DoD requirements, hazardous materials management would be planned into the installation and operation activities from conceptual design forward.

Construction

IDT and COMSATCOM construction would essentially be the same as routine commercial construction of a small communications facility and would result in only minor disturbance of the immediate area. Equipment would be fabricated prior to delivery, and only final assembly would be required on site. “Environmentally preferable” materials would be used where possible. Potentially hazardous materials such as adhesives, paints and low-toxicity cleaning products would be used to install and maintain the equipment and diesel fuel would be used for electrical generator operation. Only the minimal quantity of material necessary to perform the work would be transported to the atoll. Pollution Prevention, Recycling, and Waste Minimization would be practiced in accordance with applicable EPA, State of Hawaii, DoD, U.S. Army, and USFWS requirements. IRP sites from the Navy CLEAN program would not be affected.

Temporary storage tanks and other facilities for the storage of hazardous materials would be located in protected and controlled areas designed to comply with site-specific spill prevention and countermeasure plans. Hazardous wastes generated during construction would consist of materials such as waste oils, hydraulic fluids, cleaning fluids, cutting fluids, and waste antifreeze. The minimal quantities of hazardous waste that could potentially be generated would be containerized and returned to Hawaii and/or the continental United States by the individual contractors for disposal.

Any spill of a hazardous material or hazardous waste that may occur during construction would be quickly remediated in accordance with the contractor's Stormwater Pollution Prevention Plan and Project SPCC Plan that would be developed. All hazardous materials used and hazardous waste generated during construction would be handled in accordance with applicable federal, state, and local regulations.

Operation

IDT operation would utilize electrical power for sending and receiving signals. Electrical power could be from the local electrical grid or from a dedicated standby diesel generator. Diesel fuel for the generator would be stored in ASTs. The ASTs would be double walled and have secondary containment to conform to API standards. No USTs would be used.

Although not normally considered hazardous waste (designation varies by state), used POL would be generated in small amounts. Tank bottoms from the ASTs would be withdrawn periodically and the fuel disposed of as used (nonhazardous) POL. Generator engine oil changes would likewise result in generation of small amounts of used motor oil. Also, small amounts of potentially hazardous waste would be generated by maintenance and housekeeping activities at the site. Handling of disposal of the minimal quantities of hazardous waste generated from IDT operation would the same as discussed under IDT construction.

4.2.3.2.2 Sensors

Mobile Telemetry operation impacts would be similar to that described above for the IDT. A 10-kW generator would provide power to the mobile telemetry. Handling of POL waste would be as described for the IDT.

4.2.3.3 Cumulative Impacts

The limited operation of the IDT and COMSATCOM when combined with current and planned activities at Midway is not expected to result in cumulative hazardous materials and hazardous waste impacts.

4.2.3.4 Mitigation Measures

No hazardous waste management/hazardous materials mitigation measures are proposed for the GMD ETR activities at Midway.

4.3 REAGAN TEST SITE

Potential impacts of construction, building modification, and missile launches on air quality, biological resources, hazardous materials and waste, and health and safety have been addressed in detail in the applicable NEPA documents listed in appendix A, such as the USAKA Supplemental EIS and the USAKA Temporary ETR EA. Based on the prior analyses in those documents, and the effects of past target and interceptor launch activities, the potential environmental impacts from the proposed GMD activities are expected to be minimal, as discussed in the following sections.

4.3.1 AIR QUALITY—REAGAN TEST SITE

4.3.1.1 No Action Alternative

As described in section 2.2.1, missile flight test activities would continue at RTS. As determined in the Theater Missile Defense ETR EIS (U.S. Army Space and Strategic Defense Command, 1994) and the Supplemental USAKA EIS (U.S. Army Space and Strategic Defense Command, 1993) emissions from a typical launch at RTS (i.e., one strategic launch vehicle) are assumed to be 7.14 metric tons (7.88 tons) of carbon monoxide, 5.18 metric tons (5.71 tons) of hydrogen chloride, and 9.27 metric tons (10.22 tons) of aluminum oxide. In the USAKA Supplemental EIS (U.S. Army Space and Strategic Defense Command, 1993) air emission modeling was performed to predict maximum short-term concentration of the previously mentioned exhausts. The exhaust emission presented in the USAKA Supplemental EIS is shown in table 4.3.1-1. The worst-case scenario depicted the simultaneous launch of six strategic launch vehicles. Even with such large amounts of exhausts being emitted, the modeling results predicted that no UES or guidance levels would be exceeded

Table 4.3.1-1: Predicted Impacts from Launch Emissions at RTS

Pollutant	Averaging period	UES Ambient Air Quality Standards or Noncriteria Pollutant Guidance Level (milligrams per cubic meter)	Six Simultaneous Launches of Strategic Missiles (milligrams per cubic meter)
Carbon Monoxide	1-hour	40	0.00703
	8-hour	10	0.00492
Hydrogen Chloride	1-hour	1.5	0.393
Aluminum Oxide	8-hour	10	5.924

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

4.3.1.2 Alternative 1

4.3.1.2.1 Ground-Based Interceptors

Construction

Alternative 1 would only require minor interior modifications to existing facilities on Meck; therefore, there would be no air quality impacts to the regional air quality due to construction.

Operation

Pre-Launch Activities

Operation activities for single and dual GBI launches at RTS up to five times a year would be similar to those described in section 4.1.1.2.1 for KLC. An accidental release of liquid fuel and liquid oxidizer from the EKV would be similar to that described for KLC (table 4.1.1-3). The implementation of approved emergency response plans would limit the impact of such a release. While not defined in detail, pre-launch activities would be expected to result in very low, insignificant emissions.

Offsite power sources with backup emergency generators would continue to be used for the existing facilities at RTS. Exhausts at RTS are covered under an existing Document of Environmental Protection.

Launch Activities

Launch activities for a single or dual launch would be similar to previous launches at RTS. Possible emissions that would result from a GBI launch are listed in table 4.1.1-6. As described in section 3.3.1, air quality at RTS is considered good. It is expected that background levels would not add significantly to the ambient air concentrations.

Potential GBI exhaust emissions are 0.2 to 0.3 times the level of the launches modeled in the No Action Alternative, as shown in table 4.3.1-2. It is anticipated that the air quality impacts due to the dual launch of GBIs would be less than those modeled for six simultaneous strategic missile launches in the Supplemental USAKA EIS. The proposed GBI missile would not be expected to cause a significant impact to regional air quality surrounding RTS.

Table 4.3.1-2: Predicted Exhaust Emissions at RTS

GBI Configuration	Carbon Monoxide metric tons (tons)	Hydrogen Chloride metric tons (tons)	Aluminum Oxide metric tons (tons)
Six Strategic Missiles	42.9 (47.3)	31.1 (34.2)	55.6 (61.3)
Dual Orion 50 SXLG	9.6 (10.6)	9.6 (10.6)	16.3 (17.9)
Dual BV/BV+	10.5 (11.5)	8.9 (9.8)	17.9 (18.5)

Post-Launch Activities

Activities performed during post GBI launch would include the removal of all mobile equipment and assets brought to RTS. The removal could result in small localized amounts of fugitive dust, which would have a minor impact to air quality. However this impact would be minimized further through the use of dust suppression methods previously discussed.

4.3.1.2.2 Targets

Construction

With the implementation of Alternative 1, similar minor modifications to existing facilities at RTS for GBI launches would occur for target launches. An older silo would be modified to accommodate some target missiles. A new launch pad on Meck would be required to support dual target launches. A new launch pad would disturb approximately 0.4 hectare (1.0 acres) during construction. Table 4.3.1-3 show potential construction emissions.

Table 4.3.1-3: Potential Construction-Related Emissions for Target Facilities at RTS

Source	Emission Factor kg/hectare (lb/acre)	Graded Area hectare/yr (acres/yr)	Exposed days/yr	Emissions kg/yr (lbs/yr)	Emissions metric tons/year (tons/yr)
Bulldozing	1,046 (933.1)	0.4 (1.00)	NA	423 (933)	0.4 (0.5)
Grading	1.5 (1.3)	0.4 (1.00)	NA	0.5 (1)	0.0006 (0.0007)
Vehicle Traffic	1,019 (909)	0.4 (1.00)	NA	412 (909)	0.4 (0.5)
Erosion of Soil Piles	0.17 per day (0.15 per day)	0.4 (1.00)	90	6 (14)	0.006 (0.007)
Erosion of Graded Surface	30.0 per day (26.4 per day)	0.4 (1.00)	90	1,078 (2,376)	1.1 (1.2)
	TOTAL			1,920 (4,233)	2.0 (2.2)

PM-10 produced during construction would be reduced by half utilizing dust suppression measures such as periodically watering areas being graded; wet sweeping or otherwise removing soils and mud deposits from paved roadways and parking areas. Proper tuning and preventive maintenance of construction vehicles would serve to minimize exhaust emissions.

Operation

Pre-Launch Activities

Pre-launch activities at RTS include the transportation and assembly of the target. The mobile exhaust emissions resulting from transportation would be intermittent and not have a measurable impact to regional air quality.

Launch Activities

Proposed target launches would be similar to previous rocket launches at RTS. These land launched target missiles could consist of one of several types of missiles including Strategic Target System, Minuteman II Target, Peacekeeper Target, and Trident I Target. Table 4.1.1-13 lists missile propellant information and table 4.1.1-14 lists emission constituents for each proposed missile. Up to five launches per year would occur at RTS over the duration of the program.

Potential target exhaust emissions from a dual target launch are anticipated to be, at most, 60 percent of the level of the launches modeled in the No Action Alternative, as shown in table 4.3.1-4. It is expected that the air quality impacts due to the dual launch of any of the targets listed in table 4.3.1-4 would be less than those modeled for six simultaneous strategic missile launches in the Supplemental USAKA EIS. The proposed target missile would not be expected to cause a significant impact to regional air quality surrounding RTS.

Table 4.3.1-4: Potential Target Exhaust Emissions at RTS

Missile	Carbon Monoxide metric tons (tons)	Hydrogen Chloride metric tons (tons)	Aluminum Oxide metric tons (tons)
Six Strategic Missiles	42.9 (47.3)	31.1 (34.2)	55.6 (61.3)
Dual Strategic Target System	4.7 (5.2)	3.2 (3.5)	7.1 (7.8)
Dual Minuteman II Target	10.0 (11.0)	8.9 (9.9)	12.3 (13.9)
Dual Peacekeeper Target	20.0 (21.9)	18.9 (20.8)	19.4 (21.4)
Dual Trident I (C4) Target	11.0 (12.1)	0.8 (0.9)	13.4 (14.8)

Post-Launch Activities

Activities performed during post target flight would include the removal of all mobile equipment and assets brought to RTS. The removal could result in small localized amounts of fugitive dust, which would have a minor impact to air quality. However this impact would be minimized further through the use of dust suppression methods previously discussed.

4.3.1.2.3 Sensors

All sensors to be utilized in Alternative 1 previously exist at RTS and are currently in use. Minor software and interior modifications could be performed to these elements; therefore there would be no construction air quality impacts at RTS for sensors. Operation of existing range radar at RTS would be covered under the existing Document of Environmental Protection.

4.3.1.2.4 SBX

Construction

Warehouse and administrative space construction would occur in previously disturbed areas. All construction activities would be conducted in accordance with appropriate regulations and permits. Other than minor, short-term impacts from construction no adverse effects to regional air quality are expected.

Operation

Operational emissions aboard the SBX would be limited to the exhaust produced by generators and maintenance. Maintenance-related emissions would consist primarily of minimal levels of volatile organic compound emissions and are not expected to have a significant impact on air quality.

65 Percent and Fully Populated SBX

Based on 5 tests per year the SBX would be at the RTS PSB for 7 months. For conservative analysis purposes, 9 months will be used. The SBX is being analyzed as a mobile source with an expected use of 6,600 hours per year (24 hours a day for nine months) at a single location, approximately 5 to 6 kilometers (3 to 4 miles) north of the Kwajalein harbor. The SBX on-board power plant planned for use would include six 3.3 MW diesel driven generators. While at the PSB, only three of the generators would be used. One would operate continually while in port for daily ship functions. The other two generators would be required for powering of the half or fully populated radar for three hours per day. The SBX would not be considered a stationary source at RTS; therefore a UES New Source Review would not be required.

Total time includes 6,600 hours of operation of one 3.3 MW generator and 1,650 hours of operation for the other two generators that would be in operation at the PSB. Total power output for the three 3.3 MW generators would be 27,225 MW hours for the time the SBX is at the PSB. The remaining three months of the year it is expected the SBX would be in transit or at one of the SBX operating areas.

4.3.1.3 Alternatives 2 and 3

4.3.1.3.1 Ground-Based Interceptors

Construction and operation of GBI facilities at RTS for Alternatives 2 and 3 would be the same as those described in section 4.3.1.2.1 for Alternative 1.

4.3.1.3.2 Targets

Construction and operation of target launches and associated target facilities at RTS for Alternatives 2 and 3 would be the same as those described in section 4.3.1.2.2 for Alternative 1.

4.3.1.3.3 Sensors

Construction and operation of range sensors at RTS for Alternatives 2 and 3 would be same as those described in section 4.3.1.2.3 for Alternative 1.

4.3.1.3.4 SBX

Construction and operation of the SBX at RTS for Alternatives 2 and 3 would be the same as those described in section 4.3.1.2.4 for Alternative 1.

4.3.1.4 Cumulative Impact

Due to the limited industrialization of USAKA and the surrounding environment, the potential cumulative impacts to air quality due to the proposed interceptor and target facility construction and launches would not be substantial. Missile launches are short-term, discrete events, thus allowing time between launches for emissions products to be dispersed. The 1993 Supplemental USAKA EIS determined that there would be no significant cumulative impacts to air quality under the high level of activity alternative as a direct result of up to 14 launches of six missiles simultaneously per year. The modeling resulted in no predicted annual impacts that exceed UES Ambient Air Quality Standards. It is not likely that the Proposed Action in conjunction with current planned or anticipated launches would exceed this level of activity. The anticipated number of missile launches from RTS in support of the GMD ETR would be up to five missiles (GBI and targets combined) per year. Combined activities would be performed at different times and locations and therefore, no substantial impacts to air quality are expected.

4.3.1.5 Mitigation

No air quality mitigation measures are proposed for GMD ETR activities.

4.3.2 AIRSPACE – REAGAN TEST SITE

4.3.2.1 No Action Alternative

Under the No Action Alternative, the GMD ETR would not be established and interceptor and target launch scenarios would not require the SBX for testing under operationally realistic conditions. As described in section 2.2.1 operations currently conducted at RTS would continue.

4.3.2.2 Alternatives 1, 2, and 3

The Proposed Action for all alternatives related to airspace would be full power emissions from the SBX while at the mooring location north of Kwajalein.

4.3.2.2.1 SBX

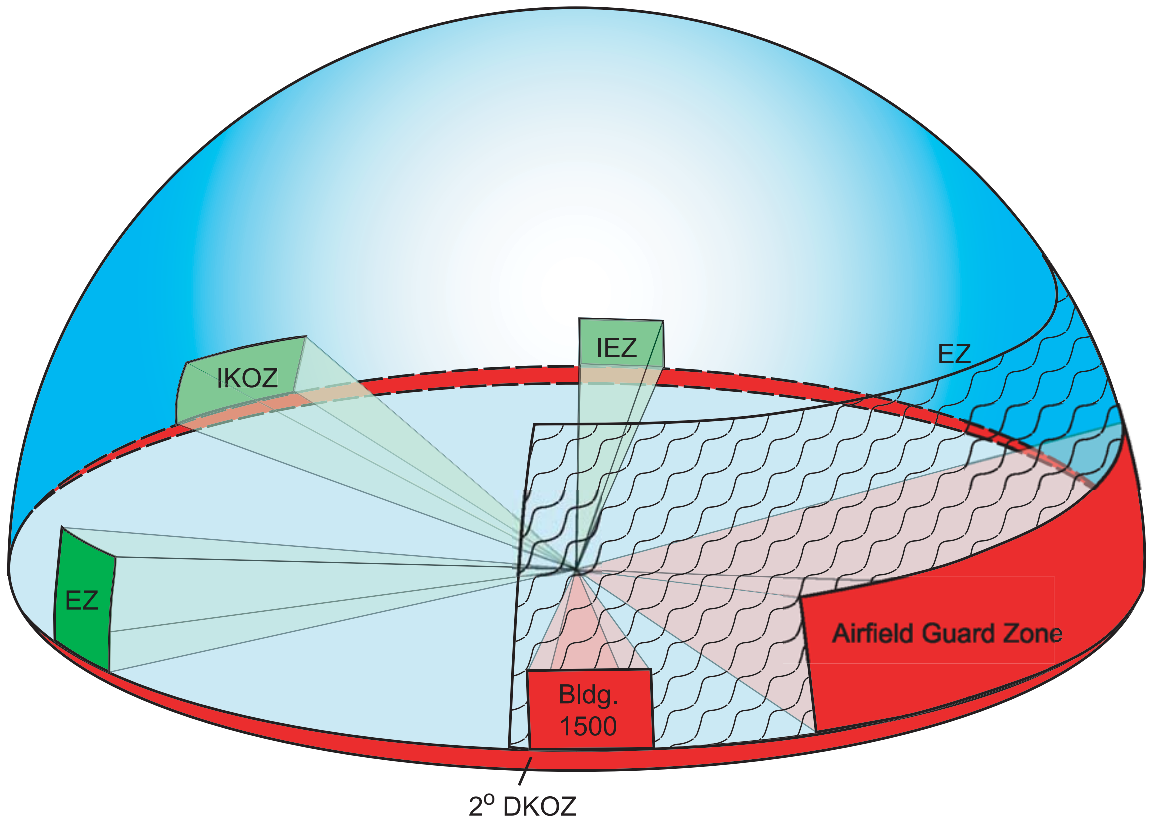
Operation

Controlled and Uncontrolled Airspace

Unrestricted operation of the SBX at the mooring location would have the potential to adversely affect air operations. In order to avoid or minimize adverse effects from EMR/EMI, DOD has established a coordination process with responsible agencies and airspace users. A full EMR/EMI survey and analysis would be conducted by the Joint Spectrum Center, in coordination with the FAA, USAKA, and other potentially affected users. The survey is used in preparing a DD Form 1494 that would be required as part of the spectrum certification and frequency allocation process. The completed DD Form 1494 that has been processed and approved by the appropriate national and international authorities would be required prior to SBX testing.

The results of the survey would also be used to define the operating area for the SBX (acceptable azimuths and operating angles). The maximum operating area would be all azimuths (360 degrees), and all angles from 2 to 90 degrees. The maximum potential interference distances are listed in table 2.1.4-2 and on figure 3.3.2-1.

The actual SBX operating area at the mooring location would be restricted in order to minimize impacts to aircraft operations, EEDs, and communication equipment. The boundaries of the SBX high energy radiation area would be configured to minimize impacts to aircraft operations and other potentially affected systems. The establishment of this SBX high energy radiation area would not impose any new flight restriction requirements. The operating area would be similar to the existing operating area for the GBR-P radar at Kwajalein (figure 4.3.2-1). As shown in the figure, the GBR-P is restricted from radiating in several areas. These include the arrival and departure corridors for Bucholz Army Airfield, in the direction of the rest of Kwajalein Island, and in the direction of other nearby islands.



EXPLANATION

Hard-Wired Code -
Default Keep-Out-Zone (DKOZ) - Hard-wired Code 2^{o} Minimum Main Beam and Permanent Structures

Operator Controlled -

Exclusion Zone (EZ) - Operator Additions to the Keep-Out-Zone. Primarily for Aircraft in Flight

Interceptor Exclusion Zone (IEZ) - Special Exclusion Zone to Avoid Illumination of the Interceptor During Launch. It is Deactivated Once the Interceptor Reaches a Safe Range/Altitude

Initial Keep-Out-Zone (IKOZ) - DKOZ Modified to Make Keep-Out Zone More Restrictive. Example would be Temporary Structures Where No Main Beam Radiation is Desired

Not to Scale

Notional GBR-P Operating Area

Figure 4.3.2-1

12-20-02 Control Zones

SBX operations would be coordinated with the FAA and Kwajalein and would be scheduled to occur during hours of minimal aircraft operations. Consequently, there would be no reduction in the amount of navigable airspace, and thus no impacts to the controlled and uncontrolled airspace in the ROI would result.

Special Use Airspace

There is no special use airspace within the ROI. Consequently, there would be no impacts to special use airspace.

En Route Airways and Jet Routes

Two en route high altitude airways (R 584 and A 222) enter the 65 percent and fully populated aircraft interference areas and terminate at Kwajalein. There are additional approach and departure routes within the ROI that would also need to be considered when defining the SBX operating area. The SBX would be programmed to limit RF emissions in the direction of airways that pass within the potential interference distance. In addition, since the radar beam is in constant motion, it is highly unlikely that the SBX would illuminate an aircraft long enough to affect the on-board electronics.

Airports and Airfields

Bucholz Army Airfield is located on Kwajalein, approximately 7 kilometers south of the proposed mooring location. With the controls placed on the SBX in a manner similar to the GBR-P radar, standard instrument approach and departure procedures at the airfield would continue unhindered. Existing airfield or airport arrival and departure traffic flows would also not be affected and access to the airfield would not be curtailed. All arriving and departing aircraft and all participating military aircraft are under the control of the Bucholz Army Airfield Control Tower, thus there would be no airfield conflicts in the ROI under the Proposed Action, and no impact.

Emissions from the XBR may also potentially degrade the overall system performance of in-band airborne and ship based systems such as fire control, bomb/navigation in military aircraft, and weather radars in both civilian and military aircraft, which all operate in the X-band (8 to 12 GHz). However, the SBX high energy radiation area would be configured to avoid impacts to these airborne and ship based systems.

4.3.2.3 Cumulative Impacts

Because the SBX operates in different frequency ranges than most aircraft radars, there would be limited potential for an incremental, additive cumulative electromagnetic effect upon the operation of an air navigation facility or the signal used by aircraft. The use of the required scheduling and coordination process, and adherence to applicable DoD directives and U.S. Army regulations concerning radar operations would preclude the potential for significant incremental, additive, cumulative impacts.

No other projects in the airspace ROI have been identified that would have the potential for other incremental, additive cumulative impacts to controlled or uncontrolled airspace, special use airspace, en route airways and jet routes, or airfields and airports in the ROI.

4.3.2.4 Mitigation Measures

The SBX high energy radiation area would be configured to mitigate potential impacts to aircraft and other potentially affected systems, and would be published on aeronautical charts. In addition to charting the SBX high energy radiation area notice, information would be published in the Airport Facility section of the *FAA Airport Guide*, and local NOTAMs would be issued. Additionally, flight service personnel would brief pilots flying in the vicinity about the SBX high energy radiation area.

4.3.3 BIOLOGICAL RESOURCES—REAGAN TEST SITE

4.3.3.1 No-Action Alternative

If the GMD ETR is not established, the following activities would still continue at RTS: launch of GBIs, use of extensive range instrumentation, use of the GBR-P ground-based XBR, use of existing IDT facilities, and missile intercepts in the BOAs north and northeast of RTS. Impacts to Biological Resources would be minimal as described in the applicable NEPA documents listed in appendix A, such as the USAKA Supplemental EIS and the USAKA Temporary ETR EA.

4.3.3.2 Alternative 1

4.3.3.2.1 Ground-Based Interceptors

Alternative 1 would require the use of existing GBI silos on Meck, a Missile Assembly Building, missile storage facility, maintenance and storage facility, and launch control facility (Facility Numbers 5098, 5064, 5065, and 5050) to support GBI launches for the GMD ETR.

GMD ETR program personnel would remove all mobile equipment/assets brought to the installation at the conclusion of its testing activities. Transportation for removal of equipment would be the same as when it was brought into the installation. 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.

Site Preparation Activities

Only minor maintenance activities would be required.

Vegetation

No new construction or other ground-disturbing activities are planned; therefore there would be no impacts to vegetation.

Wildlife

Personnel would be instructed to avoid areas designated as avian nesting or roosting habitat and to avoid all contact with any nest that may be encountered. Sea turtles or turtle nests would also be avoided. No site preparation activities are planned that could impact Essential Fish Habitat.

Environmentally Sensitive Habitat

No site preparation activities are planned that could impact reef slopes and flats or seagrass beds.

Operation

Dual target launches could potentially occur. Dual launches could result in a slightly larger affected area and longer duration of disturbance to wildlife. Impacts would in some cases be slightly greater than, but similar, to those analyzed below for single launches.

Vegetation

Meck has been extensively altered by human activity, and little native vegetation remains to serve as wildlife habitat. No additional impacts to vegetation are expected from continued GBI launches.

Wildlife

Results of monitoring conducted for a Strategic Target System launch from KTF at PMRF indicated little effect upon wildlife due to the low-level, short-term hydrogen chloride emissions (U.S. Army Space and Strategic Defense Command, 1993a). The program included marine surveys of representative birds and mammals for both pre-launch and post-launch conditions. Studies on representative birds and mammals reviewed in the Final EIS for the Strategic Target System (U.S. Army Strategic Defense Command, 1992) also indicated that low-level, short-term exposure to hydrogen chloride would not adversely affect threatened or endangered species or other wildlife. Aluminum oxide and hydrogen chloride do not bioaccumulate; therefore, no indirect effects to the food chain are anticipated.

An early flight termination or mishap could result in debris impacts along the flight corridor, which may temporarily impact fishing activities in the immediate area. Due to the small amount of propellant involved and the limited number of launches, the project is not anticipated to adversely affect trust marine resources. The potential ingestion of toxins by fish species, which may be used for food sources, would be remote because of the diluting effect of the ocean water and the relatively small area that would be affected. The primary flight test activity that may have an effect on wildlife within the flight test corridor is the actual intercept of the target missile. Debris impact areas for both the interceptor and target vehicles would be located over the Mid-atoll Corridor of the Kwajalein Lagoon or the BOA.

Any debris from mishaps landing in the Kwajalein Lagoon in approximately 50 meters (164 feet) of water would be recovered. The debris is not expected to contain hazardous materials. 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. A recent study conducted for the U.S. Air Force (Lang, et al, 2000) 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. The results are presented in the KLC Water Resources section, table 4.1.14-2. As shown in the table, it would take approximately 270 days for 90 percent of the perchlorate to leach out of solid propellant that lands in the ocean (at 29ºC [84ºF]). The perchlorate would be expected to be diluted as it mixes with the surrounding water. Larger pieces of propellant would be recovered following a mishap in the lagoon, further minimizing the potential for perchlorate contamination.

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. Wildlife such as 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).

Threatened and Endangered Wildlife Species. An early flight termination or mishap could result in debris impact along the flight corridor. Sensitive marine species are widely scattered, and the probability of debris striking a threatened or endangered species is considered remote. According to the *Strategic Target System Environmental Impact Statement,* for example, which assessed the low potential in regard to debris striking whale species, the probability of an impact is less that a 4.6 chance in 1 million (4.6×10^{-6}) (U.S. Army Strategic Defense Command, 1992).

Thus, debris impact and booster drops in the BOA are not expected to adversely affect marine mammal species protected by the UES. In addition, the probability is rather low that migratory whales or sea turtles would be within the area to be impacted by falling debris and boosters.

Environmentally Sensitive Habitat

Proposed nominal launch activities would not impact sensitive habitat such as coral reefs.

4.3.3.2.2 Targets

Alternative 1 would require the use of existing facilities on Meck, including a Missile Assembly Building, missile storage facility, maintenance and storage facility, and launch control facility (Facility Numbers 5098, 5064, 5065, and 5050) for target launches in support of the GMD ETR. Dual launches of target missiles would occur from a modified Payload Launch Vehicle GBI silo on Meck and a new launch pad on Meck.

Site Preparation Activities

Other than the construction of a new launch pad on Meck, only minor maintenance activities and internal modifications to an existing silo would be required.

Vegetation

Meck has been extensively altered by human activity, and little native vegetation remains to serve as wildlife habitat. The new target launch pad on Meck would require installation of a launch stool on reinforced concrete within a previously disturbed area. No impacts to vegetation are expected.

Wildlife

Disturbance to wildlife from the construction noise and temporary increase in personnel would be brief and is not expected to have a lasting impact nor a measurable negative effect on migratory bird populations. Personnel would be instructed to avoid areas designated as avian nesting or roosting habitat and to avoid all contact with any nest that may be encountered. Sea turtles or turtle nests would also be avoided. No site preparation activities are planned that could impact Essential Fish Habitat.

Environmentally Sensitive Habitat

No site preparation activities are planned that could impact reef slopes and flats or seagrass beds.

Operation

Dual target launches could potentially occur. Dual launches could result in a slightly larger affected area and longer duration of disturbance to wildlife. Impacts would in some cases be slightly greater than, but similar, to those analyzed below for single launches.

Vegetation

No impacts to vegetation would occur as a result of launch activities on Meck, since the new target launch site would be located within a previously disturbed area.

Wildlife

Impacts to wildlife from target missile launches would be similar to those discussed above for GBI launches.

Environmentally Sensitive Habitat

Impacts to sensitive habitat would be the same as those discussed above for GBI launches.

4.3.3.2.3 Sensors

Existing range sensors at RTS would be used, including the Advanced Research Project Agency Lincoln C-Band Observable Radar and Long-range Tracking and Instrumentation. Both of these tracking radars are located on Roi-Namur at RTS. Additional radars include the TPS-X, Millimeter Wave Radar, Tracking and Experiment Discrimination Experiment Radar, and two MPS-36 C-band general-purpose instrumentation radars located at RTS. Although the potential for mainbeam exposure thermal effects from these radars to birds exists; mitigating these concerns is the fact that radar beams are relatively narrow and constantly in motion. To remain in the beam for any period requires that a bird fly directly along the beam axis, or that a hovering bird does so for a significant time. Thus, although the potential for adverse effects exists, the probability of such an occurrence happening frequently is considered low. The potential for impacts from the use of these radars have been analyzed in prior environmental documentation and determined to be not significant.

Personnel would be instructed to avoid areas designated as avian nesting or roosting habitat and to avoid all contact with any nest that may be encountered. Sea turtles or turtle nests would also be avoided. No site preparation activities are planned that could impact Essential Fish Habitat.

4.3.3.3 SBX

Construction

Although the piers at the Kwajalein harbor do not offer adequate depth to accommodate the draft of the SBX, the vessel can enter the Kwajalein lagoon and moor in a protected anchorage. RTS has a full complement of supply and fueling vessels. The mooring site would be approximately 5 to 6 kilometers (3 to 4 miles) north of the Kwajalein harbor. The SBX would enter the lagoon either through Gea Pass on the west side of the atoll or at Mellu Pass on the north side. Both passes offer sufficient depth to accommodate the vessel. However, Mellu Pass offers a much greater width for maneuverability. Personnel would be ferried to the SBX each day either by watercraft or helicopter.

Due to limited warehouse space at RTS, a new 900- to 1,500-square-meter (3,000- to 5,000-square foot) environmentally controlled warehouse would potentially be required for SBX operations. Any construction or facility modification required to provide support to the SBX would occur in previously disturbed areas in accordance with host installation guidelines and regulations.

Typical noise levels at 15 meters (50 feet) from construction equipment range from 70 to 98 dBA. 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). Most wildlife is known to exhibit a startle response when exposed to short-term noise impacts. The combination of increased noise levels and human activity would likely displace some small mammals and birds that forage, feed, nest, or have dens within this 15-meter (50-foot) radius. However, sufficient foraging and feeding habitat occurs in adjacent areas. Studies (U.S. Department of the Air Force, 1997) indicate that birds usually show signs of disturbance, such as fluttering of wings, when a noise event occurs, but quickly return to normal behavior after the event. Although construction activities could cause flushing (birds suddenly flying up), this is a common reaction to sudden natural sounds that only slightly increases the energy expenditure of individual birds. Construction is therefore not expected to have a long-term significant adverse effect on wildlife. Other than these minor, short-term impacts from noise, such as startling and temporary displacement, no adverse effects to biological resources are anticipated.

Operation

The SBX is a high-powered radar system that would use a pulsed microwave beam to perform tracking, discrimination, and kill assessments of incoming ballistic missile warheads. Since this system has the potential for exposing regions in its vicinity to EMR, consideration has been given to the evaluation of the potential for any adverse impacts that EMR may have on biological resources.

As described in section 2.3.4, the SBX would be mounted on a semi-submersible sea platform. The sea platform would be self-propelled in open water with a cruising speed of approximately 11 to 13 kilometers (6 to 7 knots) per hour, but towed while in port. The SBX would operate at a minimum of elevation of 2 degrees. The grating lobes, which could have the potential for RF emission hazard, would reach the ground/surface at distances of 85 meters (280 feet). The transmit/receive RF emission pattern would be mostly contained within a narrow main beam. The total amount of RF radiation per week would be approximately 5 to 6 hours for mission preparation activities and 3 to 4 hours per week for GMD mission activities. A full EMR/EMI survey and analysis would be conducted by the Joint Spectrum Center, in coordination with the FAA, Department of Transportation, and other potentially affected users. An operating permit would be negotiated based on the results of the EMR/EMI survey.

In terms of the potential for EMR impacts on wildlife, the Ground-Based Radar Family of Radars EA (U.S. Army Program Executive Office Missile Defense, 1993) analyzed potential impacts on wildlife from EMR. This EA determined that several factors significantly reduce the potential EMR exposure for birds and other wildlife. The radar main beam would normally be located at least 2 degrees above horizontal, which limits the probability of energy absorption by surface-oriented wildlife. The radar beam would normally be in motion, making it extremely unlikely that a bird would remain within the most intense area of the beam for any considerable length of time. The size of the beam is relatively small, which further reduces the probability of bird species remaining within this limited region of space, even if the beam were still. (Ballistic Missile Defense Organization, 2000)

The analysis methods used to evaluate potential effects of RF radiation on birds is the Maximum Permissible Exposure level, which defines the maximum time-averaged radio frequency power density allowed for uncontrolled human exposure (and by extrapolation, to birds and other species). The Maximum Permissible Exposure Level method is independent of body size or tissue density being exposed. Analysis conducted during preparation of the Ground-Based Radar Family of Radars EA (U.S. Army Program Executive Office Missile Defense, 1993) was based on a conservative approach of limiting the microwave energy absorption rate on the Aplomado falcon (*Falco femoralis*), a bird listed as endangered by the USFWS and the State of New Mexico. The energy absorption rate was based on the falcon remaining continuously within the main beam of the ground-based radar. The absorption rate was then compared to the bird's resting metabolic rate. The analysis indicated power densities would have to exceed 42 mW/cm^2 to affect the falcon. Power densities of 38 to 61 mW/cm^2 have been determined necessary to affect other birds weighing up to 3.5 kilograms (7.7 pounds). Analysis conducted during preparation of the prototype High Power Discrimination Radar at PMRF was based on the potential effects on the Laysan albatross (U.S. Department of the Navy, 2002).

The analyses were 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 may pose a potential for an adverse effect. Birds in general typically expend energy at up to 20 times their resting metabolic rates during flight. Since birds are not likely to remain continuously within the radar beam and the power density is not expected to exceed levels stated above that could impact birds, the likelihood of harmful exposure is not great. (Ballistic Missile Defense Organization, 2000)

Potential impacts from EMR from the XBR on wildlife have been compared to the existing COBRA DANE radar operating on Eareckson AS on Shemya Island, Alaska. The COBRA DANE operates in the L-Band (1,000 to 2,000 MHz), while the proposed SBX would operate in the X-Band (8,000 to 12,000 MHz). The X-Band has less potential to cause thermal heating in biological resources than the L-Band. Like the COBRA DANE, the proposed SBX main beam would be constantly moving and would not be stationary over one area. The USFWS has not noticed die-offs of birds below the COBRA DANE radar (Martin, 1999). Overall, it is expected that no die-off of birds would be expected as a result of operation of the SBX. (Ballistic Missile Defense Organization, 2000)

The SBX radar is not expected to radiate lower than 2 degrees and since marine mammals would normally be found below the surface of the water, this signal height would be safely above any surfacing mammals. RF radiation does not penetrate the surface of water to any great degree. The power density level just below the surface of the ocean would not exceed the permissible exposure level for uncontrolled environments. (U.S. Department of the Navy, 2002) No adverse impacts would occur to whales, other marine mammals, or sea turtles at least 1.3 centimeters (0.5 inch) below the surface. It is also highly unlikely that an individual would be on or substantially above the surface of the water for a significant amount of time within the main beam or side lobe areas during the 3 to 6 hours per week that the SBX radar would be operating. For these reasons, no effects are anticipated on the humpback whale, other marine mammals, or sea turtles that might be present in the vicinity of the homeport and transit locations. Operation of the SBX would not require delays if humpback whales and other marine mammals are observed. Therefore, no further action regarding humpback whales is required pursuant to the Endangered Species Act and the Marine Mammal Protection Act.

The potential for impacts to marine mammals or sea turtles due to an accidental release of diesel fuel is considered low. The relatively slow speed of the SBX platform would preclude the potential for collision with a free-swimming marine mammal. Overall, no adverse impacts to marine mammals or sea turtles are anticipated.

4.3.3.4 Alternatives 2 and 3

The Proposed Actions and environmental effects at RTS under Alternatives 2 and 3 are identical to those described under Alternative 1.

4.3.3.5 Cumulative Impacts

The limited amount of construction planned on RTS would not likely result in cumulative impacts to biological resources. The 1993 Supplemental USAKA EIS determined that there would be no significant cumulative impacts to biological resources under the intermediate level of activity alternative as a direct result of launching up to 28 strategic launch vehicles per year from Meck. The anticipated number of missiles launches from RTS in support of the GMD ETR could be up to five missile launches (GBI and targets combined) per year. No significant cumulative impacts to biological resources have been identified as a result of prior launch-related activities from RTS. The GMD ETR activities when combined with current and proposed launch activities on RTS would not increase the total number of annual launches currently allowed. These activities would have negligible cumulative impacts on biological resources.

4.3.3.6 Mitigation Measures

Personnel would be instructed to avoid areas designated as avian or sea turtle nesting or avian roosting habitat and to avoid all contact with any nest that may be encountered.

4.3.4 HAZARDOUS MATERIALS AND HAZARDOUS WASTE—REAGAN TEST SITE

This section addresses potential impacts that could result from the storage and use of hazardous materials and the generation and disposal of hazardous waste associated with launch operations from the RTS.

A general description of impact on hazardous material and waste management is provided in appendix B. Pollution prevention, recycling, waste minimization, IRPs, USTs, ASTs, asbestos, lead-based paint, and PCBs have been considered. Potential impacts from GMD ETR activities are addressed under each alternative as applicable.

4.3.4.1 No Action Alternative

If the GMD ETR is not established, the following activities would still continue at RTS: launch of GBIs, use of extensive range instrumentation, use of the GBR-P ground-based XBR, use of existing IDT facilities, and missile intercepts in the BOAs north and northeast of RTS. Impacts to hazardous materials and hazardous waste management practices would be minimal as described in the previous NEPA documents listed in appendix A.

4.3.4.2 Alternative 1

4.3.4.2.1 Ground-Based Interceptors

Under Alternative 1 Meck Island would serve as the location for missile assembly and as well as launch. GBI launches would utilize existing GBI facilities on Meck as described in section 2.3.1.3.

Construction

Alternative 1 would only require minor interior modifications to existing facilities on Meck; therefore, only minor impacts to hazardous materials and waste management practices would be expected.

Operation

Pre-Launch Activities

Missile components would likely be brought to Kwajalein Island as the initial arrival point at the USAKA. Kwajalein Island would also serve as the supply point for consumable materials to be employed during interceptor vehicle preflight assembly and checkout operations, and consumable supplies needed for the maintenance of the ongoing radar operations. Some of the materials in these consumable supplies are considered to be hazardous materials (e.g., contact cleaners for sensor systems). These materials would be stored on Kwajalein in appropriate warehouse facilities before issuance for use on other islands. These materials are similar to hazardous materials already in use for other operations (including standard facility maintenance activities) and represent only a small increase in the total amount of materials to be handled. The quantity of these materials that would be used represents a *de minimis* increase above those already in use and could therefore, easily be accommodated by the current hazardous materials management systems.

Launch Activities

GBI launch activities would be similar to ongoing activities. The use of hazardous materials during target launch operations would be limited to small amounts of solvent cleaners (e.g., acetone, isopropyl alcohol), ethylene glycol coolant in the radar, and some handling and storage of motor fuels for use in motor vehicle and/or generator systems. Use and management of hazardous materials associated with missile launch activities would continue to be performed in accordance with the requirements of the UES and the RTS Range Safety office.

No USTs exist on Meck Island. ASTs exist for storage of diesel fuel for the power plant and for MOGAS fuel storage.

As discussed in section 3.3.4, hazardous waste management at USAKA is performed in accordance with the UES, which requires shipment of waste back to the United States for treatment and/or disposal. In most cases, contractors utilize USAKA Prime Contractor Services for waste packaging, manifesting, shipment, and disposal. If contractors make their own hazardous waste arrangements, shipments have to be arranged through USAKA Shipping and Receiving. Minimal hazardous waste generation would occur.

Personnel trained in the appropriate procedures to handle potentially hazardous materials, including spill containment and cleanup, would be on standby should a mishap occur. Such personnel involved in these operations would wear appropriate protective clothing, as necessary.

During normal flight operations there would be no hazardous materials or waste issues associated with flight corridors. If an in-flight malfunction occurs, the range safety officer may initiate flight termination, resulting in missile debris being deposited beneath the flight path. Debris impacts may occur in the Mid-atoll Corridor within the Kwajalein Atoll Lagoon. The potential effects on the ocean environment from hazardous materials associated with missile debris are discussed in section 4.3.2 and have been analyzed in previous NEPA documents such as the Final EIS for the Strategic Target System (U.S. Army Strategic Defense Command, 1993) and concluded that impacts would be minimal.

Post-Launch Activities

Specific restoration actions and debris recovery, if necessary, would be determined on a case-by-case basis in coordination with the procedures of the Facility Services Division of Hazardous Materials.

The types of hazardous wastes that would potentially be generated from GBI launches are similar to wastes already handled at the USAKA. The quantity of hazardous waste that may be generated would represent a small increase over current conditions and would be collected in accordance with the KEEP and UES. Collected wastes would be sent first to point of generation accumulation point on Meck, and on to the USAKA Hazardous Wastes Collection Point (Building 1521) on Kwajalein for eventual shipment to the Continental United States and final disposition. The *de minimis* increase in the quantity of hazardous waste would not significantly impact the existing hazardous waste management and disposal system.

4.3.4.2.2 Targets

Construction

Under Alternative 1, similar minor modifications to existing facilities as described for GBI would occur on Meck. An older silo could be modified to accommodate some target missiles. A new target launch pad on Meck would be required to support dual launches. A new launch pad would consist of basic reinforced concrete and structural steel construction, with little hazardous waste generation.

Many facilities at RTS date from the 1950s through the 1970s. Therefore, any structure, such as an existing launch silo, to be modified for target launch activities would be sampled for asbestos or lead-based paint. Meck Island is essentially PCB-free due to an aggressive PCB removal plan pursued during the 1990s. If asbestos, lead-based paint, or PCBs are encountered during the sampling or modification process, then these materials would be contained and removed in accordance with USAKA SOPs. Such activities are routine at RTS. Launch control wiring and instrumentation modification would also be performed as necessary. Installation of trenches for fiber optic cable and fencing around the launch site would not result in the release of a potentially hazardous material or waste.

Minor construction is normally performed by USAKA Facilities Engineering. Major construction at RTS is routinely contracted and managed by the U.S. Army Corps of Engineers – Pacific Ocean Division, Honolulu District, and performed according to U.S. Army Corps of Engineers requirements, as modified to meet USAKA environmental management requirements. USAKA requirements are incorporated into the U.S. Army Corps of Engineers Statement of Work, and all contractors provide an Environmental Compliance Plan demonstrating knowledge of UES requirements. In accordance with DoD regulation 5200.2R, pollution prevention, waste minimization and recycling would be incorporated into design and construction plans. Construction activities would be performed in accordance with the USAKA Stormwater Pollution Prevention Plan to minimize potential erosion and stormwater runoff.

Operation

Pre-launch, launch, and post-launch activities for target missiles would be similar to that described for the GBI.

4.3.4.2.3 SBX

Any construction or facility modification required to provide support to the SBX would occur in previously disturbed areas in accordance with host installation guidelines and regulations. Other than minor, short-term increase from the use of potentially hazardous materials such as paints, solvents and fuels, no adverse effects to ongoing hazardous materials storage and handling are anticipated. The small increases in the amount of potentially hazardous materials used during construction activities would result in generation of added wastes. However, this increase is not expected to be significant and would be accommodated in accordance with existing protocol and regulations.

Operation

Shipboard Hazardous Materials and Waste Management

The U.S. 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 SBX vessel will 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.

Increased operations that could take place at RTS would be servicing and maintenance of the SBX. This small increase in servicing operations would not significantly affect hazardous materials management or waste disposal. There would be no significant operational impacts, and no mitigation would be required.

4.3.4.3 Alternatives 2 and 3

The Proposed Actions and potential impacts would be the same as those described under Alternative 1. Construction and operation of the SBX at RTS for Alternatives 2 and 3 would be the same as those described in section 4.3.4.2.3 for Alternative 1.

4.3.4.4 Cumulative Impacts

Adherence to the hazardous materials and waste management systems on USAKA would preclude the potential accumulation of hazardous materials or waste. The UES establishes emergency response procedures that would aid in the evaluation and cleanup of any hazardous materials released. GMD actions are not expected to result in cumulative hazardous materials and hazardous waste impacts on USAKA. No other projects in the ROI have been identified that would have the potential for incremental, additive cumulative impacts to existing hazardous materials and waste management practices.

4.3.4.5 Mitigation Measures

Mitigation measures would be employed in accordance with the UES, which incorporates Council on Environmental Quality NEPA requirements, applicable EPA regulatory requirements, and Executive Order (Presidential) requirements for installations outside the continental United States. In addition other DoD and U.S. Army requirements apply, as tiered requirements under the preceding.

4.3.5 HEALTH AND SAFETY—REAGAN TEST SITE

Appendix B includes a description of health and safety issues.

4.3.5.1 No Action Alternative

If the GMD ETR is not established, the following activities would still continue at RTS: launch of GBIs, use of extensive range instrumentation, use of the GBR-P ground-based XBR, use of existing IDT facilities, and missile intercepts in the BOAs north and northeast of RTS. Impacts to health and safety would be minimal as described in the previous NEPA documents listed above in appendix A.

Planning and execution of GBI launches would be in compliance with federal, state, local, and international health and safety requirements and regulations, as well as RTS standards and procedures. Adherence to such requirements would ensure that potential risks to the general public, workers, and the launch areas do not exceed RCC Standard 321-02 criteria. Therefore, no increase in potential impact to health and safety would be expected as a result of the No-action alternative.

4.3.5.2 Alternative 1

4.3.5.2.1 Ground Based Interceptor

Construction

Existing RTS missile sites and support facilities on Meck would be used under Alternative 1. Therefore, no potential impact to health and safety from construction activities would be expected.

Pre-Launch

Pre-launch activities, including the transportation, storage and handling of missile components would generally occur as described in sections 3.3.5 and 4.1.7.2.

Missile components would initially be transported to Kwajalein. Kwajalein would also be used as the storage location for all consumable materials (e.g., solvents/cleaners, small parts, tools) that would be used during test flight pre-launch and launch operations. As indicated in section 4.3.4, the primary hazard related to these storage operations would be the potential for explosion/fire of solid fuel motors and/or small explosive actuation devices (used in missile control and FTS). At Kwajalein, as at all other USAKA locations, all operations involving explosives (including packaging and handling for movement) would require implementation of a written procedure, which has been approved by the USAKA Safety Office. These operations must be conducted under the supervision of an approved ordnance officer using explosive-certified personnel. All storage and handling of explosives is required to take place in facilities designed to handle explosives and which have been sited in accordance with the requirements of Kwajalein Missile Range Regulation 385-75, *Explosive Safety* (U.S. Army Kwajalein Atoll, 1993). The regulation specifies the required ESQDs for each facility to ensure safety in the event of explosion, based upon the maximum quantity of explosive material permitted for the facility. This would serve to prevent propagation of explosions to nearby facilities where explosives are also stored.

The explosive devices and materials proposed for use as part of the GBI flight tests would be very similar to those currently stored and used at RTS. Storage operations would not entail any specialized procedures beyond those already in use. Storage facilities (magazines) are available at Kwajalein for proper storage of all explosive materials. Missile assembly buildings, launch silos, launch pads and operations buildings are separated by distances specified in DoD and U.S. Army regulations. The types of facilities as well as the quantity and type of propellant and other explosives stored in magazines and missile handling areas are used to determine the distance requirements for structure spacing. In situations such as on Meck where the distance requirements cannot be met by separation, other methods of personnel protection would be implemented. Barricades between launch silos provide barriers between missiles and other exposed sites. The Meck Control Building and the Systems Technology Testing Facility are hardened and provide protection from fragments.

Launch

Under Alternative 1, launch of GBI missiles would occur at existing RTS facilities on Meck. As lead range, RTS would coordinate with other ranges to track and document safety responsibilities. The principal health and safety concerns would be missile malfunctions on or near the launch silo, potential hazards following a flight termination action and intercept debris impact.

Flight safety studies would be performed to ensure that launches would not compromise range safety requirements and that risk to personnel would be within RCC Standard 321-02 limits. Launches would not be permitted to occur without review and agreement by the Range Safety Officer. Protection circles, based on the payload, missile and launch azimuth, would be established for each launch. Figure 4.3.5-1 indicates the protection circles associated with GMD ETR launch activities. Access to launch sites and the island would be limited to all but mission essential persons. Personnel essential to launch activities would be sheltered in hardened buildings. The GBI flight corridor would be over the islands and BOA. At RTS, thrusted stages which can potentially hazard populated areas must have a flight termination system. (Smith, 2002)

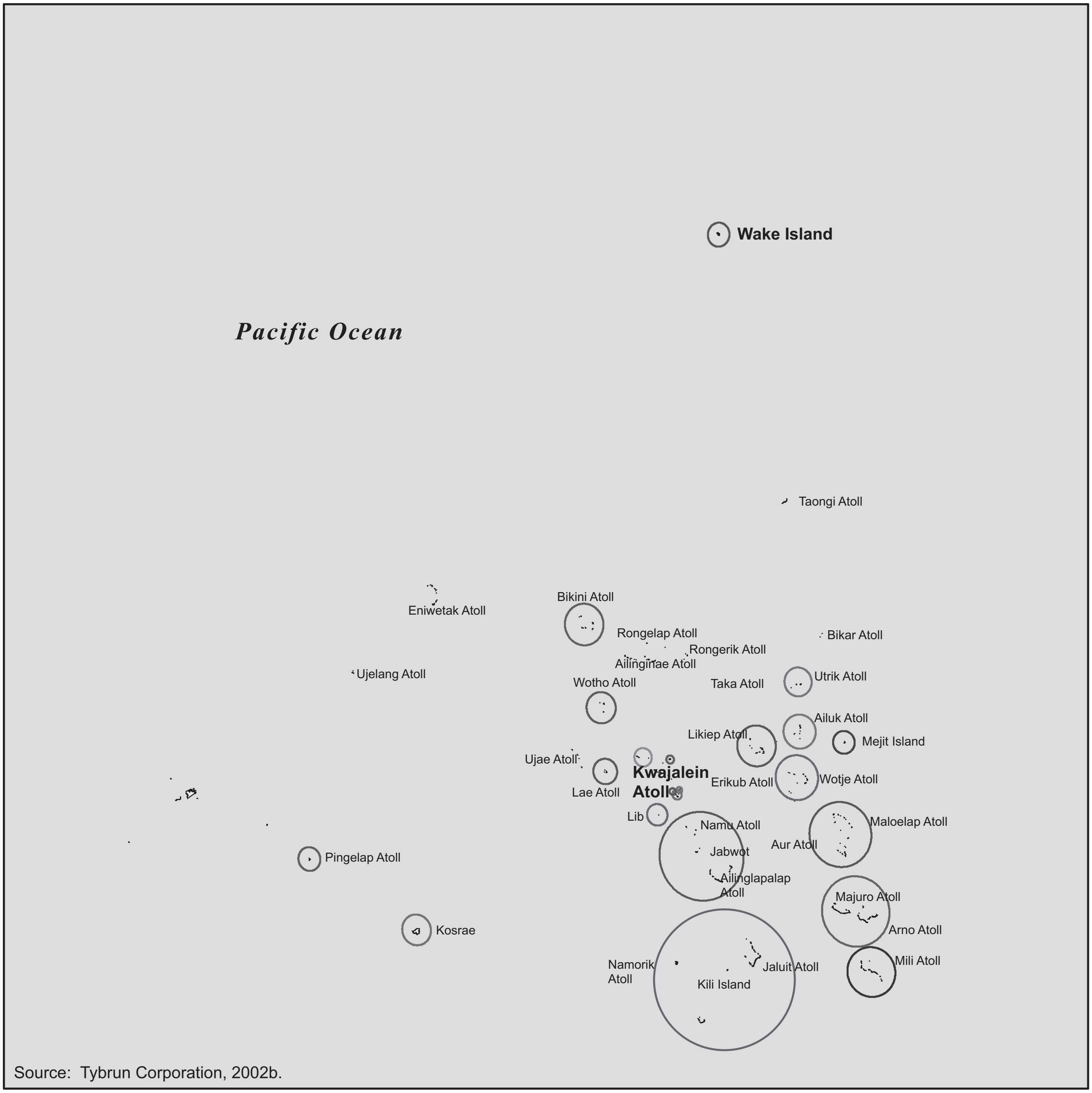
Targets launched from KLC, Vandenberg AFB, air and/or ocean platforms, if not destroyed by intercept, would impact in the BOA. Intercept debris would land in the BOA or possibly on uninhabited islands within the precalculated debris hazard/impact zone. When containment within the debris hazard/impact zone appears impossible, risk analysis based on established RTS Flight Safety risk equation is done to determine if the risk to the public is within acceptable RCC Standard 321-02 criteria. (Smith, 2002) Collective risk to the general public from any potentially hazardous inert debris (debris impacting the earth with a kinetic energy equal to, or greater than, 1.4 kilogram-meters [11 foot-pounds]) during a single launch would be limited to RCC Standard 321-02 criteria of $3x10^{-5}$. Individual risk from potentially hazardous inert debris would be limited to $1x10^{-7}$.

Post-Launch

Post-launch activities at RTS would generally occur as described in sections 3.3.5 and 4.1.7.

4.3.5.2.2 Targets

Dual target launches would occur from RTS under Alternative 1. Such launches would require construction of new launch pad and modification of an existing GBI launch silo. Otherwise, existing facilities on Meck would be used as previously discussed. Potential impacts from pre-launch, launch, and post-launch activities would be similar to those described for the GBI.



EXPLANATION

Protection Circle - Based on Payload, Missile, and Launch Azimuth

Launch Protection Circles

Scale

0 165 330 kilometers

0 102.5 205 miles

NORTH

Reagan Test Site

Figure 4.3.5-1

12-20-02 Debris Zones

4.3.5.2.3 In-Flight Interceptor Communication System Data Terminal

Under Alternative 1, existing communication systems would be used at current levels discussed under the No Action Alternative. Therefore, no increased impact to health and safety from ongoing operations would be expected.

4.3.5.2.4 Sensors

Use of sensors would continue in accordance with ongoing activities at RTS. For communication link equipment, associated radio frequency emissions are considered to be of sufficiently low power so that there is no exposure hazard. All sensor systems would be sited before operation to ensure that no occupied structures or accessible travel areas are within any hazard area necessitated by radio frequency emissions. Through the use of these procedures, it has been previously determined that proper exposure control would be achieved, and that operation of these systems would not present a significant health and safety hazard (U.S. Army Space and Strategic Defense Command, 1993b).

4.3.5.2.5 SBX

Construction

Due to limited warehouse space at RTS, a new 900- to 1,500-square-meter (3,000- to 5,000-square foot) environmentally controlled warehouse would potentially be required to support SBX operations. Any construction or facility modification required to support the SBX would occur in accordance with existing RTS safety protocol/plans and applicable UES requirements. No adverse effects to health and safety of construction contractors or the public are anticipated.

Operation

The operating area for the SBX would be similar to the existing operating area for GBR-P radar at Kwajalein as described in section 2.1.4.

An EMR/EMI survey and analysis would be conducted by the Joint Spectrum Center that considers hazards of EMR on personnel, fuel, and ordnance. The analysis provides recommendations for sector blanking and safety systems to minimize exposures. The proposed systems would have the appropriate safety exclusion zones established before operation, and warning lights to inform personnel when the system is in operation and emitting EMR. Mechanical and software stops would be used to prevent the main beam from being directed in specified sectors where it may present a hazard.

Potential health and safety hazards associated with operation of similar radars were analyzed in two previous documents. *Ground Based Radar Family of Radars Environmental Assessment and Finding of No Significant Impact,* (U.S. Army Space and Strategic Defense Command, 1993b); and the *Environmental Assessment for Theater Missile Defense Ground Based Radar Testing Program at Fort Devens, Massachusetts* (U.S. Army Space and Strategic Defense Command, 1994e). The analysis considered both program operational requirements and restrictions and range-required safety procedures. It was concluded that the required implementation of 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.

Radiation Hazards

Human Exposure. The analysis method used to evaluate potential effects of RF radiation is the IEEE MPEL, which defines the maximum time-averaged radio frequency 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. (IEEE C95.1-1999) General public exposure is typically limited to one-fifth of the occupational limits. For non-ionizing radiation, OSHA established (29 CFR 1910.97) a radiation protection guide for normal environmental conditions and for incident electromagnetic energy of frequencies from 10 MHz to 100 MHz. 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 HPM narrow-band and EMP broad-band simulator systems.

Computer models were used to determine the power density received on the ground over an average time of 9.5 minutes. For the fully populated radar at a distance of 150 meters (492 feet), and for the 65 percent populated radar at a distance of 85 meters (279 feet), and an average time of 9.5 minutes, the power density was calculated to be 2.5 mW/cm^2. This power density is significantly less than the 6.33 mW/cm^2 permitted by the IEEE. The IEEE guidelines are more stringent than the EPA guidelines, based on the shorter averaging time, and are therefore used in the analysis.

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.

EEDs. The potential impacts to EEDs from emissions from the XBR are twofold: (1) the EED could be made not to work, or (2) 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. As can be seen from table 4.3.5-1, EEDs in the handling/loading phase are substantially more susceptible to EMR hazards; however, main beam illumination on the ground will not occur. It is assumed that the handling/loading of EEDs will 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 XBR to inform pilots of the potential electromagnetic interference hazard to certain aircraft.

Table 4.3.5-1: Required Separation Distances for EEDs in the Main Beam and Sidelobe of the XBR for the Presence, Shipping, and Handling/Loading Phases

EED Phase	Threshold (volts per meter)	Standard	Main Beam Separation Distance in kilometers (miles)		Grating Lobe Separation Distance in kilometers (miles)	
			Fully Populated	65 Percent Populated	Fully Populated	65 Percent Populated
Presence/Shipping	1,270 (peak)	MIL-STD-464	7.5(4.7)	4.6 (2.9)	0.2 (0.1)	0.1 (0.6)
Handling/Loading	200 (peak)	AFR-127-100	Not applicable	Not applicable	2.3 (1.4)	1.6 (1.0)

Based upon a grating lobe illumination from the fully populated SBX, a separation distance of 0.2 kilometer (0.4 mile) is recommended for EEDs in the presence/shipping phase and 2.3 kilometers (1.4 miles) in the handling/loading phase (table 4.3.5-1). The distances for the 65 percent populated SBX are also shown in table 4.3.5-1. There is no predicted potential for inadvertent initiation of vehicle airbags because the metallic body/frame of the vehicle provides sufficient shielding.

Fuels. Based upon the threshold of 5,000 mW/cm^2 from Technical Order 31Z-10-4, the SBX does not present a radiation hazard to fuels because the SBX does not emit radiation levels that exceed 5,000 mW/cm^2.

Communications–Electronics Frequency-Related Interference

Communications–Electronics In-band Radio Frequency Interference. In-band frequency interference addressed in this EIS is for the X-Band (8,000-12,000 MHz). In-band radio frequency interference occurs when two pieces of communications-electronics equipment are located within the same frequency band. Therefore, equipment with frequencies falling within the X-band would most likely be affected.

Communications–Electronics Adjacent Band Interference. Adjacent band radio frequency interference is similar to in-band radio frequency interference. The adjacent bands for the X-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.

Ground-based, airborne, and ship-based systems will be evaluated for in band, adjacent band, and harmonic band interference during the detailed EMR/EMI survey that is underway. Level 2 surveys are planned to be completed in Spring of 2003.

Communications–Electronics Non-frequency-related Interference

High Power Effects. Non-frequency-related interference from the SBX to the electromagnetic environment is 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 will 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. Additional modeling is underway to determine potential interference distances related to high power effects.

Aircraft/Avionics. The potential exists for EMR emissions from the main beam of the SBX 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. Since the FAA average threshold of 300 volts per meter is more conservative, it is the threshold used in this EIS. Interference distance related to aircraft is discussed in the airspace section.

Implementation of RTS 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 radiofrequency radiation from SBX operation would be approximately 5 to 6 hours per week during testing. The duration of radar radiofrequency radiation would decrease to 3 to 4 hours per week during actual GMD mission activities. The actual operating area of SBX at the mooring location would be restricted to minimize impacts. SBX operations would be coordinated 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.

4.3.5.3 Alternatives 2 and 3

The Proposed Actions and health and safety impacts would be the same as those described under Alternative 1. Construction and operation of the SBX at RTS for Alternatives 2 and 3 would be the same as those described in section 4.3.5.2.5 for Alternative 1.

4.3.5.4 Cumulative Impacts

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. No other projects in the ROI have been identified that would have the potential for incremental, additive cumulative impacts to health and safety. Adherence to RTS safety plans and procedures would preclude potential cumulative impacts to health and safety resulting from the implementation of the GMD ETR.

4.3.5.5 Mitigation Measures

Limitations imposed on the range of azimuth and angles of operation for the SBX and other radar would preclude potential impacts related to health and safety. Mechanical and software stops would be used to control radar operation.

4.3.6 UTILITIES—REAGAN TEST SITE

Appendix B includes a description of utilities issues. A project may have substantial effects on infrastructure and utilities if it increases demand in excess of utility system capacity to the point that substantial expansion would be necessary. Environmental impacts could also result from system deterioration due to improper maintenance or extension of service beyond its useful life.

4.3.6.1 No Action Alternative

Under the No Action Alternative, the GMD ETR would not be established and the SBX would not be developed to support interceptor and target launch scenarios, needed for operationally realistic test conditions. Kwajalein would continue their current operations.

Energy

Daily average demand for electricity at Kwajalein is 13,500 kW. This is 46 percent of the maximum capacity of the electrical service to RTS, or 29,200 kW.

Water

Potable water consumption at Kwajalein is 1.1 million liters (300,000 gallons) per day. This is 64.7 percent of the maximum available amount of potable water, 1.7 million liters (450,000 gallons) per day.

Wastewater

Recent wastewater generation at Kwajalein amounted to approximately 560 liters (148 gallons) per capita per day. This would remain below available capacity.

Solid Waste

Solid waste disposal at Kwajalein is handled by landfill and shipping offsite.

4.3.6.2 Alternatives 1, 2, and 3

The Proposed Action related to utilities for all Alternatives would be PSB support for the SBX while at the mooring location north of Kwajalein.

4.3.6.2.1 SBX

All of the alternatives would include SBX as one of the component of the Proposed Action. The operation of SBX would require BOA and a PSB.

Electrical power requirements for the SBX platform and its various payloads would be approximately 19.8 MW, supplied by six on-board 3.3-MW generators on board. The SBX would be self-propelled by four steerable 3.5-MW electric thrusters that would effectively propel and maneuver the SBX without assistance. During transportation, the thrusters would consume 14 MW, leaving 5.8 MW available for necessary ship-board operations, as well as the XBR.

The SBX has a fuel capacity of approximately 2,293,960 liters (606,000 gallons). The approximate fuel consumption for transit and radar operation is 54,800 liters (14,500 gallons) per day, which would amount to only 2.4 percent of total fuel capacity daily.

There would be a total of 50 crew members, including 20 marine crew and 30 GMD mission support personnel. Additionally, up to 50 people could be accommodated on board on a temporary daytime basis.

At the intervals between GMD test missions, the SBX would return to a PSB for crew rotations, re-supply, and maintenance activities. However, for SBX with fixed thrusters, a supply ship would deliver food, supplies, repair parts, and fuel from the PSB. While at the PSB or an adjacent mooring location, only three of the generators would be used, one operating continually while in port for daily ship functions while the remainder would power the half- or fully populated radar three hours per day.

Although the piers at the RTS harbor do not offer adequate depth to accommodate the draft of the SBX, the vessel can enter the Kwajalein lagoon and moor in a protected anchorage. A re-supply vessel would not be required as RTS has a full complement of supply and fueling vessels. The mooring site would be approximately 5 to 6 kilometers (3 to 4 miles) north of the RTS harbor. The SBX would enter the lagoon either through Gea Pass on the west side of the atoll or at Mellu Pass on the north side. Both passes offer sufficient depth to accommodate the vessel. However, Mellu Pass offers a much greater width for maneuverability. Personnel would be ferried to the SBX each day either by watercraft or helicopter. There would be no direct impacts to RTS area utilities from the self-contained SBX.

Due to limited warehouse space at RTS, a new 900- to 1,500-square-meter (3,000- to 5,000-square foot) environmentally controlled warehouse would potentially be required for SBX operations. This would require accommodations for a maximum of 25 personnel. Ongoing logistics and support operations such as re-supply, fueling and maintenance and crew/operator training would also occur at the PSB.

Studies have shown an average 189 liters (50 gallons) per capita per day water consumption and 170 liters (40 gallons) per capita per day of wastewater production. Recent figures indicate that in the United States, the per capita generation of municipal solid waste in 1998 was 2 kilograms (4.46 pounds) per capita per day (U.S. Environmental Protection Agency, 2002). Average daily demand for water, wastewater, and municipal solid waste for a maximum 25 personnel would be estimated as follows, based on typical usage: 4,725 liters (1,250 gallons) water; 4,250 liters (1,000 gallons) wastewater and 50 kilograms (112 pounds) of solid waste.

Any new facilities being constructed would be required to facilitate this level of use, as well as to accommodate any energy demand.

4.3.6.3 Cumulative Impacts

At this time, there are no ongoing or foreseeable future programs/plans identified in the region of influence that when combined with the relatively minor SBX utility requirements would result in cumulative impacts to utilities. Therefore, no cumulative impacts are anticipated with Alternatives 1, 2, and 3.

4.3.6.4 Mitigation Measures

No mitigation measures would be required or proposed.

4.4 PACIFIC MISSILE RANGE FACILITY

Potential impacts of construction, building modification, and missile launches at PMRF have been addressed in detail in the Strategic Target System EIS, the Restrictive Easement EIS, the PMRF Enhanced Capability EIS, and several program-specific EAs. Based on the prior analyses done and the effects of past target and missile launch activities, the potential impacts related to proposed GMD ETR activities are expected to be minimal, as discussed in the following sections.

4.4.1 AIR QUALITY—PACIFIC MISSILE RANGE FACILITY

4.4.1.1 No Action Alternative

Under the No-Action Alternative there would be no change in current air quality impacts at PMRF. The GMD ETR would not be established and GBI and target launch scenarios would not be tested under operationally realistic conditions. Missile flight test activities would continue at PMRF.

Activities associated with the pre-launch of a target missile include the transportation of targets to the PMRF facilities as well as the assembly of the target. The mobile exhaust emissions due to transportation would be intermittent and would not have a measurable impact to air quality.

The exhaust emissions presented in the PMRF Enhanced Capability EIS (U.S. Department of the Navy, 1998) are shown in table 4.4.1-1. As shown, no guidance levels would be exceeded.

Table 4.4.1-1: Estimated Emissions of Typical Missile Launches at PMRF

Pollutant	Guidance Levels	Hawk(1) mg/m^3	Talos/Zest(2) mg/m^3	Strategic Target System(3) mg/m^3
Aluminum Oxide	10 (8-hour TLV)			8.46(4)
	5 (8-hour TWA)	0.07(5)	0.06	
Carbon Dioxide	40 (1-hour TWA)	0.094		0.92(6)
	10 (8-hour TWA		0.096	0.68(6)
Hydrogen Chloride	1.5 (1-hour TWA)	0.087	0.051	0.47(6)

Source: U.S. Department of the Navy, 1998
(1) Hawk emissions based on EPA approved version of TSCREEN/PUFF model at 1900 meters (6200 feet)
(2) Talos emissions based on commercial version of TSCREEN/PUFF model at 3000 meters (9840 feet)
(3) Strategic Target System used Rocket Exhaust Effluent Dispersion Model to model Hydrogen Chloride
(4) At 190 meters (623 feet)
(5) Value is a 1-hour TWA. Due to near-instantaneous nature of emissions, 8-hour TWA would be lower
(6) At 3,000 meters (9,840 feet)
mg/m^3 = milligrams per cubic meter
TLV = Threshold Limit Value
TWA = Time-weighted Average

Previous analysis for target launches at PMRF included the Strategic Target System in the PMRF Enhanced Capability EIS (U.S. Department of the Navy, 1998). Table 4.4.1-2 lists the exhaust emissions of the Strategic Target System.

Table 4.4.1-2: Potential Target Exhaust Emissions (Single Launch) at PMRF

Missile	Aluminum Oxide metric tons (tons)	Chlorine metric tons (tons)	Carbon Monoxide metric tons (tons)	Carbon Dioxide metric tons (tons)	Hydrogen metric tons (tons)	Water metric tons (tons)	Hydrogen Chloride metric tons (tons)	Nitrogen metric tons (tons)
Strategic Target System	3.56 (3.92)	0.019 (0.02)	2.35 (2.59)	0.19 (0.21)	0.22 (0.24)	0.60 (0.66)	1.58 (1.74)	0.87 (0.96)

The EIS determined that exhaust emissions from Strategic Target System launches would produce 5.1 metric tons (5.6 tons) of aluminum oxide, 3.8 metric tons (4.2 tons) of carbon monoxide and 1.8 metric tons (1.9 tons) of hydrogen chloride. These levels were not determined to produce short-term exceedences within a previously determined ground hazard area of 3,048 meters (10,000 feet). This area is evacuated of all personnel before any launch. Therefore, no air quality impacts are anticipated for target launches at PMRF.

Activities performed during post target launch would include the removal of all mobile equipment and assets brought to PMRF. The removal could result in small localized amounts of fugitive dust, which would have a minor impact to air quality. However this impact would be minimized further through the use of dust suppression methods previously discussed.

4.4.1.2 Alternatives 1, 2, and 3

4.4.1.2.1 Target

Construction

No modifications to existing facilities would be required, and there would be no impact to regional air quality.

Operation

Pre-Launch Activities

Activities associated with the pre-launch of a target missile would be as described under the No Action Alternative.

Launch Activities

Launch activities at PMRF for Alternative 1, 2, or 3 would include launching up to four Strategic Target System targets per year. Potential impacts would be as described under the No Action Alternative.

Post-Launch Activities
Potential impacts would be as described under the No Action Alternative.

4.4.1.2.2 TPS-X

Construction

Installation of the TPS-X radar would require 0.3 hectare (0.8 acre) of previously disturbed land on northern PMRF or at Makaha Ridge. There would be no anticipated impacts to regional air quality.

Operation

The prime power unit for the TPS-X at PMRF is a 1.5-megawatt generator that provides power to the radar during testing. The generator is assumed to be in operation a maximum of 2,520 hours per year. Potential emissions for the TPS-X are listed in table 4.4.1-3. It is anticipated that operation of the TPS-X would have no adverse impacts on regional air quality at PMRF.

Table 4.4.1-3: Possible Generator Emissions for TPS-X Facility at PMRF

Generator	Emissions (2,520 hours/year)			
	Oxides of Nitrogen metric tons (tons)	Hydrogen Chloride metric tons (tons)	Carbon Monoxide metric tons (tons)	PM-10 metric tons (tons)
1.5 Megawatt Diesel Generator	4.6 (5.1)	0.66 (0.72)	5.7 (6.3)	0.27 (0.30)

4.4.1.3 Cumulative Impacts

The annual number of closures of the Restrictive Easement for missile launches from PMRF is currently limited to 30 per year. It is not likely that the Proposed Action of up to four target launches per year, in conjunction with currently planned or anticipated launches, would exceed this level of activity. No cumulative impacts to air quality have been identified from past launches at PMRF. Missile launches are short-term, discrete events with temporary impacts that are not expected to result in a cumulative impact on air quality.

4.4.1.4 Mitigation Measures

No mitigation measures would be required.

4.4.2 BIOLOGICAL RESOURCES—PACIFIC MISSILE RANGE FACILITY

4.4.2.1 No Action Alternative

If the GMD ETR is not established, PMRF would still continue to be operated as a launch facility and would support single launches of target missiles for a less robust GMD program. Missile flight test activities would continue at PMRF. Impacts from launches of Strategic Target System missiles are described below.

Site Preparation Activities

Vegetation

Only minor site preparation activities are required for target launches. The site(s) for the launch activities are previously cleared, improved locations. Any spill or release of hazardous material would likely be restricted to a small, localized area near the source. SOPs and spill plans reduce any potential impact to vegetation. Negligible impacts to vegetation are anticipated.

Threatened and Endangered Plant Species. No adverse impacts are anticipated to the Ohai and Lau'ehu habitat since no ground-disturbing activities would be required.

Wildlife

Disturbance to wildlife, including migratory birds, from minor site preparation activities and increased personnel would be short-term and is not expected to have a lasting impact or a measurable negative effect.

Any spill or release would likely be restricted to a small, localized area near the source. SOPs and spill plans would reduce any potential impact to wildlife in the vicinity of the spill.

Threatened and Endangered Wildlife Species. No impacts from site preparation activities are expected to the Newell's Townsend's shearwater, Hawaiian dark-rumped petrel, Hawaiian (American) coot, Hawaiian black-necked stilt, Hawaiian common moorhen, and Hawaiian duck, which have been observed in the drainage ditches and ponds on PMRF. Reflection from outdoor lighting could disorient the Newell's Townsend's shearwater, which may fly over PMRF at night (mainly between April and November). Any outdoor lighting associated with site preparation activities is properly shielded, following USFWS guidelines to minimize reflection and impact to these birds.

Site preparation activities and personnel presence are not anticipated to affect the Hawaiian hoary bat, which has been observed feeding offshore of Polihale State Park north of the Strategic Target System launch pad. Site preparation activities are also not likely to affect marine species such as the Hawaiian monk seal and sea turtles since areas used are not within areas used by the monk seal or sea turtles. Any observed green sea turtle nests near the launch pad would be noted and avoided.

Environmentally Sensitive Habitat

No adverse impacts to the coastal dune systems, marine sanctuary, coral reefs, or critical habitats are anticipated as a result of any minor site preparation activities.

Launch Activities

Up to four Strategic Target System missiles per year may currently be launched from the KTF at PMRF. The current missile trajectories are toward the RTS BOA and toward the BOA off the northwest coast of North America. The RTS trajectory has been successfully used four times in the last 10 years.

Vegetation

Normal launch activities are not expected to impact vegetation. Analysis provided in the Strategic Target System EIS (U.S. Army Strategic Defense Command, 1992) concluded that although vegetation near the Strategic Target System launch pad could suffer some temporary distress from the heat generated at launch and from hydrogen chloride or aluminum oxide emissions, there is no evidence of any long-term adverse effect on vegetation from two decades of launches at PMRF. The continued presence of the adder's tongue, a species removed from the list of federal candidate species, indicates that emissions from Strategic Target System missiles have not had a significant impact on sensitive vegetative species.

Threatened and Endangered Plant Species. The possibility of a spill or other accident involving hazardous materials impacting Ohai and Lau'ehu habitat is considered remote since these plants have only been observed north of PMRF. Any spill or release of hazardous material would likely be restricted to a small, localized area near the source and would be cleaned up in accordance with PMRF's spill plan.

Wildlife

No substantial impacts to threatened and endangered species from existing EMR sources on PMRF have been identified.

Noise. Disturbance to wildlife from the launches is brief and is not expected to have a lasting impact nor a measurable negative effect on migratory bird populations. Wildlife such as 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 within a short time frame (Federal Aviation Administration, 1996).

Potential noise effects on wildlife can be categorized as auditory and non-auditory. Auditory effects would consist of direct physical changes, such as eardrum rupture or TTS. Non-auditory effects could include stress, behavioral changes, and interference with mating or foraging success. The effects of noise on wildlife vary from serious to no effect in different species and situations. Behavioral responses to noise also vary from startling to retreat from favorable habitat. Animals can also be very sensitive to sounds in some situations and very insensitive to the same sounds in other situations. (Larkin, 1996) Informal observation at several launch facilities indicates the increased presence of personnel immediately before a launch tends to cause birds and other mobile species of wildlife to temporarily leave the area that would be subject to the highest level of launch noise. Therefore, no direct physical auditory changes are anticipated. Wildlife is known to exhibit a startle effect when exposed to short-term noise impacts, such as the launch of a target missile. Birds usually show signs of disturbance, such as fluttering of wings, when the noise occurs, but quickly return to normal behavior after the event. Video camera observations of a wood stork colony located 0.8 kilometer (0.5 mile) south of the Space Shuttle launch pad at Kennedy Space Center showed the birds flew south away from the noise source and started returning within 2 minutes, with a majority of individuals returning in 6 minutes (National Aeronautics and Space Administration, 1997).

A rookery at Kennedy Space Center used by wood storks and other species of wading birds is located approximately 750 meters (2,461 feet) from a Shuttle launch pad. This rookery continues to be used successfully, even though it has received peak noise levels of up to approximately 138 dB. (American Institute of Aeronautics and Astronautics, 1993) As mentioned above, monitoring studies of birds during the breeding season indicate that adults respond to Space Shuttle noise by flying away from the nest, but they return within 2 to 4 minutes. Birds within 250 meters (820 feet) of Titan launch complexes at Cape Canaveral Air Station have shown no mortality or reduction in habitat use. Titan IV vehicles produce noise levels of approximately 170 dB in the immediate vicinity of the launch pad. This attenuates to 125 dB at a distance of 3 kilometers (2 miles) within about 30 seconds following launch. (U.S. Department of the Air Force, 1990)

No evidence has indicated that serious injuries would result, and no long-term adverse effects are anticipated. The brief noise peaks produced by the missiles such as the Strategic Target System are comparable to levels produced by close range thunder (120 dB to 140 dB peak), and there is no species known to be susceptible to hearing damage following intermittent exposure to this common noise source (U.S. Department of the Air Force, 2001).

Emissions. Hydrogen chloride, which is emitted during missile launches, is known to affect wildlife. Birds flying through the exhaust plume may be exposed to concentrations that could irritate eye and respiratory systems (Federal Aviation Administration, 1996). However, results of monitoring conducted following a Strategic Target System launch from the KTF at PMRF indicated little effect upon wildlife due to the low-level, short-term hydrogen chloride emissions (U.S. Army Space and Strategic Defense Command, 1993a). The program included marine surveys of representative birds and mammals for both pre-launch and post-launch conditions. Studies on representative birds and mammals reviewed in the Final EIS for the Strategic Target System (U.S. Army Strategic Defense Command, 1992) also indicated that low-level, short-term exposure to hydrogen chloride would not adversely affect threatened or endangered species or other wildlife. Aluminum oxide and hydrogen chloride do not bioaccumulate; therefore, no indirect effects to the food chain are anticipated.

An early flight termination or mishap could result in debris impact along the flight corridor, which may temporarily impact fishing activities in the immediate area. Due to the small amount of propellant involved and the few number of launches, ongoing launches are not anticipated to adversely affect marine resources. 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 contaminant 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, 2000) 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. The results are presented in the KLC Water Resources section, table 4.1.14-2. As shown in the table, 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 ºC [84ºF]). The perchlorate would be expected to be diluted as it mixes with the surrounding water. The potential ingestion of toxins by fish species, which may be used for food sources, would be remote because of the diluting effect of the ocean water and the relatively small area that would be affected.

Essential Fish Habitat. The potential impact to Essential Fish Habitat from nominal launch activities would mainly be from spent boosters and missile debris to waters off the coast within the Temporary Operating Area. 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. (U.S. Department of the Air Force, 2001)

In the unlikely event of a launch mishap, scattered pieces of burning propellant could enter coastal water and potentially affect 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)

Threatened and Endangered Wildlife Species. Impacts from launch noise to the Newell's Townsend's shearwater, Hawaiian dark-rumped petrel, Hawaiian (American) coot, Hawaiian black-necked stilt, Hawaiian common moorhen, and Hawaiian duck would be limited to startle or flushing reactions as discussed above. Reflection from outdoor lighting could disorient the Newell's Townsend's shearwater; however, any outdoor lighting associated with launch activities would be properly shielded, following USFWS guidelines. Existing range radars and other instrumentation that would be used at PMRF are discussed in section 2.3.1.4. No substantial impacts to threatened and endangered species from existing EMR sources on PMRF have been identified.

No adverse impacts are anticipated to the Hawaiian hoary bat, which has been observed feeding offshore of Polihale State Park, north of the project area. The likelihood that debris from a spent booster or terminated launch would strike a Hawaiian monk seal is considered remote since the waters adjacent to PMRF are used infrequently by this species. The launch would be delayed if monk seals are observed in the launch safety zone or beach portion of the Launch Hazard Area. Green sea turtles nests have been observed in the sand near the Nohili Ditch. Green sea turtles lay eggs only at night, once every 2 to 4 years. Thus the potential for debris to strike a green sea turtle near, or on shore is remote. Access to green sea turtle nesting beaches would be restricted.

Environmentally Sensitive Habitat

The Hawaiian Islands Humpback Whale National Marine Sanctuary EIS and Management Plan (National Oceanic and Atmospheric Administration, 1997) recognizes that PMRF plays an important role in national defense training. The EIS includes missile launches as one of the DoD activities that currently occurs within the sanctuary boundaries. The ongoing missile launches would have impacts within the parameters of ongoing missile programs.

According to analysis provided in the PMRF Enhanced Capability EIS, debris from shore-based missile launch programs is not expected to produce any measurable impacts on benthic (sea floor) resources beyond those currently experienced during natural conditions associated with storms.

4.4.2.2 Alternatives 1, 2, and 3

Alternatives 1, 2, and 3 would require the use of existing launch pads, Missile Assembly Building, missile storage facility, range radars, and maintenance and storage facility to support target missile launches.

4.4.2.2.1 Targets

Site Preparation Activities

Site preparation activities at PMRF for Alternative 1, 2, or 3 would include launching up to four Strategic Target System targets per year. Potential impacts would be as described under the No Action Alternative.

Launch Activities

Launch activities at PMRF for Alternative 1, 2, or 3 would include launching up to four Strategic Target System targets per year. Potential impacts would be as described under the No Action Alternative.

Post Launch Activities

Potential impacts would be as described under the No Action Alternative.

4.4.2.2.2 TPS-X Radar

Site Preparation Activities

Vegetation

Installation of the TPS-X radar would require 0.3 hectare (0.8 acre) of previously disturbed land on northern PMRF or at Makaha Ridge. No impacts to vegetation are anticipated.

Threatened and Endangered Plant Species. No impacts to potential Ohai or Lau'ehu habitat on PMRF or to the endangered dwarf iliau found within the Makaha Ridge complex are anticipated since no ground-disturbing activities would be required.

Wildlife

Disturbance to wildlife, including migratory birds, from the minor site preparation activities and temporary increase in personnel in the area would be short-term and is not expected to have a lasting impact or measurable negative effect.

Threatened and Endangered Wildlife Species. Site preparation activities could potentially startle any Newell's Townsend's shearwater, Hawaiian dark-rumped petrel, Hawaiian (American) coot, Hawaiian black-necked stilt, Hawaiian common moorhen, or Hawaiian duck, which could be in the drainage ditches adjacent to the TPS-X radar site on northern PMRF, or the Hawaiian goose population present in the Makaha Ridge area. This disturbance would be brief and is not expected to have a lasting impact nor a measurable negative effect on migratory bird populations. Wildlife such as waterfowl would quickly resume feeding and other normal behavior patterns. Reflection from outdoor lighting could disorient the Newell's Townsend's shearwater, which may fly over PMRF at night (mainly between April and November). Any outdoor lighting associated with construction activities and permanent structures would be properly shielded, following USFWS guidelines to minimize reflection and impact to these birds.

Site preparation activities and personnel presence are not anticipated to affect the Hawaiian hoary bat, which has been observed feeding offshore north of the Nohili Ditch. Site preparation activities are also not likely to affect marine species such as the Hawaiian monk seal and sea turtles since these animals are normally offshore or on the beach seaward of the berm. Any observed green sea turtle nests near the northern PMRF site would be noted and avoided.

Environmentally Sensitive Habitat

No wetlands or other sensitive habitat would be disturbed during installation of the TPS-X radar.

Operation

Vegetation

Impermeable ground covering material and spill containment berms would be placed for containment of fuel during fueling operations of the Prime Power Unit and Cooling Equipment Unit system hook-up. Spill control procedures would be established in cooperation with the host installation, and spill control kits would be present at the site in the unlikely event of a fuel leak or spill.

Threatened and Endangered Plant Species. No impacts to potential Ohai or Lau'ehu habitat on PMRF or to the endangered dwarf iliau found within the Makaha Ridge complex are anticipated from operation of the TPS-X radar since no ground-disturbing activities would be required.

Wildlife

The Prime Power Unit is a self-contained trailer with a noise-dampening shroud that would minimize the potential for diesel generator noise impacts.

As discussed in the KLC section, the power densities emitted from the TPS-X radar are unlikely to cause any biological effects in animals or birds. The TPS-X radar is not expected to radiate lower than 5 degrees, which would preclude EMR impacts to terrestrial species from either operation of the TPS-X radar during flight tests or later during proposed tactical testing. Impacts to wildlife on PMRF or Makaha Ridge would be similar to those discussed above in the KLC TPS-X radar section.

Threatened and Endangered Wildlife Species. There have been no reports of birds being affected by EMR from the existing sensors located in the Makaha Ridge complex. Impacts to the threatened and endangered birds on and offshore of PMRF would be similar to those discussed above in the KLC TPS-X radar section. The protection provided by the restricted access, and grassy habitat within Makaha Ridge would continue to have a positive effect on the small population of Hawaiian goose (Pacific Missile Range Facility, 2000). Impacts to threatened and endangered marine species offshore of PMRF would be similar to those discussed above in the KLC TPS-X radar section.

Environmentally Sensitive Habitat

No wetlands or other sensitive habitat would be adversely affected by operation of the TPS-X radar.

4.4.2.3 Cumulative Impacts

No cumulative impacts to biological resources have been identified from past launches at PMRF. Combined activities would be performed at different times and locations and therefore, no substantial cumulative impacts to biological resources are anticipated at PMRF.

4.4.2.4 Mitigation Measures

No biological resources mitigation measures are proposed for GMD ETR activities.

4.4.3 HAZARDOUS MATERIALS AND HAZARDOUS WASTE—PACIFIC MISSILE RANGE FACILITY

This section addresses potential impacts that could result from the storage and use of hazardous materials and the generation and disposal of hazardous waste associated with launch operations from PMRF, and construction required to support GMD launch operations. Pollution prevention, recycling, waste minimization, IRPs, USTs, ASTs, asbestos, lead-based paint, and PCBs have been considered. Potential impacts from launch activities are addressed under each alternative as applicable.

4.4.3.1 No Action Alternative

Implementation of the No Action Alternative would result in the ongoing launch of Strategic Target System missiles from PMRF. Use of PMRF for flight preparation and testing has been previously analyzed in the PMRF Enhanced Capability Final EIS (Pacific Missile Range Facility, Barking Sands, 1998) and the North Pacific Targets Program EA (U.S. Army Space and Missile Defense Command, 2001b). These documents concluded that adherence to PMRF standard SOPs as well as federal, state and local regulations would significantly reduce any impact from hazardous materials handling or waste generation. Impacts from launches of Strategic Target System missiles would be as described below.

Pre-Launch Activities

All elements of the Strategic Target System would be transported, handled and stored at PMRF in accordance with applicable federal, state, U.S. Army and U.S. Air Force regulations and standard range SOPs.

Launch Activities

Potentially hazardous materials (external to those preloaded into the missiles) to be used would be fuel required for electrical power generators, coating, sealants and solvents needed for launch and launch preparation. The types of hazardous materials used and hazardous waste generated would be managed in accordance with existing PMRF procedures and requirements. These procedures and requirements conform to federal and state of Hawaii laws and regulations. Best practices, lessons learned, and expectations indicated in the interim guidance DoD 5000.2R would be incorporated into design and construction plans.

In addition, the PMRF Fire Department and Hazardous Materials Response Team are trained in the appropriate procedures to handle the materials associated with Strategic Target System launches should a mishap occur. All personnel involved in these operations would wear protective clothing and receive specialized training in spill containment and cleanup.

During launches there is the potential for a mishap to occur resulting in missile potentially hazardous debris and propellants falling within the ground hazard area. As addressed for previous launch programs on PMRF, the hazardous materials that result from a flight termination would be cleaned-up and any contaminated areas remediated. All hazardous waste generated in such a mishap would be disposed of in accordance with appropriate state and federal regulations.

Post-Flight Test Activities

Specific restoration actions, if necessary, would be determined on a case-by-case basis in coordination with the procedures of the Facility Services Division of Hazardous Materials.

4.4.3.2 Alternatives 1, 2, and 3

4.4.3.2.1 Target

Alternatives 1, 2, and 3 would involve single Strategic Target System launches from PMRF, as described in the No Action Alternative. This is a routine activity for PMRF and is included in current hazardous materials and hazardous waste management plans. No additional activities would be performed, no new potentially hazardous materials would be used, and no significant increase in the amounts of hazardous waste currently generated would be expected to occur. Hazardous materials used and hazardous wastes generated would continue to be handled in accordance with existing laws and regulations governing the transportation and disposal of these materials.

4.4.3.2.2 TPS-X Radar

Construction

Alternative 1, 2, and 3 would require the set up of the TPS-X radar and associated equipment. The site would include a gravel pad, concrete pad, security fencing and utilities/communications installation. Generation of potential hazardous waste (e.g., corrosion control coatings, adhesives, and sealants) would be minimal. Management of hazardous materials and hazardous waste would be performed in accordance with PMRF requirements, and would not significantly impact existing PMRF hazardous materials and hazardous waste management procedures.

Operation

Operation of the TPS-X would have little effect on hazardous waste and hazardous materials management. A 3,785-liter (1,000-gallon) AST would be used for diesel fuel for the back-up generator.

4.4.3.3 Cumulative Impacts

Adherence to the hazardous materials and waste management systems on PMRF would preclude the potential accumulation of hazardous materials or waste. The base has implemented an emergency response procedure that would aid in the evaluation and cleanup of any hazardous materials released. The Proposed Action is equivalent to the No Action Alternative and is not expected to result in cumulative hazardous materials and hazardous waste impacts on PMRF.

4.4.3.4 Mitigation Measures

No hazardous materials/hazardous waste management mitigation measures are proposed for GMD ETR activities.

4.4.4 HEALTH AND SAFETY—PACIFIC MISSILE RANGE FACILITY

4.4.4.1 No Action Alternative

Under the No Action Alternative, Strategic Target System launches would continue at PMRF. Potential health and safety issues associated with Strategic Target System launches include pre-launch, launch, and post-launch activities. Use of PMRF for flight preparation and testing and potential health and safety issues have been previously analyzed in the PMRF EIS and North Pacific Targets Program EA. These documents concluded that PMRF takes every reasonable precaution during the planning and execution of these operations to prevent injury to human life or property. Therefore, no increased risk to health and safety is expected as a result of implementing this alternative. Impacts from launches of Strategic Target System missiles would be as described below.

Pre-Launch Activities

Missiles and support equipment arrive at Pearl Harbor before final shipment to PMRF. Equipment would be available at Pearl Harbor for the loading and unloading of missiles. Storage areas would be available for the temporary storage of any hazardous materials.

Missiles and support equipment would be transported by aircraft or ship to Nawiliwili Harbor, then by DoD/DOT-approved over the road carrier truck to PMRF. Applicable state and federal regulations and range safety plans and procedures are followed in transporting and handling potentially explosive ordnance and hazardous materials. Missile components, including any propellant, are transported in DOT and military designed and approved shipping containers.

The type of protection afforded by shipping containers is sufficient to protect solid rocket motors from receiving the shock required to cause an explosion. In the event of a transportation accident, it is more likely that the solid propellants would burn. The solid propellants would release exhaust components, specifically hydrogen chloride, which would irritate the eyes and skin of persons in the nearby area. Such an accident would not likely occur given the in-place safety procedures used by PMRF during transportation and handling of missile components. ESQDs would be established around transportation corridors.

On arrival at PMRF, support equipment is placed in secure storage until assembly and launch preparation. ESQDs are established around ordnance storage and Missile Assembly Buildings. Access to storage and support facilities is limited to trained and authorized PMRF/mission critical personnel.

Launch Activities

A pre-launch accident on the launcher or in the assembly building would be characterized by either an explosion and/or detonation of missile propellants or burning of the propellants without an explosion or detonation. An ESQD surrounding the launcher would be calculated based on the equivalent explosive force of all propellant and pyrotechnic materials contained on the flight vehicle. Areas outside the ESQD zone provide acceptable protection and require that areas inside the ESQD zone be cleared of non-mission-essential personnel. The ESQD would vary from missile to missile. Fire suppression, hazardous materials emergency response, and emergency medical teams would routinely be provided during the actual launch operations.

Potential health and safety impacts associated with launch operations could occur as a result of inhalation of exhaust products associated with normal operation; impact hazard associated with a launch anomaly (explosion, crash, flight termination); and inhalation hazards from an abnormal launch (fire, crash, flight termination). The primary method for preventing potential adverse safety and health effects associated with these occurrences involves the physical isolation of the area immediately surrounding the launch site, before launch. At no time shall individuals of the public 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. This standard maximum risk to the public is less on an annual basis than the risks from accidents occurring in the home or in public. (Range Commanders Council, Range Safety Group, 2002) Before launch, safety clearance areas would be established to provide an area where all potentially hazardous debris from a launch anomaly would be contained. Ground and range safety areas would be determined to protect the general public and private property against potential launch mishap. Non mission essential personnel would be excluded from the ground safety area and Launch Hazard Area during launch operations. Personnel working within the Launch Hazard Area would be protected in bunkers or behind berms. Numerous factors determine the shape and dimensions of the ground safety area and Launch Hazard Area, including the following:

- Size and flight characteristics of the missile

- Individual flight profile for each exercise or flight test
- Reaction time between recognition of a flight malfunction and the decision to terminate flight

The ground safety area size is determined by simulating the missile's capability to travel off course in any direction (360 degrees) from the launch point for a specified period of time. Five seconds would be the commonly used time period, but this period can be modified based on local range procedures, capabilities, and mission requirements. The analysis assumes that at the end of the time period, the missile flight would be terminated by the FTS and the associated debris falls to the ground or sea. The outer perimeter within which this potentially hazardous debris could fall, in any direction, factoring in prevailing wind conditions, defines the boundaries of the ground safety area.

Data processed by ground-based or onboard missile computer systems is used to recognize malfunctions and terminate missile flight. The Safety Officer continuously monitors the flight and would always retain the capability to terminate the flight, if necessary. For a typical aerial target drone, the nominal ground safety area for launches extends to a radius of up to approximately 366 meters (1,200 feet). For ballistic missiles, the nominal ground hazard area is 610 meters (2,000 feet) for unguided rail-launched targets and a modified 3,048 meters (10,000 feet) for larger stool-launch guided missile targets (Lopez, 1996). The Range Safety Officer would use computer models to determine actual ground safety area dimensions and safety procedures for each target missile flight, based on the above factors.

To accommodate launches of larger missiles, PMRF has an existing restrictive easement for a ground safety area of a modified 3,048 meters (10,000 feet) that extends beyond the PMRF property boundary. This restrictive easement is used to set up the launch hazard area to ensure public safety during a launch. The use of the restrictive easement until 2030 was analyzed in the PMRF Enhanced Capability EIS. As described in the PMRF Enhanced Capability EIS, launches from Kauai Test Facility toward the BOA near USAKA/KMR used the launch azimuth of 280 degrees to avoid overflight of the Island of Niihau. The North Pacific Targets Program EA analyzed launches for payload impact in the BOA off the northwest coast of North America with initial launch azimuths of 310 to 360 degrees. The Range Safety Officer would use computer models to determine actual ground safety area dimensions and safety procedures for each target missile flight.

In addition to the ground safety area, a Launch Hazard Area is established over water where any potentially hazardous debris from a flight termination or missile stage could fall. The Launch Hazard Area would be determined for each type of flight test, taking into account the same parameters used in determining the ground safety area. Before launch PMRF would issue NOTAMs and NOTMARs. Area surveillance and clearance of the Launch Hazard Area is provided by PMRF aircraft and marine vessels, as part of their routine operations. To further minimize potential launch associated hazards emergency response teams are on standby during launch operations for fire suppression, hazardous materials collection and removal and medical response as necessary.

The potential health and safety impact resulting from a nominal launch includes the inhalation of exhaust products during the first few seconds of the launch operation. Concentrations of exhaust products are expected to be below applicable health-based standards by the time the exhaust plume reaches the boundary of the ground safety area or Launch Hazard Area. Thus the public would not be exposed to concentrations exceeding exposure limits. Modeling conducted for previous Strategic Target System launches has determined that a normal launch would not endanger public health or safety in the vicinity/area of PMRF.

Post-Launch Activities

Potentially hazardous debris would impact the ground or open ocean should a flight termination occur. Debris would primarily consist of metals, solid propellant, and batteries. Much of any hazardous material in the missile would be consumed in launch anomaly. Potentially hazardous debris would be recovered from the ground and disposed of in accordance with applicable state, federal and range hazardous waste regulations and operating procedures. Most liquid propellant potentially used in upper stages would be consumed in flight termination and would not likely pose an effect on health and safety.

4.4.4.2 Alternatives 1, 2, and 3

4.4.4.2.1 Target

Single target launches would occur from PMRF under Alternatives 1, 2, and 3. All launch activities would be conducted as previously analyzed in the PMRF EIS, Strategic Target System EIS, North Pacific Target Program EA, and in compliance with federal, state, local and, if applicable, international health and safety requirements and strict PMRF SOPs. Therefore, no increased risk to health and safety would be expected as a result of selecting these alternatives.

Sensor Operations

A mobile telemetry system could be used at PMRF Main base at Makaha Ridge. Before installation and use of any radar or telemetry unit, the Navy conducts EMR hazard review that considers hazards of EMR on personnel, fuel, and ordnance (HERP, HERF, and HERO, respectively). The review provides recommendations for sector blanking and safety systems to minimize HERP, HERF, and HERO exposures. The proposed systems would have the appropriate safety exclusion zones established before operation, and each unit would have warning lights to inform personnel when the system is emitting EMR.

4.4.4.2.2 TPS-X Radar

Construction

The potential TPS-X locations would be northern PMRF or at Makaha Ridge. Construction activities would be accomplished in accordance with the safety plans and procedures described in section 4.1.7.2. No adverse effects to health and safety are expected from construction of the TPS-X pad.

Operation

EMR hazard zones would be established within the beam's tracking space and near emitter equipment. The potential interference distances are shown in figure 2.3.1-8. A visual survey of the area would be conducted to verify that all personnel are outside the hazard zone prior to startup. Personnel may not enter these hazard zones while the radar is in operation. The radar is prevented from illuminating in a designated cutoff zone, in which operators and all other system elements would be located. Potential safety consequences associated with radar interference with other electronic and emitter units (flight navigation systems, tracking radars, etc.) would also examined prior to startup. Adherence to AADC, FAA and DoD safety procedures relative to radar operations would preclude significant impact to health and safety.

4.4.4.3 Cumulative Impacts

Potentially hazardous operations at PMRF would continue at levels similar to current conditions. No cumulative impact to the public health and safety would be expected from exposure to EMR emission, hazardous air pollutants, hazardous materials or hazardous waste operations at PMRF. Any long-term exposures to on-base personnel would be minimized due to the strict adherence to regulatory control when handling materials. Based on the PMRF SOPs and other activities in the area, there is minimal potential for cumulative health and safety risk to the public from operations at PMRF. The proposed number of single target launches expected under Alternatives 1, 2 and 3 would not represent an increase over current conditions and therefore would not increase potential public health and safety risk.

4.4.4.4 Mitigation Measures

No health and safety mitigation measures are proposed for GMD ETR activities.

4.4.5 SOCIOECONOMICS—PACIFIC MISSILE RANGE FACILITY

4.4.5.1 No Action Alternative

Under the No Action Alternative, Strategic Target System launches would continue at PMRF. The use of PMRF for flight preparation and testing and potential socioeconomic issues have been previously analyzed in the PMRF EIS and North Pacific Targets Program EA. These documents concluded that there would be no significant impacts to socioeconomics from the launch of four Strategic Target System missiles per year. Impacts from launches of Strategic target System missiles would be as described below for the proposed action.

4.4.5.2 Alternatives 1, 2, and 3

4.4.5.2.1 Target

Under the implementation of Alternatives 1, 2, and 3, PMRF would be used as a launch site for single, Strategic Target System vehicles; the impacts from the launch of these targets have previously been analyzed in the PMRF Enhanced Capability Final EIS (Pacific Missile Range Facility, Barking Sands, 1998) and in the North Pacific Targets EA (U.S. Army Space and Missile Defense Command, 2001b). Potential impacts would be the same as described for the No Action Alternative.

4.4.5.2.2 Sensors

Under the implementation of each Alternative, PMRF would be used as a supporting facility for mid-range telemetry during both target and GBI launches and intercepts. This could include the use of existing tracking and surveillance radars, telemetry receivers and recorders, and communications systems. Mobile telemetry systems could also be used at PMRF or at Makaha Ridge.

4.4.5.2.3 Cumulative Impacts

The Proposed Action is equivalent to the No Action Alternative and is not expected to result in cumulative socioeconomic impacts at PMRF.

4.4.5.2.4 Mitigation Measures

No socioeconomic mitigation measures are proposed for GMD ETR activities.

4.5 VANDENBERG AIR FORCE BASE

4.5.1 AIR QUALITY—VANDENBERG AIR FORCE BASE

4.5.1.1 No Action Alternative

Under the No Action Alternative, launch activities would continue at Vandenberg AFB, although the GMD ETR would not be established and GBI and target launch scenarios would not be tested under operationally realistic conditions.

Table 4.5.1-1 lists propellant information for the Titan IV, Delta II and IV, and Atlas V, common launch vehicles at Vandenberg AFB. The exhaust emissions presented in the EIS for the Evolved Expendable Launch Vehicle Program (EELV) (U.S. Department of the Air Force, 1998a) and the Supplemental EIS for the EELV (U.S. Department of the Air Force, 2000) for these vehicles are shown in table 4.5.1-2.

Table 4.5.1-1: Missile Propellant Information at Vandenberg AFB

Missile	Propellant Mass kilograms (pounds)
Titan IV	631,400.6 (1,392,000)
Delta II	106,140.6 (234,000)
Atlas V	<382,106.2 (<842,400)
Delta IV	<227,063.8 (<500,590)

Source: U.S. Department of the Air Force, 1998a; 2000

Table 4.5.1-2: Predicted Pollutant Concentration Levels at Vandenberg AFB

Launch Vehicle	Time	Hydrogen Chloride (ppm)	Aluminum Oxide (mg/m^3)
Titan IV [a]		3.32	NA
Delta II [a]		1.821	NA
Atlas V [b]	Peak/Instantaneous	1.896	2.694
	30-minute	0.067	0.116
	60-minute	0.033	0.058
Delta IV [b]	Peak/Instantaneous	1.270	1.779
	30-minute	0.045	0.077
	60-minute	0.023	0.039

a U.S. Department of the Air Force, 1998
b U.S. Department of the Air Force, 2000
ppm = parts per million
mg/m^3 = milligrams per cubic meters
NA = Not available

These vehicle emissions are typical of those launched from Vandenberg AFB. The U.S. Air Force standard for hydrogen chloride is 10 ppm for an instantaneous level. The OSHA standard for aluminum oxide is 5 mg/m^3.

The EIS and Supplemental EIS concluded that up to an additional nine launches per year would not exceed NAAQS, state AAQS, U.S. Air Force, or OSHA standards. Current range activities would continue. Launches from Vandenberg AFB are limited to 30 annually (10 military launches and 20 space launches), including current launching of the Peacekeeper, BV, targets and Minuteman II. Table 4.5.1-3 lists annual emissions from Vandenberg AFB and Santa Barbara County.

Table 4.5.1-3: Vandenberg AFB and Santa Barbara County Emissions (tons/year)

	Volatile Organic Compounds	Oxides of Nitrogen	Carbon Monoxide	Sulfur Dioxide	PM-10
Estimated 2001 Emissions from Vandenberg AFB	5.0	19.6	51.8	1.1	64.6
1996 Santa Barbara County Annual	44,460	16,589	103,369	865	13,553

Source: U.S. Department of the Air Force, 2000

4.5.1.2 Alternative 1

4.5.1.2.1 Targets

Construction

Construction activities associated with target facilities at Vandenberg AFB would include interior and software modifications to existing facilities. Therefore, there would be no increase to regional air quality emissions at Vandenberg AFB due to construction.

Operation

Santa Barbara County is in attainment for all air quality standards except the federal and state ozone standards, and the state standard for PM-10. Alternative 1 would not substantially impact the regional air quality within the Santa Barbara Air Basin.

Pre-Launch Activities

Vandenberg AFB complies with the Santa Barbara County Air Pollution Control District rules and regulations listed below. Alternative 1 would comply with these and any other applicable rules.

- Rule 317, Organic Solvents, provides limits to any solvent materials used in the project.
- Rule 323, Architectural Coatings, provides for coating materials applied to an architectural structure.
- Rule 330, Surface Coating of Metal Parts and Products, applies if metal parts are coated on base before construction.
- Rule 353, Adhesives and Sealants, applies if adhesives, adhesive bonding primers, adhesive primers, sealants, sealant primers, or any other primers are used during the project unless specifically exempted by this rule.
- Only California Air Resources Board-certified blasting medium would be permitted if abrasive blasting were used.

- Any portable equipment powered by an internal combustion engine of 20 British horsepower or higher used in this project must be registered in the California Statewide Portable Equipment Registration Program or have a valid Santa Barbara County Air Pollution Control District Permit to operate. (Vandenberg Air Force Base, 2001)

Pre-launch activities associated with Alternative 1 at Vandenberg AFB would include the transportation of the target. The mobile emissions resulting from this transportation would be intermittent and would not have a measurable impact to regional air quality.

Emergency generators would supply backup power to target facilities with offsite commercial power sources providing primary power. The emergency backup generators would be operated under appropriate permits and restrictions.

Launch Activities

Proposed target missiles could consist of one of several types of missiles including Strategic Target System, Minuteman II Target, Peacekeeper Target and Trident I (C4) target. Table 4.5.1-4 lists missile propellant information and table 4.5.1-5 lists emission constituents during Stage I for each proposed missile. In Alternative 1, a total of five target launches per year would be anticipated at Vandenberg over the duration of the program.

Table 4.5.1-4: Missile Propellant Information for Proposed Targets at Vandenberg AFB

Missile	Booster	Propellant Mass kilograms (pounds)
Strategic Target System	Stage I	9,422 (20,772)
	Stage II	4,025 (8,874)
	Stage III	414 (913)
Minuteman II Target	Stage I	20,810 (45,879)
	Stage II	6,296 (13,851)
	Stage III	1,658 (3,655)
Peacekeeper Target	Stage I	44,661 (98,462)
	Stage II	24,556.3 (54,137.7)
	Stage III	7,068.7 (15,583.9)
	Stage IV	644 (1,420)
Trident I (C4) Target	Stage I	17,667 (38, 948)
	Stage II	7,924 (17,469)
	AKM	415 (914)

Table 4.5.1-5: Potential Target Exhaust Emissions (Single Launch) at Vandenberg AFB

Missile	Aluminum Oxide metric ton (ton)	Chlorine metric ton (ton)	Carbon Monoxide metric ton (ton)	Carbon Dioxide metric ton (ton)	Hydrogen metric ton (ton)	Water metric ton (ton)	Hydrogen Chloride metric ton (ton)	Nitrogen metric ton (ton)
Strategic Target System	3.56 (3.92)	0.019 (0.02)	2.35 (2.59)	0.19 (0.21)	0.22 (0.24)	0.60 (0.66)	1.58 (1.74)	0.87 (0.96)
Minuteman II Target	6.29 (6.93)	0.027 (0.030)	5.00 (5.51)	0.77 (0.85)	0.44 (0.48)	1.98 (2.18)	4.47 (4.93)	1.83 (2.02)
Peacekeeper Target	9.69 (10.68)	NA	9.95 (10.96)	1.04 (1.15)	1.00 (1.10)	3.36 (3.70)	9.46 (10.42)	3.76 (4.14)
Trident I (C4) Target	6.71 (7.40)	<0.009 (<0.01)	5.48 (6.04)	0.35 (0.39)	NA	0.72 (0.79)	0.39 (0.43)	4.06 (4.48)

NA = Not available

Launches are short-term, discrete events, thus allowing time between launches for emission products to be dispersed. The proposed target missiles contain less solid rocket fuel capacity than the previously analyzed Titan IV, Delta II, Atlas V, and Delta IV, and therefore would likely produce lower exhausts. Based on these results, the proposed launches would not cause or contribute to violation of any air quality standards.

In the event of dual launches of target missiles, the exhaust products would conservatively be estimated to be double those for a single launch, assuming the two target missiles are the same. The largest of the proposed target vehicles is the Peacekeeper Target. During the event of a dual Peacekeeper Target launch, the level of hydrogen chloride is estimated to continue to be within the U.S. Air Force exposure limits or to exceed them for a limited time. Previous analysis performed by the U.S. Air Force for a nominal launch of the Titan IV missile, determined that hydrogen chloride concentrations would fall below the ceiling level of 10 ppm in approximately 10 minutes. The Titan IV hydrogen chloride emissions are approximately double those of a Peacekeeper Target. The Titan IV was the launch vehicle chosen by the U.S. Air Force for analysis at Vandenberg AFB. Analysis determined that similar levels would be expected by comparable vehicles such as Delta and Atlas rockets, Minuteman and Peacekeeper missiles and the space shuttle. The hydrogen chloride ceiling level of 10 ppm is also considerably less than the hydrogen chloride IDLH level of 50 ppm. (National Research Council, Commission of Life Sciences, Board on Environmental Studies and Toxicology, Committee on Toxicology, Subcommittee on Rocket Emission Toxicants, 1998)

Determination of Non-Applicability

Santa Barbara County is in non-attainment for both the federal and state standards for ozone and the state standards for PM-10. Air quality impacts from Vandenberg AFB missile launches similar in size and type of propellant to the targets have been examined in previous EAs, such as the 1999 Booster Verification Tests EA and the 1997 Targets Programmatic EA, through a Determination of Non-Applicability and determined to be insignificant. In the Targets Programmatic EA it was determined that approximately 2.7 metric tons (3 tons) of volatile organic compounds and 1.8 metric tons (2 tons) of nitrogen oxide would be emitted as a result of 30 missile launches (solid and liquid) per year. 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 source reactive organic gases and nitrogen oxides are 15.8 metric tons (17.4 tons) and 20 metric tons (22 tons) per day respectively. Analysis provided in the Theater Ballistic Missile Targets EA determined that five target 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 nitrogen oxides. The up to five proposed launches are not expected to cause or contribute to any new violation of any air quality standards in the ROI.

No federal *de minimis* levels have been established for state non-attainment areas. However, potential emissions are less than the federal *de minimis* levels for serious federal PM-10 non-attainment. Since the region is in federal attainment, the Santa Barbara County Air Pollution Control District has not established planning values for PM-10.

Post-Launch Activities

Post-launch activities would include the removal of all mobile equipment and assets brought to Vandenberg AFB. The removal could result in small localized amounts of PM-10, which would be minimized further through dust suppression measures previously discussed.

4.5.1.2.2 Sensors

Current range radars (such as High Accuracy Instrument Radar, AN/TPQ-18, AN/FPS-16, AN/MPS, and TPS-X), sensors, fixed and mobile telemetry, and optics equipment would be utilized in Alternative 1 and would require no construction or modifications. Operation of existing range radars at Vandenberg AFB would be covered under existing permits.

4.5.1.3 Alternative 2

4.5.1.3.1 Ground-Based Interceptors

Construction

The construction of the GBI silos and associated facilities to be used at Vandenberg AFB was analyzed in the ABV EA and determined to cause no significant air quality impacts to the regional air.

Operation

Pre-Launch Activities

Pre-launch activities associated with the GBIs would be similar to pre-launch activities for targets at Vandenberg AFB.

An accidental release of liquid fuel or liquid oxidizer from the EKV would be similar to that described for KLC in section 4.1.1.2.1. During nominal propellant tank installation, the propellants remain sealed inside their tanks. The likelihood of an accidental release of the liquid fuel or oxidizer would be low. However, if such an accident were to occur, it would most likely occur during missile assembly. Table 4.5.1-6 indicates the results of analysis using the U.S. Air Force Toxic Corridor Model computer model to determine distances at which IDLH health standard could be exceeded assuming all 7.5 liters (2 gallons) of fuel and 5.5 liters (1.5 gallons) of oxidizer were released to the atmosphere during an accident. The IDLH is the level of exposure (not time-weighted) above which it is thought a person would suffer life-threatening or irreversible health effects or other injuries that would impair them from escaping the hazardous environment. The IDLH level was the only level of concern as others are based on time weighted averages over prolonged exposures.

Actual hazard distances would depend on the propellant released, the amount released, meteorological conditions, and emergency response measures taken. However, the low likelihood of such an event and the implementation of approved emergency response plans would limit the impact of such a release.

Table 4.5.1-6: Potential Exceedances Due to Accidental Oxidizer or Fuel Leak at Vandenberg AFB

Propellant	Health Standard	Standard Limit	Exceedance Distance [b]
Hydrazine	NIOSH IDLH [a]	50 ppm (66.5 mg/m^3)	Not exceeded
Methyl Hydrazine	NIOSH IDLH [a]	20 ppm (38.4 mg/m^3)	Not exceeded
Nitrogen Tetroxide (liquid)	NIOSH IDLH [a]	20 ppm (36 mg /m^3)	60 meters (197 feet)
Nitrogen Tetroxide (gas)	NIOSH IDLH [a]	20 ppm (36 mg /m^3)	30 meters (98 feet)

Source: Center for Disease Control and Prevention, 2002a, b; Asia Pacific Space Launch Centre EIS Site
[a]The National Institute for Occupational Safety and Health (NIOSH) Immediately Dangerous to Life and Health (IDLH) is the level of exposure (not time-weighted) above which it is anticipated a person would suffer life-threatening or irreversible health effects or other injuries that would impair them from escaping the hazardous environment.
[b]Exceedance Distance—Average of U.S. Air Force Toxic Corridor model results for 15-minute and 30-minute averaging time and multiple stability classes
ppm = parts per million by volume.
mg/m^3 = milligrams per cubic meter

Launch Activities

Alternative 2's launch activities includes up to five launches (GBI and target combined) per year at Vandenberg AFB over the duration of the test program and would also comply with the rules listed in section 4.5.1.2.1. Table 4.5.1-7 lists propellant information for each GBI configuration, and table 4.5.1-8 gives emissions constituents for Stage 1 of each proposed GBI configuration. Emissions from rocket and missile launches are not considered stationary sources by the Santa Barbara County Air Pollution Control District.

Table 4.5.1-7: Missile Propellant Information for Proposed GBIs at Vandenberg AFB

Missile	Booster	Propellant Mass kilograms (pounds)
Orion 50SXLG	Stage I	15,069 (33,227)
	Stage II	3,926 (8,655)
	Stage III	772 (1,701)
BV/BV+	Stage I	11,742 (25,891)
	Stage II	415 (914)
	Stage III	415 (914)

Table 4.5.1-8: Potential Exhaust Emissions (Single Launch) at Vandenberg AFB

Missile		Emissions							
		Aluminum Oxide	Carbon Monoxide	Carbon Dioxide	Chlorine	Nitrogen	Hydrogen Chloride	Hydrogen	Water
Athena-2	Metric tons	14.2	17.7	1.5	NA	NA	14.2	NA	NA
	Tons	15.7	19.5	1.7	NA	NA	15.7	NA	NA
GBI (Orion 50SXLG)	Metric tons	8.14	4.82	0.59	.062	1.89	4.79	0.49	1.89
	Tons	8.97	5.31	0.65	0.068	2.08	5.28	0.54	2.08
GBI (BV/BV+)	Metric tons	8.39	5.23	0.52	0.49	2.06	4.43	0.48	2.23
	Tons	9.25	5.77	0.58	0.54	2.27	4.89	0.53	2.47

NA = Not available

As determined in the Booster Verification Test EA (U.S. Department of the Air Force, 1999) the configuration of the proposed GBI is similar to that of the Athena-2 (formerly the Lockheed Martin Launch Vehicle). However, the Athena-2 has a much larger solid rocket fuel capacity compared to that of the GBI. Air quality emission modeling in the Booster Verification Test EA (U.S. Department of the Air Force, 1999) concluded that a normal launch of an Athena-2 at Vandenberg AFB would not cause a significant impact to regional air quality at Vandenberg AFB; therefore, the much lower levels of the GBI exhaust would not be expected to cause a significant impact to air quality.

In the event of dual GBI launches, the exhaust products are conservatively estimated to be twice the level of a single launch. During such an event, the level of hydrogen chloride is estimated to be approximately 68 percent of a single Athena-2 launch. Therefore, the lower levels of the dual launch GBI exhaust would not be expected to cause a significant impact to air quality.

Determination of Non-Applicability

Santa Barbara County is in non-attainment for both federal and state standards for ozone and the state standard for PM-10. Impacts to air quality from missile launches at Vandenberg AFB of similar size and propellant to GBIs have been examined in previous EAs, such as the 1997 Targets Programmatic EA and the 1999 Booster Verification Test EA, through a determination of Non-Applicability and determined to be insignificant. In the Targets Programmatic EA it was determined that approximately 2.7 metric tons (3 tons) of volatile organic compounds and 1.8 metric tons (2 tons) of nitrogen oxide would be emitted as a result of 30 missile launches (solid and liquid) per year. 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 source reactive organic gases and nitrogen oxides are 15.8 metric tons (17.4 tons) and 20 metric tons (22 tons) per day respectively. Analysis provided in the Booster Verification Test EA determined that two GBI missile launches would result in 0.121 metric tons (0.133 ton) of reactive organic gases and 0.0997 metric ton (0.1099 ton) of nitrogen oxides. The up to five proposed launches are not expected to cause or contribute to and new violation of air quality standards in the ROI.

No federal *de minimis* levels have been established for state non-attainment areas. However, potential emissions are less than the federal *de minimis* levels for serious federal PM-10 non-attainment. Since the region is in federal attainment, the Santa Barbara County Air Pollution Control District has not established planning values for PM-10.

Post-Launch Activities

Post-launch activities would include the removal of all mobile equipment and assets brought to Vandenberg AFB. The removal could result in small localized amounts of PM-10, which would be minimized further through dust suppression measures previously discussed.

4.5.1.3.2 Targets

Target construction and operation at Vandenberg AFB for Alternative 2 would be the same as described in section 4.5.1.2.1 for Alternative 1.

4.5.1.3.3 In-Flight Interceptor Communication System Data Terminal

Construction

An IDT site would be constructed for Alternative 2, requiring the disturbance of approximately 2.0 hectares (4.9 acres). The potential PM-10 construction emissions are listed in table 4.5.1-9.

Table 4.5.1-9: Potential Construction-Related Emissions (PM-10) for IDT Facilities at Vandenberg AFB

Source	Emission Factor kg/hectare (lb/acre)	Graded Area hectare/yr (acres/yr)	Exposed days/yr	Emissions kg/yr (lb/yr)	Emissions metric tons/year (tons/yr)
Bulldozing	1,046 (933.1)	2.0 (4.9)	NA	2,116 (4,666)	2.1 (2.3)
Grading	1.5 (1.3)	2.0 (4.9)	NA	3 (7)	0.002 (0.003)
Vehicle Traffic	1,019 (909)	2.0 (4.9)	NA	2,062 (4,545)	2.1 (2.3)
Erosion of Soil Piles	0.17 per day (0.15 per day)	2.0 (4.9)	90	31 (68)	0.03 (0.04)
Erosion of Graded Surface	30.0 per day (26.4 per day)	2.0 (4.9)	90	5,387 (11,880)	5.4 (5.9)
	TOTAL			9,599 (21,166)	9.6 (10.6)

As Vandenberg AFB is within a non-attainment area for federal and state one-hour ozone standards, exhaust emissions of nitrogen oxides and hydrocarbons would be of concern. However, the amount of emissions generated by construction equipment would depend upon the type and amount of equipment used and the amount of time it would be operated. Emissions would be monitored in accordance with Memorandum of Agreements between Vandenberg AFB and Santa Barbara County Air Pollution Control District. Therefore, impacts are not expected to be substantial.

Operation

Operation of the IDT at Vandenberg AFB would have little effect on regional air quality. Power would be provided by offsite commercial power sources, however in the event of a loss of power a 275-kW diesel generator would be used. Along with the generator itself, there would be 3,785-liter (1,000-gallon) AST for fuel. Table 4.5.1-10 lists the possible emissions associated with the use of this generator. The generator is assumed to be tested weekly during non-launch periods and used during power outages for approximately 250 hours a year.

Table 4.5.1-10: Potential Generator Emissions for IDT Facilities at Vandenberg AFB

Generator	Emissions			
	Oxides of Nitrogen metric tons (tons)	Hydrogen Chloride metric tons (tons)	Carbon Monoxide metric tons (tons)	PM-10 metric tons (tons)
275 kW Diesel Generator	0.60 (0.70)	0.09 (0.10)	0.80 (0.90)	0.03 (0.04)

4.5.1.3.4 Sensors

Current range radars (such as High Accuracy Instrument Radar, AN/TPQ-18, AN/FPS-16, AN/MPS, and TPS-X), sensors, fixed and mobile telemetry, and optics equipment would be utilized in Alternative 2 and would require no construction or modifications.

4.5.1.4 Alternative 3

Alternative 3 would require modification to existing launch sites for GBI and the use of preexisting missile support facilities and range radars. Air quality impacts for these activities are similar to those described for Alternatives 1 and 2.

4.5.1.5 Cumulative Impacts

Launches from Vandenberg AFB are limited to 30 annually (10 military launches and 20 space launches). The prior EAs that analyzed GMD activities at Vandenberg AFB (U.S. Army Space and Missile Defense Command, 2002a; U.S. Department of the Air Force, 1999) indicated no cumulative impact to air quality for up to six GBI launches annually. Based on preliminary planning information through fiscal year 2007, the Proposed Action of up to five launches (interceptor and target), in conjunction with current planned or anticipated launches, could meet or slightly exceed the 30 annual launches from Vandenberg AFB during fiscal year 2004. Missile launches are short-term, discrete events, thus allowing time between launches for emission produces to be dispersed. Combined activities would be performed at different times and locations, and therefore no cumulative impact to air quality is anticipated.

4.5.1.6 Mitigation Measures

No air quality mitigation measures are proposed for the GMD ETR activities at Vandenberg AFB.

4.5.2 BIOLOGICAL RESOURCES—VANDENBERG AIR FORCE BASE

The biological resources analytical approach involved evaluating the potential impacts of the Proposed Action and alternatives, such as construction, site preparation activities, use of existing and new sensors, and missile launches, on vegetation, wildlife, threatened and endangered species, and sensitive habitat within the ROI. Impacts that could result from construction and other site preparation activities include disturbance and removal of vegetation and disturbance to wildlife from the accompanying noise and presence of personnel. Impacts could also result from launch-related activities such as noise, air emissions, debris impacts, and the use of radar equipment.

All transportation of equipment and materials such as fuels would be conducted in accordance with applicable federal (DOT) and state regulations. SOPs for spill prevention, containment, and control measures while transporting equipment and materials would preclude impacts to biological resources.

GMD ETR program personnel would remove all mobile equipment/assets brought to the installation at the conclusion of its testing activities. Transportation for removal of equipment would be the same as when it was brought into the installation. 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.

4.5.2.1 No Action Alternative

If the GMD ETR is not established, Vandenberg AFB would still continue to be operated as a test area for space and missile operations. Other GMD-related activities would continue such as the GBI test flights addressed in the EA for Booster Verification Tests (U.S. Department of the Air Force, 1999) and the ABV Verification Tests EA (U.S. Army Space and Missile Defense Command, 2002c) and single target launches. These activities are consistent with the ongoing mission of Vandenberg AFB and have been analyzed by the referenced EAs. No additional impacts to biological resources would occur as a result of the No Action Alternative.

4.5.2.2 Alternative 1

4.5.2.2.1 Targets

Target missiles are currently launched from LF-6 and LF-3 in support of the GMD program. Up to five target missiles per year could be launched from Vandenberg AFB to support the GMD ETR program over the 10-year performance period. Dual target missile launches could potentially occur.

Site Preparation

Vegetation

Alternative 1 would require the use of existing launch facilities (LF-6 and LF-3) (figure 3.5.2-1), Missile Assembly Building (Building 1819), and missile and maintenance storage facilities. No new construction would be needed to support target launches for this alternative. The minor site preparation activities would result in no ground disturbance and thus there would be no impacts to vegetation.

Threatened and Endangered Plant Species. No adverse impacts are anticipated to the Gaviota tarplant and Lompoc yerba santa as a result of site preparation activities since no ground disturbance is anticipated.

Wildlife

Site preparation activities would implement procedures to minimize the potential for soil erosion if necessary and are not expected to adversely affect waterbodies, including Essential Fish Habitat. Site preparation activities would be limited in duration, and no direct physical auditory changes are anticipated.

California sea lions, northern elephant seals, northern fur seals, and other sensitive marine mammals in adjacent offshore areas would normally be at least 296 meters (970 feet) from the closest launch site (LF-6) and are not expected to be affected by site preparation noise.

Threatened and Endangered Wildlife Species. Site preparation activities would not occur in areas that could result in impacts to water bodies that could potentially contain the tidewater goby, unarmored threespine stickleback, or California red-legged frog.

The California least tern, California brown pelican, and western snowy plover preferentially forage and roost along the coast approximately 296 meters (970 feet) away and are unlikely to be affected by site preparation noise. 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 GMD-related facilities to the shoreline (approximately 296 meters [970 feet]).

Environmentally Sensitive Habitat

The coastal dune systems are outside the area that could potentially be disturbed during site preparation activities at LF-6 or LF-3. Site preparation activities are not anticipated to directly or indirectly impact the nearest wetlands, which are approximately 1.6 kilometers (1 mile) northwest of Building 1819.

Operation

Vandenberg AFB typically supports approximately five Minuteman or Peacekeeper launches per year from northern launch sites on base. Based on previous environmental studies and a Letter of Authorization with the National Marine Fisheries Service, up to 10 Minuteman and Peacekeeper launches per year could occur from northern Vandenberg AFB launch sites. GMD target missiles would be included in this number. Up to five GMD target launches would occur per year from north Vandenberg AFB. Dual target missile launches could potentially occur. Dual launches could result in a slightly larger affected area and longer duration of disturbance to wildlife. Impacts would in some cases be slightly greater than, but similar, to those analyzed below for single launches.

Vegetation

Normal launch activities are not expected to impact vegetation. Launch exhaust products would include hydrogen chloride, aluminum oxide, carbon monoxide, nitrogen dioxide, carbon dioxide, water, and chlorine. 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 non-fibrous aluminum oxide, as found in solid rocket motor exhaust, is nontoxic (U.S. Department of the Air Force, 1997b). Analysis of launch-related deposition of aluminum oxide has not shown it to be harmful to vegetation (Federal Aviation Administration, 1996).

The greatest potential for impacts to vegetation comes from hydrogen chloride deposition. Direct effects could include discoloration, foliage loss, and changes in species composition. 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 and affect wildlife. However, the potential impact on vegetation and wildlife from the proposed launches of the smaller target missiles is expected to be slight. The hydrogen chloride would cause a change in marine or fresh surface water pH for only a short duration; any alteration of the water's pH would be almost imperceptible. (U.S. Department of the Air Force, 1997b)

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, which lower the age class of area vegetation). Moreover, emergency fire-fighting personnel are on standby status for all launch activities as a protective measure.

Threatened and Endangered Plant Species. No adverse impacts are anticipated to the Gaviota tarplant and Lompoc yerba santa as a result of nominal launch activities since these plants have not been identified at the proposed target launch sites.

Wildlife

Emissions. 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 change in surface water pH for only a short duration, and any alteration of the water's pH would be almost imperceptible. The EPA has determined that non-fibrous aluminum oxide from solid rocket exhaust is non-toxic (Vandenberg Air Force Base, 1999).

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

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 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). 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, 1997b). 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.

Pacific harbor seals, the main pinniped species using north Vandenberg AFB, would normally be at least 2.0 kilometers (1.2 miles) from the launch site. Other pinnipeds such as California sea lions and northern elephant seals may haul-out temporarily on beaches several kilometers (miles) from the launch facility. Noise from prior launches has not appeared to affect pinniped use of the coastal areas on Vandenberg AFB. Pinniped monitoring has been performed for launches of larger missiles on north 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 the launch site. Recent surveys discovered a new harbor seal haul-out site on north Vandenberg AFB that is regularly used by up to three harbor seal mothers and their pups. The U.S. Air Force, 30th Space Wing, Vandenberg AFB began monitoring harbor seals at this site for Minuteman and Peacekeeper launches (launch reports in preparation) 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 30th Space Wing.

Noise monitoring would be performed during the initial launch of GMD target missile and 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. If expansion of the 10-launch (total) limit is desired, a request would be made to the National Marine Fisheries Service for an additional Letter of Authorization for harassment takes of marine mammals.

Threatened and Endangered Wildlife Species. Prior agency consultations have provided both for regulatory agency assessments of missile programs on Vandenberg AFB and identified monitoring/minimization measures to ensure there are no significant impacts. These consultations have been addressed in several documents: USFWS 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; and the Programmatic Marine Mammal Incidental Harassment Authorization for Space and Missile Launches on Vandenberg AFB, May 2000. (Vandenberg Air Force Base, 2002a)

The California least tern, California brown pelican, and western snowy plover preferentially forage and roost along the coast approximately 296 meters (970 feet) away from the proposed launch area. 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 296 meters (970 feet) from the 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 an altitude of 407 meters (1,335 feet) as it arches past the coastline. The intermittent launches planned for the GMD ETR test flights (up to five target missile flights per year over a 10-year period) are not expected to substantially impact the southern sea otter. (U.S. Department of the Air Force, 1997b; 1999)

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. (U.S. Department of the Air Force, 2001)

In the unlikely event of a launch mishap, scattered pieces of burning propellant could enter coastal water and potentially affect Essential Fish Habitat and pinnipeds hauled out along the adjacent coastline. 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 likely strike the water further downrange. 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 contaminant 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, 2000) 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. The results are presented in the KLC Water Resources section, table 4.1.14-2. As shown in the table, 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). The perchlorate would be expected to be diluted as it mixes with the surrounding water. 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)

Potential exists to disturb biological resources during debris recovery activities; however, recovery efforts would be coordinated with applicable range representatives and agencies to develop appropriate mitigation measures to avoid impact to sensitive resources and to restore natural areas as necessary following debris recovery efforts. Negligible adverse effects to biological resources would be expected during debris recovery activities.

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

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 wildlife are expected as a result of accidental release of liquid propellant.

Threatened and Endangered Wildlife Species. Impacts to threatened and endangered species resulting from proposed GMD ETR 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 tidewater goby, unarmored threespine stickleback, or California red-legged frog. Since the westerly launch trajectory used for most missile launches would carry the missile over snowy plover habitat, fire and debris from an anomaly could potentially impact snowy plovers. However, as stated above, 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 SOPs 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 BOA off the coast are not expected to adversely affect marine mammal species protected by the Marine Mammal Protection Act of 1972. An early flight termination or mishap could result in debris impact along the flight corridor. Early flight termination could result in widely scattered debris, but the probability of this debris hitting wildlife is remote since sensitive marine species in the ocean are widely scattered and occupy relatively small surface areas, and the probability of debris striking a threatened or endangered species is considered remote, 1×10^{-6} or less than one in a million.

Environmentally Sensitive Habitat

No adverse impacts as a result of the GMD ETR activities are anticipated to occur within the current Channel Islands National Marine Sanctuary located off the coast south of Vandenberg AFB. Additional consultation will be performed with the National Oceanographic and Atmospheric Administration following their decision on the of the sanctuary boundary expansion.

4.5.2.2.2 Sensors

Existing range sensors at Vandenberg AFB include several range radars (AN/TPQ-18, AN/FPS-16, High Accuracy Instrumentation Radar, AN/MPS-39, TPS-X) as well as fixed and mobile telemetry and optics equipment. Launch control would be located in existing launch control facilities. No additional impacts to biological resources would result from these existing sensors in support of the GMD ETR activities.

4.5.2.3 Alternative 2

Alternative 2 would be similar to Alternative 1 with the exception that GBI launches would be from Vandenberg AFB and RTS instead of KLC and RTS. The GBI launch would require construction of an IDT and modifications of existing support facilities at Vandenberg AFB. The other components described in Alternative 1 would remain the same.

4.5.2.3.1 Ground-Based Interceptors

Under Alternative 2, Vandenberg AFB would continue to be a launch site for GMD target missiles and would support dual GBI launches. The following activities would continue at Vandenberg AFB: dual launch of target missiles, dual launch of GBI missiles, use of the TPS-X radar, and use of existing range instrumentation.

Site Preparation Activities

The following facilities located on north Vandenberg AFB may be required for the GBI tests: LF-21 and LF-23 and Buildings 1900, 1959, 1978, 1555, 1871, and 1819 as listed in table 2.3.2-1 and shown on figures 2.3.2-1 and 3.5.2-1. These facilities have been used to support GBI booster verification tests and, as such, would require only minor interior modifications to support continued GMD testing, and therefore no vegetation impacts are anticipated.

For communication among the components on the same installation, the ETR would maximize use of available communications assets to include cable. If communication cable is not available, new cable would be installed. Installation of new cable would be in existing conduit, if available. If not, new conduit would be constructed along rights-of-way, in coordination with the Vandenberg AFB Environmental Office with minimal impacts to area vegetation.

Wildlife

Since no modifications to existing facilities are anticipated, no impacts to area wildlife are expected.

Environmentally Sensitive Habitat

Since no modifications to existing facilities are anticipated, no impacts to sensitive habitat onshore or offshore of Vandenberg AFB are expected.

Launch Activities

Dual GBI launches could potentially occur. Dual launches could result in a slightly larger affected area and longer duration of disturbance to wildlife. Impacts would in some cases be slightly greater than, but similar, to those analyzed below for single launches.

Vegetation

The majority of the blast residue would be contained within the silo, minimizing the potential for impacts on vegetation. All applicable U.S. Air Force, DOT, and U.S. Army 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; 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 (U.S. Department of the Air Force, 1997b).

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 and affect wildlife. However, the potential impact on vegetation and wildlife from the proposed launch of the smaller GBI is expected to be slight. The hydrogen chloride would cause a change in surface water pH for only a short duration; any alteration of the water's pH would be almost imperceptible. (U.S. Department of the Air Force, 1997b)

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 which 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.

Threatened and Endangered Vegetation. No adverse impacts are anticipated to the Gaviota tarplant and Lompoc yerba santa as a result of nominal launch activities since these plants have not been identified at the proposed launch facilities.

Wildlife

Emissions. 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 change in pH of only short duration, and any alteration of the water's pH would be almost imperceptible. The EPA has determined that non-fibrous aluminum oxide from solid rocket exhaust is nontoxic (Vandenberg Air Force Base, 1999).

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

Noise. The primary potential for impacts to wildlife would be from the noise created during the proposed missile launches. Noise from Minuteman launches ranges from 98 dBA approximately 4.2 kilometers (2.6 miles) from the launch site to 80 dBA approximately 13 kilometers (8 miles) from the launch site. The level of noise for the GBI missile during launch and flight is expected to be less and relatively short in duration. At approximately the same distance from the launch facility, the previous booster vehicle-2 launch (GBI vehicle) was 6 dB less than the Minuteman III launch and 17 dB less than Peacekeeper launches.

Pacific harbor seals, the main pinniped species using north Vandenberg AFB, would normally be at least 2.0 kilometers (1.2 miles) from the launch site. Other pinnipeds such as California sea lions and northern elephant seals may haul-out temporarily on beaches several kilometers (miles) from the launch facility. Noise from prior launches has not appeared to affect pinniped use of the coastal areas on Vandenberg AFB. Pinniped monitoring has been performed for launches of larger missiles on north 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 the launch site. Recent surveys discovered a new harbor seal haul-out site on north Vandenberg AFB that is regularly used by up to three harbor seal mothers and their pups. The U.S. Air Force, 30th Space Wing, Vandenberg AFB began monitoring harbor seals at this site for

Minuteman and Peacekeeper launches (launch reports in preparation) 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 30th Space Wing.

Noise monitoring would be performed during the initial launch of a GBI and harbor seal monitoring would be conducted during the pupping season in accordance with Vandenberg AFB guidelines. The GBI launches would be included with previously approved Peacekeeper and Minuteman launches in the 10 (total) intercontinental ballistic missile launches allowed under Vandenberg AFB's 5-year programmatic permit and letter of authorization. If expansion of the 10 launch (total) limit is desired, request would be made to the National Marine Fisheries Service for an additional Letter of Authorization for takes of marine mammals.

The disturbance to pinnipeds as a result of visual stimulus is unlikely due to the approximate altitude of 1,250 meters (4,100 feet) a GBI could reach as it approaches the coastline. The intermittent launches planned for the GBI test flights (up to five per year) are not expected to substantially impact marine species. (U.S. Department of the Air Force, 1999)

Wildlife in general is known to exhibit a startle response when exposed to short-term noise impacts. Studies (U.S. Department of the Air Force, 1997b) 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).

Threatened and Endangered Wildlife. The California least tern, California brown pelican, and western snowy plover preferentially forage and roost along the coast approximately 1,250 meters (4,100 feet) away from the proposed launch area. Noise levels 4.2 kilometers (2.6 miles) from the launch site during previous Minuteman missile launches were 98 dBA. No effects to sensitive bird species have been identified. The GBI is a smaller vehicle with less propellant than a Minuteman, and lower noise levels are anticipated. Proposed launch activities are unlikely to adversely affect the long-term well-being, reproduction rates, or survival of these listed birds. The level of noise for the GBI during launch and flight is also expected to be relatively short in duration. Noise monitoring would be performed for the first launch.

Southern sea otters in adjacent offshore areas would also be at least 1,250 meters (4,100 feet) from the 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 GBI would be at an altitude of 1,250 meters (4,100 feet) as it approaches the coastline. The intermittent launches planned for the GBI test flights (up to five flights per year) are not expected to substantially impact the southern sea otter. (U.S. Department of the Air Force, 1997b; 1999)

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. (U.S. Department of the Air Force, 2001)

In the unlikely 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)

Debris impact and booster drops in the BOA off the coast are not expected to adversely affect marine mammal species protected by the Marine Mammal Protection Act of 1972. An early flight termination or mishap could result in debris impact along the flight corridor. Early flight termination could result in widely scattered debris, but the probability of this debris hitting wildlife is remote.

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

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 above plans in place, no impacts to wildlife are expected as a result of accidental release of liquid propellant.

Threatened and Endangered Wildlife. Debris from nominal launches is not expected to impact water bodies that could potentially contain the tidewater goby, unarmored threespine stickleback, or California red-legged frog.

As discussed above, sensitive marine species in the ocean are widely scattered and occupy relatively small surface areas, and the probability of debris striking a threatened or endangered species is considered remote.

Environmentally Sensitive Habitat

No adverse impacts to the coastal dune systems are anticipated as a result of launch activities. Personnel would be instructed to avoid bird nesting and roosting locations and pinniped haul-out areas. Nominal launch activities are not anticipated to impact the wetlands approximately 1.6 kilometers (1 mile) northwest of Building 1819. An early flight termination or mishap would result in widely scattered debris, which could potentially impact the wetlands. Debris would be recovered and removed if practicable.

No adverse impacts as a result of the GMD ETR activities are anticipated to occur within the current Channel Islands National Marine Sanctuary located off the coast south of Vandenberg AFB. Additional consultation will be performed with the National Oceanographic and Atmospheric Administration following their decision on the of the sanctuary boundary expansion.

4.5.2.3.2 In-Flight Interceptor Communication System Data Terminal

Site Preparation Activities

Vegetation

The IDT (figure 2.3.2-1) would require disturbance of approximately 0.4 hectare (0.9 acre) within a fenced area of approximately 2 hectares (5 acres). The minimal requirements include a concrete base for the COMSATCOM, an all-weather road to the site, and a prepared surface within the fence around the site at least 4.6 meters (15 feet) wide. This loss of vegetation would represent only a small portion of the total vegetation available within Vandenberg AFB boundaries.

Threatened and Endangered Plant Species. No federally proposed or listed candidate, threatened, or endangered plant species would be impacted by installation of the IDT.

Wildlife

Impacts from ground disturbance and equipment noise would be similar to those discussed above for GBI site preparation.

Environmentally Sensitive Habitat

No wetlands or other sensitive habitat would be disturbed during construction and installation of the IDT.

Operation

During normal operations, the IDT would not transmit except for a few minutes during annual testing of the equipment. Given the short duration of transmission, no adverse impacts to biological resources are anticipated. Most operational impacts to wildlife from the IDT would come from security lighting and noise from electrical generators required for the site. The lighting and noise could encourage species less tolerant of these disturbances to avoid the area. Generator noise could range from 80 to 85 dBA at up to 105 meters (344 feet). These noise levels would only occur a couple of hours a week during maintenance activities required for backup generators or continuously if no commercial power is available.

4.5.2.3.3 Targets

Impacts of site preparation and launch activities in support of target launches from Vandenberg AFB would be the same as those addressed in Alternative 1.

4.5.2.4 Alternative 3

Alternative 3 would consist of a combination of Alternative 1 and Alternative 2 with similar or the same potential for impacts to biological resources.

4.5.2.5 Cumulative Impacts

Launches from Vandenberg AFB are limited to 30 annually (10 military launches and 20 space launches). The prior EAs that analyzed GMD activities at Vandenberg AFB (U.S. Army Space and Missile Defense Command, 2002a; U.S. Department of the Air Force, 1999) indicated no cumulative impact to biological resources for up to six GBI launches annually. Based on preliminary planning information through fiscal year 2007, the Proposed Action of up to five launches (interceptor and target), in conjunction with current planned or anticipated launches, could meet or slightly exceed the 30 annual launch limit from Vandenberg AFB during fiscal year 2004. However, missile launches are short-term, discrete events, thus allowing time between launches for emission products to be dispersed. Launch activities would be performed at different times and locations, and therefore no cumulative impact to air quality is anticipated.

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 approximately 20 missile launches estimated for fiscal year 2002.

4.5.2.6 Mitigation Measures

No biological resources mitigation measures are proposed for GMD ETR activities at Vandenberg AFB since noise monitoring during the initial launch of a GBI and harbor seal monitoring during the pupping season would be performed in accordance with current Vandenberg AFB SOPs.

4.5.3 CULTURAL RESOURCES—VANDENBERG AIR FORCE BASE

4.5.3.1 No Action Alternative

Under the No Action Alternative, GMD ETR activities would not be established and Vandenberg AFB would be operated as a test area for space and missile operations. Other GMD activities would continue, such as the GBI test flights for Booster Verification tests. No additional impacts to cultural resources would occur as a result of the No Action Alternative.

4.5.3.2 Alternative 1

4.5.3.2.1 Target

Operation

Proposed target operations for Alternative 1 at Vandenberg AFB would include single and dual launches of target missiles.

Flight Activities

Target launch activities would be similar to interceptor launches. Potential effects could result from this 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 Vandenberg AFB's cultural resources.

Lastly, potentially adverse effects to area 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.

Post-Flight 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.

4.5.3.2.2 Sensors

Operation

Existing range sensors at Vandenberg AFB include several range radars (AN/TPQ-18, AN/FPS-16, High Accuracy Instrumentation Radar, AN/MPS-39, TPS-X) as well as fixed and mobile telemetry and optics equipment. Launch control would be located in existing launch control facilities. No additional impacts to cultural resources would result from these existing sensors in support of the GMD ETR activities.

4.5.3.3 Alternative 2

4.5.3.3.1 Ground-Based Interceptors

Construction

Construction would include minor modifications to existing facilities. As project details are further delineated, coordination would occur with the Environmental Planning Section and the Cultural Resources Section at Vandenberg AFB to further ensure that cultural resources would be protected. The GMD Project Office would be responsible for implementation of any cultural resources avoidance or mitigation measures assigned to this project as a condition of approval for proceeding with any proposed activity. These measures may include, but are not limited to, literature searches, archaeological and American Indian monitoring, flagging or fencing to protect resources, avoidance of resource areas, archaeological testing, data recovery, evaluation of historic structures, and report preparation. 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 30 meters (100 feet) of 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 Vandenberg AFB Historic Preservation Officer.

Potentially, LF-21 and LF-23 would be used as launching facilities for the GBIs. LF-21 is currently being used by Vandenberg and would require only minor modification. LF-23 would require power, which would be provided by overhead cables, and fiber-optic cable installation, which would be installed along existing roads to avoid two existing cultural sites that are in the area. The modification to LF-23 was covered in detail in the ABV Verification Tests EA.

Operation

Flight Activities

Proposed GBI operations for Alternative 2 at Vandenberg AFB would consist of single and dual launches of GBIs. Only in the unlikely event of flight termination over land (necessitating debris recovery within the ROI) would the possibility for impacts to cultural resources from off-road vehicle activity exist. Even then, all areas affected by ground impacts of flight hardware would be cleared of all recoverable debris in strict accordance with current Vandenberg AFB policy.

Other potential effects could result from this debris striking the ground where surface or subsurface archaeological deposits are located. The probability of this occurring, however, is considered extremely remote. Debris falling offshore would pose no threat to Vandenberg AFB's cultural resources.

Lastly, potentially adverse effects to area 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.

Post-Flight 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.

4.5.3.3.2 Target

Operation

Proposed target operations for Alternative 2 at Vandenberg AFB would be identical as that described for Alternative 1.

4.5.3.3.3 In-Flight Interceptor Communication System Data Terminal

Construction

Proposed IDT construction for Alternative 2 at Vandenberg AFB includes a new IDT with associated roads and cables at one of six alternative locations.

The proposed IDT construction area is located very close to previously paved roads. As project details are further delineated, coordination would occur with the Environmental Planning Section and the Cultural Resources Section at Vandenberg AFB to further ensure that cultural resources would be protected. Records on file at Vandenberg AFB would be consulted to determine whether sites have been identified at this location. Therefore, no archaeological resources are anticipated to be impacted. Should cultural resources be found during the course of any GMD ETR activity, all activities would cease in the area and the proper authorities would be notified. Subsequent actions would follow the guidance provided.

Operation

IDT operations are not expected to adversely impact cultural resources. The nature of the operation of these systems combined with the lack of existing cultural resources would most likely result in negligible impacts. Once again, personnel would be informed of the sensitivity of cultural resources and the types of penalties that could be incurred if sites are damaged or destroyed.

4.5.3.3.4 Sensors

Proposed sensor operation for Alternative 2 at Vandenberg AFB is the same as that described for Alternative 1.

4.5.3.4 Alternative 3

Alternative 3 at Vandenberg AFB would consist of a combination of both Alternatives 1 and 2.

4.5.3.5 Cumulative Impacts

Construction would occur in new locations with minimal impact and not result in cumulative impacts to cultural resources. Launches from Vandenberg AFB are limited to 30 annually (10 military launches from Vandenberg AFB and 20 space launches). The prior EAs that analyzed GMD activities at Vandenberg AFB (U.S. Army Space and Missile Defense Command, 2002a; U.S. Department of the Air Force, 1999) indicated no cumulative impact to cultural resources for up to six GBI launches annually. Based on preliminary planning information through fiscal year 2007, the Proposed Action of up to five launches (interceptor and target), in conjunction with current planned or anticipated launches, could meet or slightly exceed the 30 annual launch limit from Vandenberg AFB. However, missile launches are short-term, discrete events. Activities would be performed at different times and locations, and therefore no cumulative impact to cultural resources is anticipated.

4.5.3.6 Mitigation Measures

No cultural resources mitigation measures are proposed for the GMD ETR activities at Vandenberg AFB at this time. However, once specific communication and fiber optic cable routes are identified they will be reviewed to determine if cultural resources mitigations are necessary. As project details are further delineated, coordination would occur with the Environmental Planning Section and the Cultural Resources Section at Vandenberg AFB to further ensure that cultural resources would be protected.

4.5.4 HAZARDOUS MATERIALS AND HAZARDOUS WASTE—VANDENBERG AIR FORCE BASE

This section addresses potential impacts that could result from the storage and use of hazardous materials and the generation and disposal of hazardous waste associated with launch operations from Vandenberg AFB, and construction required to support GMD launch operations. Pollution prevention, recycling, waste minimization, IRPs, USTs, ASTs, asbestos, lead-based paint, and PCBs have been considered. Potential impacts from launch activities are addressed under each alternative as applicable. A general description of impact on hazardous material and waste management is provided in the beginning of section 4.1.6.

4.5.4.1 No Action Alternative

Under the No Action Alternative, Vandenberg AFB would continue to be operated as a test area for space and missile operations. GMD-related activities such as the booster verification test flights addressed in the EA for Booster Verification Tests (U.S. Department of the Air Force, 1999) and the ABV Verification Tests EA (U.S. Army Space and Missile Defense Command, 2002c), and single target launches would continue. No new substantive use of hazardous materials or generation of hazardous waste would occur as a result of the No Action Alternative.

4.5.4.2 Alternative 1

4.5.4.2.1 Targets

Alternative 1 would involve single and dual target launches from Vandenberg AFB. This is within the range of launches routinely performed at Vandenberg AFB, as described in chapter 2.0 and under the No Action Alternative, and no new substantive use of hazardous materials or generation of hazardous waste would occur.

Operation

Vandenberg AFB could support to the proposed five target launches per year over the duration of the test program. Existing hazardous materials and waste management procedures at Vandenberg AFB would ensure that no adverse environmental impacts occur. MDA would be responsible for the shipment and distribution of hazardous materials to the base. Vandenberg AFB Safety and Environmental offices would provide guidance for the receipt and storage of hazardous materials, and the disposal of hazardous waste generated from implementation of Alternative 1.

Pre-Launch Activities

Pre-launch activities include transportation of target missiles to Vandenberg AFB, temporary storage, pre-launch assembly and checkout, and preparation of the missiles for launch.

Missile components arrive at Vandenberg AFB approximately 4 to 6 weeks prior to launch. Missile components would be handled and stored in accordance with applicable federal and state, and U.S. Air Force regulations. An ESQD would be established around storage and assembly areas based on the equivalent explosive force of propellant contained within the missile.

As discussed in section 3.5.4, hazardous materials (external to those preloaded into the missiles) that may typically be used as part of missile launch activities include coatings, cleaners, solvents, lubricants, and motor and diesel fuel. Most of these materials would be consumed during use, generating minimal waste.

Facility modifications associated with target launch and launch support activities at Vandenberg AFB may disturb asbestos or lead-based paint. Management and abatement of asbestos and lead-based paint at Vandenberg AFB will be compliant with the appropriate regulatory requirements and standards referenced in appendix B. Best practices, lessons learned, and expectations indicated in the interim guidance DoD 5000.2R would be incorporated into design and construction plans. In the unlikely event that a spill or release occurs, the use of procedures outlined in the Vandenberg AFB SPCC Plan and Hazardous Materials Emergency Response Plan would ensure that the potential impact would be minimal. Target launch and launch support activities would not require additional fuel storage tanks or hinder actions at Vandenberg AFB IRP sites.

Launch Activities

Flight activity considerations include the Launch Hazard Area, flight corridor clearance, missile launch, and missile impact.

An ESQD would be calculated around the launch site based on the equivalent explosive force of all propellant and pyrotechnic materials contained within the missile. Before each launch, the Vandenberg AFB Safety Office computes a toxic hazard corridor to ensure surrounding communities are not at risk in the event of an anomaly. Only when meteorological conditions indicate this corridor does not extend off the base is the operation allowed to proceed.

It is possible for a missile booster to detonate or for the propellant to burn, but not explode and terminate the launch at the launch site. It is also possible for missile flight to be terminated at the point of/shortly after liftoff, or to be terminated shortly after the missile has left the launch pad. In the event of such a mishap, the incident would be handled as an explosive ordnance event. In accordance with Range Safety Requirements, EWR 17-1, an emergency response team from Vandenberg AFB would be on standby near the launch site to ensure immediate response and rapid control in the event of such an occurrence. The emergency response team would consist of Vandenberg AFB fire fighting, safety, medical and bio-environmental engineering personnel. Any remaining hazardous materials would be regarded as hazardous waste for management purposes. The resulting hazardous waste would be rendered safe by Explosive Ordnance Disposal personnel and disposed of in accordance with applicable federal, state, and base requirements.

If a launch is terminated after the missile has left the launch pad, then hazardous material would remain within the ESQD/evacuation zone and there would be minimal impact to personnel and no impact to the public from an accidental release. Any debris would fall within the Vandenberg AFB Test Ranges and the open ocean west of the base. Areas such as oil rigs and shipping lanes would be cleared before launch in accordance with existing Vandenberg AFB SOPs. Any debris falling on Vandenberg AFB would fall in areas cleared before launch and would be handled in accordance with Vandenberg AFB emergency response plans.

Post-Launch Activities
Post-flight activities involve check of release areas, clean-up, and transportation from Vandenberg AFB. Following test activities, the target launch facilities would be readied for the next use or placed in standby mode. Any waste would be collected and segregated as nonhazardous, hazardous, and possibly special wastes for proper disposal in accordance with federal, State of California, and DoD requirements. Specific restoration actions, if necessary, would be determined on a case-by-case basis in coordination with the procedures of the Facility Services Division of Hazardous Materials.

4.5.4.3 Alternative 2

Alternative 2 would consist of activities described in the No Action and Alternative 1 except as noted herein. Dual launch of GBI missiles would also occur under Alternative 2. GBI-related activities would include support facility modification, IDT construction and operation, and GBI launches. Hazardous materials use and hazardous waste generation would be managed as described in section 3.1.6.

4.5.4.3.1 Ground Based Interceptor

Construction

Section 2.3.1.5 discusses the facilities/structures to be modified or constructed to support GBI launch activities. The staging areas for any construction materials and equipment associated with the modification of the missile launch silos or buildings would be paved. Since some of the facilities proposed for use were constructed in a period during which lead-based paint was used as exterior and interior coating and asbestos was used in equipment and construction materials, the minor modifications planned could result in disturbance of exterior or interior surfaces.

Prior to the initiation of any construction/structural modification, the contractor responsible for facility modifications would perform surveys and sampling for lead-based paint, asbestos and PCBs using applicable federal, state regulations, the Vandenberg AFB Lead-Based Paint Management Plan, AFI 32-1052, Facility Asbestos Management, the Vandenberg AFB Asbestos Management Plan, the Asbestos Operating Plan, the Vandenberg AFB PCB Management Plan and the Vandenberg AFB Hazardous Waste Management Plan. Any removal/abatement or disposal of these hazardous wastes would be conducted in accordance with applicable federal and state regulations, and the referenced AFI and Vandenberg AFB management plans and requirements. Therefore, there is a low likelihood of the potential release of lead-based paint, asbestos, or PCBs.

The potential installation of new conduit and fiber-optic cable would not likely result in the release of a potentially hazardous material or waste.

Missile components would be handled and stored in accordance with applicable federal and state, and U.S. Air Force regulations as discussed in section 3.5.6 and under the No Action Alternative and Alternative 1. No onsite fueling of the GBI would be required. No release or spills of hazardous materials would be expected as a result of pre-launch operations.

Operation

GBI launch operations would be conducted as described in section 4.1.6. The proposed launch of GBIs from Vandenberg AFB is not expected to substantially increase the volume of hazardous materials used, or hazardous waste generated, at Vandenberg AFB. MDA would be responsible for the shipment and distribution of hazardous materials to the base. Transportation and handling of missile components are discussed in section 2.3.2. Vandenberg AFB Safety and Environmental offices or the MDA contractor would be responsible for the receipt and storage of hazardous materials, and the disposal of hazardous waste.

4.5.4.3.2 In-Flight Interceptor Communication System Data Terminal

Hazardous materials use would be minimal for IDT construction and operation, and would consist or corrosion control materials (e.g., paints) and low-toxicity cleaning products. These materials are routinely used at Vandenberg AFB and would be handled in compliance with applicable federal, state, and base regulations and requirements.

4.5.4.4 Alternative 3

The proposed actions and potential impacts would be the same as those described under Alternatives 1 and 2.

4.5.4.5 Cumulative Impacts

Construction would occur in new locations with minimal impact and not result in cumulative impacts to hazardous waste and hazardous materials management. Launches from Vandenberg AFB are limited to 30 annually (10 military launches from north Vandenberg AFB and 20 space launches). The prior EAs that analyzed GMD activities at Vandenberg AFB (U.S. Army Space and Missile Defense Command, 2002c; U.S. Department of the Air Force, 1999) indicated no cumulative impact to cultural resources for up to six GBI launches annually. Based on preliminary planning information through fiscal year 2007, the Proposed Action of up to five launches (interceptor and target), in conjunction with current planned or anticipated launches, could meet or slightly exceed the 30 annual launch limit from Vandenberg AFB. However, missile launches are short-term, discrete events. Activities would be performed at different times and locations, and therefore no cumulative impact to hazardous material or hazardous waste management practices is anticipated at Vandenberg AFB.

4.5.4.6 Mitigation Measures

No hazardous waste/hazardous materials management mitigation measures are proposed for the GMD ETR activities at Vandenberg AFB.

4.5.5 HEALTH AND SAFETY—VANDENBERG AIR FORCE BASE

4.5.5.1 No Action Alternative

Under the No Action Alternative single target launches would occur at Vandenberg AFB. Regional safety programs would be the same as safety programs for current launch systems as described in section 3.5.5. Potential issues related to health and safety would be associated with pre-launch, launch, and post-launch activities. Planning and execution of target launches would be in compliance with federal, state, local and range health and safety requirements. Therefore, no increase in risk to health and safety would be expected as a result of implementing this alternative.

4.5.5.2 Alternative 1

4.5.5.2.1 Target

Construction

Existing launch pads, support facilities and equipment would be utilized for the target launches. No construction or facility modification would be necessary under this alternative. Therefore, no increase in potential impact to health and safety would be expected from construction activities.

Pre-Launch Activities

Launch preparation activities would consist of transportation and storage of the booster/launch vehicle, target re-entry vehicle, missile components and support equipment to Vandenberg AFB. Transportation of missile components would be accomplished by aircraft or over road by truck in compliance with applicable state, federal, and U.S. Air Force safety regulations. Hazardous materials and explosives would be in packaged in shipping containers designed according to DOT requirements to protect against release in the event of an accident. All containers would have proper placards and only carriers licensed to handle/transport hazardous materials would be utilized. These transportation procedures would minimize the potential for accidents, as well as provide the means of mitigating potential adverse effects should an accident occur. Therefore, no health and safety effects to the general public or to military and government-employed civilians working on the base are anticipated.

Storage areas would be fenced, and appropriate placards would be used. Access would be limited to mission critical personnel. All personnel associated with the Proposed Action, including material storage, would be properly trained in compliance with 29 CFR 1910 procedures and other applicable state and federal regulations and guidelines. However, the handling and assembly of missile components, accomplished within enclosed areas, has the potential to affect worker health and safety training; adherence to appropriate safety regulations and operating plans and protocol would serve to maintain potential health and safety risks to mission personnel within acceptable levels. Since public access to Vandenberg AFB is limited and since ESQDs would be established around storage areas and Buildings 1855 and 1819, no impact to public health and safety would be expected.

Launch Activities

Compliance with launch safety regulations would be provided through 30 SW/CCC, 30 SW/SE, and Mission Flight Space Control Officer. A written procedure for all explosive pre-launch activities is required and must be approved by 30 SW/SE. An ESQD would be established around the launch site because of the potential for missile malfunction during a launch. Established procedures to prohibit access to restricted areas would be followed. The restricted areas are based upon the probability of potential hazards involved with malfunction during test flights and would include:

- The impact limit line, sets the boundary of the protection line for all non-mission-essential personnel
- The launch caution corridor, an area limited to essential personnel
- The Launch Hazard Area, an area around the launch point limited to essential personnel in hardened facilities (approximately 20 essential personnel in the Launch Control Center)
- The stage impact area

For impact limit lines that extend beyond Vandenberg AFB boundaries, an agreement would be made with the appropriate landowners to control the use of these areas during launches. The 30 SW/SE and the 30th Range Squadron Airspace and Offshore Management Section (for offshore oil rigs) would oversee evacuations of surrounding land and water users.

An emergency response team, consisting of fire fighting, safety, medical, and bio-environmental engineering personnel, would be near the proposed project site during launch activities. Additional Vandenberg AFB personnel and resources would be called out if needed. Emergency response would also be provided through local county entities, if needed. The range of acceptable launch azimuths for a Minuteman II from LF-23 was between 260 degrees and 280 degrees. The final range of approved azimuths for target launches would be determined after submittal of the preliminary flight data package, which defines the proposed launch azimuth and all launch vehicle performance characteristics for the proposed launch vehicle configuration. The azimuth would be limited to ensure that potential missile failure would not result in debris outside the azimuthal boundary. Final launch azimuth boundaries would be established after all vehicle performance data and areas of endangerment are reviewed, and FTS requirements are established.

Target launches would take place in either existing restricted areas or warning area airspace that would be cleared of non-participating aircraft. The launches would be short-term events, after which joint-use airspace would be released to other users; advance scheduling would obviate impacts. The Flight Safety Analyst from 30 SW/SE would define which airspace areas would potentially be affected by the Proposed Action and the Chief of Range Operations would coordinate with the FAA and the U.S. Coast Guard to identify and address any issues of concern. No additional impacts would occur to airspace as a result. With the implementation of the appropriate safety regulations and approvals and coordination with 30 SW/SE, the target launches would not be expected to present a substantial impact to the health and safety of base workers and personnel or the public.

Post-Launch Activities

Minor facility maintenance would occur after each 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. Any blast residue generated from the launch would remain within the launch silo and the missile canister. Entry to the silo would be restricted to trained and approved personnel in proper protective equipment. The blast residue would be removed, collected and properly disposed of according to 40 CFR, California Code of Regulations Title 22, and the Vandenberg AFB Hazardous Waste Management Plan. Should the residue be identified as hazardous, there would be no impact to the health and safety of base personnel or the public.

4.5.5.2.2 Sensors

Sensor operation would continue at current levels. No increased impact to health and safety would be expected as a result of implementing Alternative 1 at Vandenberg AFB.

4.5.5.3 Alternative 2

4.5.5.3.1 Ground Based Interceptor

Construction

Construction activities would comply with OSHA, U.S. Air Force safety and health regulations, Range Safety Requirements and other recognized standards for operations that involve construction or facility modifications. Restricted public access to the proposed project site would be ensured through use of signs and fencing. A health and safety plan would be prepared by the contractor and submitted to the base to ensure the health and safety of onsite workers. A formally trained individual would be appointed to act as safety officer. The appointed individual would be the point of contact on all problems involving job site safety. During performance of work, the contractor must comply with all provisions and procedures prescribed for the control and safety of construction team personnel and visitors to the job site. Compliance with regulations would ensure that no health and safety impacts would result from the silo and building modification.

Operation

Pre-launch, launch, and post launch activities would generally occur as discussed in section 4.5.4.3.1. No increased impact to health and safety would be expected.

4.5.5.3.2 Target

Construction

Construction of a target launch pad would generally occur as discussed in section 4.5.4.3.1. Adherence to base safety plans and procedures would ensure no increased risk to health and safety.

Operation

Pre-launch, launch, and post launch activities would generally occur as discussed in section 4.5.4.2.1. No increased impact to health and safety would be expected.

4.5.5.3.3 In-Flight Interceptor Communication System Data Terminal

Construction

Adherence to base safety plans and procedures would ensure no increased risk to health and safety.

Operation

Adherence to base safety plans and procedures would ensure no increased risk to health and safety.

4.5.5.3.4 Sensors

Sensor operation would continue at current levels. No increased impact to health and safety would be expected as a result of implementing Alternative 2 at Vandenberg AFB.

4.5.5.4 Alternative 3

Implementation of Alternative 3 would include all of the components Alternative 1 and Alternative 2. Therefore, no increase in potential risk to health and safety would be expected as a result of selecting this alternative.

4.5.5.5 Cumulative Impacts

Adherence to Vandenberg AFB safety plans and procedures would preclude potential cumulative impacts to health and safety resulting from the implementation of the GMD ETR. Based on Vandenberg AFB SOPs and other activities in the area, there is minimal potential for cumulative health and safety risk to the public from operations at Vandenberg AFB.

4.5.5.6 Mitigation Measures

No health and safety mitigation measures are proposed for the GMD ETR activities at Vandenberg AFB.

4.5.6 LAND USE—VANDENBERG AIR FORCE BASE

4.5.6.1 No Action Alternative

Under the No Action Alternative, the GMD ETR would not be established and interceptor and target launch scenarios would not be tested under operationally realistic conditions. Activities and facilities involved in GBI booster verification launches, single target missile launches, and radar operation would continue and would not change Vandenberg AFB’s general land use. Adjacent lands which exhibit open-type agricultural uses with no development would continue to be compatible with the requirements of Vandenberg AFB. Planning and execution of launches would be in total compliance with federal, state, local, and range land use requirements. Therefore, adverse impacts to the land use would not be expected under the No Action Alternative.

The continuation of activities at Vandenberg AFB is compatible with the California Coastal Zone Management Program under the No Action Alternative. Under the No Action Alternative, closures of recreational areas and adjacent parks would continue during periods of hazardous operation. To minimize the land use conflicts Vandenberg AFB extensively publicizes launch hazard areas. Coastline, beach, and recreational area availability would continue to be made know to the public through various local media sources. Furthermore, similar coastal opportunities are not unique to Vandenberg AFB and are provided elsewhere along the coast.

4.5.6.2 Alternative 1

Under Alternative 1, Vandenberg AFB would conduct single and dual target missile launches and sensor support facilities.

4.5.6.2.1 Target

Construction

Maximum use would be made of Vandenberg AFB's existing infrastructure and facilities. No new construction is required for pre-launch, flight, or post flight of target missiles from Vandenberg AFB.

Operation

Pre-Launch Activities

Pre-launch 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 FAA, DOT, OSHA, and U.S. Air Force safety regulations for transportation by air and/or over land by trucks. Regulations would minimize the potential for adverse impacts to land use and provide a means of mitigating adverse effects should an improbable 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 temporary on-base closures would cause a land use impact to traffic, closures would be of short duration and considered normal base activity.

Flight Activities

Launch preparations scheduled at Vandenberg AFB would follow standard evacuation procedures of the launch vicinity. During the time the target missile booster is on the launch pad, potential impacts to land use could occur. Land areas that are within the Launch Hazard Area would be cleared approximately 1 hour before launch and guarded to ensure they remain clear of all non-mission personnel. A notice of intent to clear hazardous areas would be published in the local newspaper and broadcast in local media. Clearance and closures are considered normal operations and would be determined by necessary pre-launch missile Launch Hazard Area determinations and flight corridor clearances.

Under Alternative 1, no new Launch Hazard Area would be created or extended that would violate existing or off-base land uses. Launch operations would utilize the already existing LF-6 or its alternate LF-3 launch silos. Potential impacts to the California Coastal Zone would be the same as determined for the No Action Alternative.

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.

Post-Flight 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 or silo 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 GMD operations involving the launch of target missiles would be coordinated with the California Coastal Consistency Commission to ensure the potential impacts would be the same as described for the No Action Alternative and completely consistent with the California Coastal Zone Management Program.

4.5.6.3 Alternative 2

Under Alternative 2, Vandenberg AFB would conduct single and dual GBI and target missile launches and operate necessary IDT and sensory support facilities.

4.5.6.3.1 Ground-Based Interceptors

Construction

Necessary construction for the launching of dual GBIs from Vandenberg AFB could involve modifications to the existing LF-21, LF-23, and missile storage buildings as identified in chapter 2.0. The types of proposed modifications have previously been addressed in the ABV EA and determined not to propose any significant impacts to land use.

Operation

Under Alternative 2, pre-launch, flight, and post-flight activities of GBI missiles would be similar to the operation of target missiles in section 4.5.6.2.1.

4.5.6.3.2 Target

Under Alternative 2, activities involving target missiles at Vandenberg AFB would include all actions and pose the same potential impacts mentioned under Alternative 1 in section 4.5.6.2.

4.5.6.3.3 In-Flight Interceptor Communication System Data Terminal

The construction and operation of a fixed, re-locatable, or mobile IDT at Vandenberg AFB would require and area of approximately 13,490 square meters (145,201 square feet) and require being mounted or supported on a concrete pad, commercial electrical power, site backup electrical generation, three fiber optic phone circuits, all weather access roads, security fencing, water and sewer services. The proposed IDT locations include Area 460, Tracking E, Titan, Have Stare, Doppler, Borrow Pit, and Talo Road. Construction at any of the proposed locations would be routinely accomplished and the facility would exist within an area compliant with Vandenberg AFB's overall general land use. Likewise, no conflicts with land use would occur. Furthermore, safety precautions would be followed during operation to prevent any unidentified land use conflicts from arising.

Operation

Pre-Launch Activities

IDT components would be transported to the operation site from U.S. Government storage depots or contractor facilities by air, sea, or over land by trucks. Delivery would be conducted under routine procedures in accordance with applicable FAA and DOT safety standards to minimize any possible impacts to land use.

Flight Activities

Although operation of IDT facilities would only function during times of GMD exercises, installation would immediately be established and secured after delivery, limiting the access to the surrounding area. This would result in a change in land use within the immediate operation area by restricting access to unauthorized personnel. However, all impacts to land use were considered in the facilities site selection and would not decrease land utilization nor change the general land use within or outside the boundaries of Vandenberg AFB.

Post-Flight Activities

Post-flight operation would include the standard maintenance procedures to secure the IDT facilities and preparation for possible relocation of the transportable IDT. Procedures would be confined to areas already used for the establishment of such facilities and would not change or introduce a conflicting use of land within the vicinity.

All GMD operations involving an IDT would be consistent with the California Coastal Zone Management Program. Vandenberg's coordination with the California Coast Commission would ensure that potential impacts would be the same as described for the No Action Alternative.

4.5.6.4 Alternative 3

Alternative 3, GMD activities would include all actions and pose the same potential impacts as described in Alternatives 1 and 2.

4.5.6.5 Cumulative Impacts

Recreational activities along the Vandenberg AFB's coast and recreational areas are only available to the public during times of nonhazardous operations. The potential exists for cumulative impacts on coastal access and recreational use of Vandenberg AFB's public access beach. The proposed action of up to five launches could contribute to northern beach closures. However, beach closure for an additional 5 days per year would not represent a significant cumulative impact.

4.5.6.6 Mitigation Measures

No land use mitigation measures are proposed for the GMD ETR activities at Vandenberg AFB.

4.5.7 NOISE—VANDENBERG AIR FORCE BASE

This section is concerned with the potential impacts due to construction and operation of the GBI, target, and sensor elements of the GMD ETR on the regional noise environment at Vandenberg AFB. Also identified are the potential cumulative impacts and possible mitigation measures.

Noise impacts to wildlife are addressed in section 4.5.2.

4.5.7.1 No Action Alternative

The No Action Alternative would not change the level of noise at Vandenberg AFB. Existing facilities already in use would continue and the GMD ETR would not be established. The GBI and target launch scenarios would not be tested under operationally realistic conditions.

4.5.7.2 Alternative 1

4.5.7.2.1 Targets

Construction

Construction activities involved in the building and silo modification for target launches for Alternative 1 would be minor at Vandenberg AFB. Current facilities would be used and minor interior and software alterations would be made. Noise impacts to the surrounding environment would be minor.

Operation

Pre-Launch Activities

Noise from launch preparation, including silo and building modifications, would comply with the Occupational Safety and Health Act, the U.S. Air Force Occupational Safety and Health regulations, Range Safety Requirements, and other recognized standards for operations that involve construction or facility modifications. Restricted public access to the proposed project site would be ensured through use of signs and fencing. A health and safety plan, requiring the use of hearing protection when appropriate would be prepared by the contractor and submitted to the base to ensure the health and safety of onsite workers.

Launch Activities

OSHA has established noise limits to protect workers at their work places. According to these standards, no worker can be exposed to noise levels higher than 115 dBA. The exposure level of 115 dBA is limited to 15 minutes or less during an 8-hour work shift (U.S. Air Force 1992). The OSHA standards are the maximum allowable noise levels for the personnel in the vicinity of the launch pad. Workers exposed to excessive launch noise would be required to wear hearing protection.

Noise from missile launches can range from 60 to 100 dBA in the vicinity of the launch including areas near Lompoc and Santa Maria. The noise from a Minuteman launch is 80 dBA approximately 13 kilometers (8 miles) from the launch site. Figure 4.5.7-1 depicts noise levels for a Minuteman launch from Vandenberg AFB. However, because the launches occur infrequently, the resulting noise has little impact on the L_{dn} or CNEL in these areas. Therefore, ambient noise levels would not be affected substantially on an annual basis from the proposed GMD ETR tests. Noise impacts would also be short in duration.

Since the flight pattern of a target launch would be over the open ocean to the west, the flight would not cross-populated areas such as nearby Lompoc or Santa Maria. Therefore, impacts from noise to populated areas would be minor. 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 regulations, the proposed launches would not cause or contribute to noise impacts.

Post-Launch Activities

Noise generated during the removal of all mobile equipment/assets should have minimal impact to the noise environment.

No substantial noise would be expected from post-launch activities. However, any noise would likely fall within or below the noise level measurements of post-launch noise associated with the previously approved Minuteman launch vehicles. Noise impacts would also be short in duration. Post-launch activities would not cause or contribute to noise impacts.

4.5.7.3 Alternative 2

4.5.7.3.1 Ground-Based Interceptors

Construction

Existing missile storage, missile assembly and maintenance and storage facilities would be utilized with minor modifications possible.

Operation

Pre-Launch Activities

Noises produced during pre-launch activities include noise from mechanical equipment such as worker vehicles, trucks, and by the use of the public address systems. Transportation noise would increase as launch support personnel drive to the site and additional trucks bring material to the site.

Launch Activities

All public, civilian, and nonessential personnel would be required to be outside of the ground hazard area where the expected noise levels would be below the 115 dBA limit for short-term exposure.

Personnel would normally be at the Launch Control Center during launches. Although no standards exist for single-event noise exposure, a time-weighted average of 90 dBA is established as a limit for an 8-hour exposure. However, workers exposed to excessive launch noise would be required to wear hearing protection.

GBI launch noise would fall within or below the noise level of previous Minuteman launches. Figure 4.5.7-1 depicts the noise levels produced during a Minuteman launch from Vandenberg AFB.

In addition to the noise of the rocket engine, sonic booms are possible. However, GBI launches would be in a western direction and would not occur over land. They are not expected to impact Vandenberg AFB or surrounding communities. Vessels impacted by sonic booms would be expected to experience sound resembling mild thunder.

During operations, it is estimated that up to 300 personnel would be involved in supporting a dual launch. The increase in noise associated with these personnel traveling to and from Vandenberg AFB is expected to be a minor.

Post-Launch Activities

Noise generated during the removal of all mobile equipment/assets should have minimal impact to the noise environment.

4.5.7.3.2 Targets

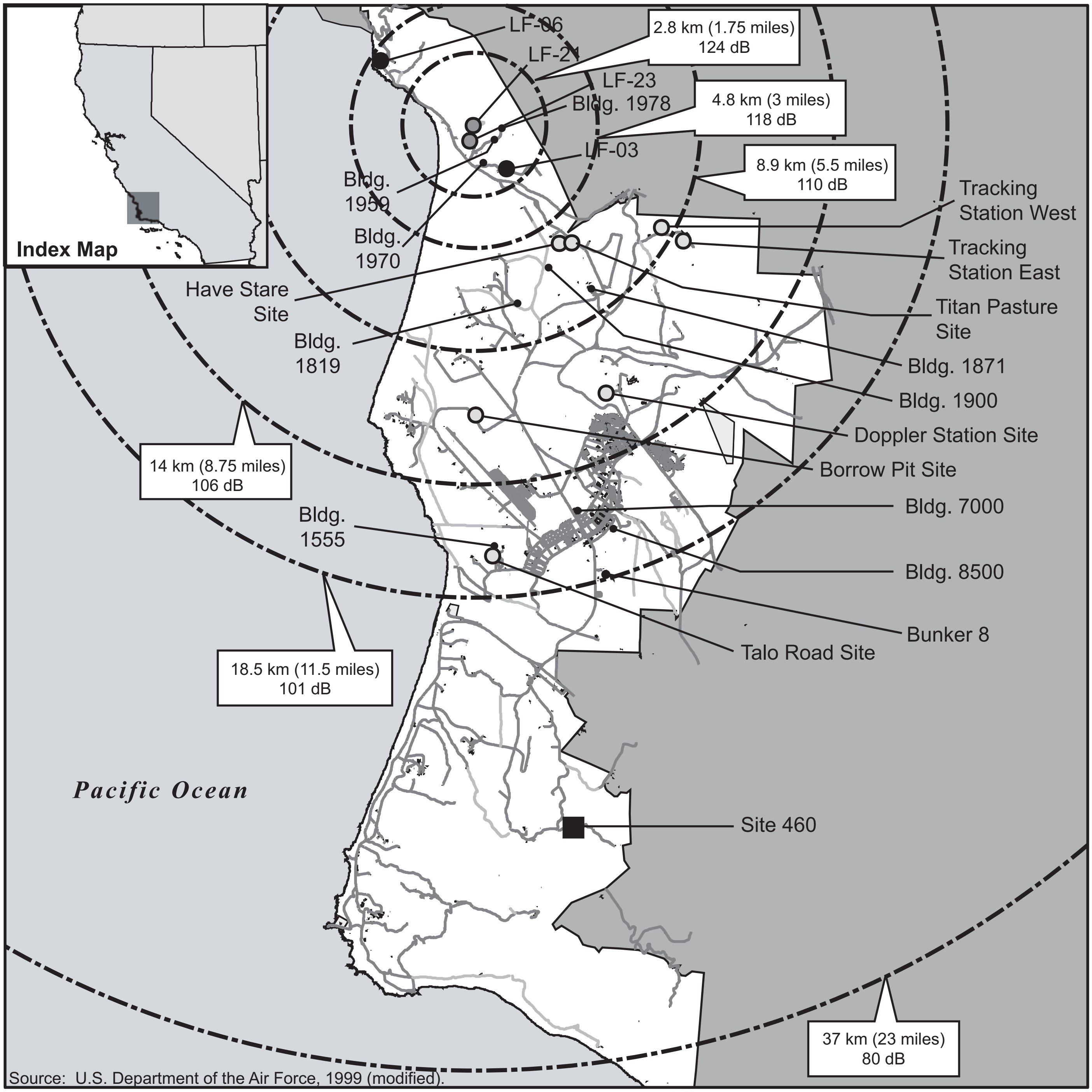
Under Alternative 2, construction and operation of target facilities and target launches from Vandenberg AFB would be the same as those described in section 4.5.6.3.2 for Alternative 1.

4.5.7.3.3 In-Flight Interceptor Communication System Data Terminal

Construction and operation of an IDT at Vandenberg AFB would have minimal impact to the surrounding environment’s noise levels. Construction noises would include noise from mechanical equipment. Noises involving traffic increases are included in analysis for GBI construction.

4.5.7.4 Alternative 3

Construction and operation of GBI facilities, target facilities, GBI launches, target launches, and range radars for Alternative 3 would be the same as those describe in Alternative 1.



Source: U.S. Department of the Air Force, 1999 (modified).

EXPLANATION

- Pacific Ocean
- Target Launch Site
- GBI Launch Site
- IDT
- TPS-X Radar Site
- Noise Levels
- Vandenberg Air Force Base
- Land

LF = Launch Facility
IDT = In-flight Interceptor Communication System Data Terminal
TPS-X = Transportable System Radar
GBI = Ground Based Interceptor

Note: Noise levels from Minuteman launch comparable to Ground-Based Interceptor launch.

Scale
0 2.92 5.84 kilometers
0 1.82 3.63 miles
NORTH

Minuteman Noise Levels

Vandenberg Air Force Base, California

Figure 4.5.7-1

12-20-02 Vberg Noise

4.5.7.5 Cumulative Impacts

Since the sound level generated by each launch is a short, discrete event, the potential cumulative impacts to noise from GMD ETR 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.

4.5.7.6 Mitigation Measures

No noise mitigation measures are proposed for the GMD ETR activities at Vandenberg AFB.

4.5.8 SOCIOECONOMICS—VANDENBERG AIR FORCE BASE

4.5.8.1 No Action Alternative

Under the No Action Alternative, the GMD ETR would not be established and interceptor and target launch scenarios would not be tested under operationally realistic conditions. The activities at Vandenberg AFB would continue their current operations. No significant socioeconomic impacts from the No Action Alternative would occur.

4.5.8.2 Alternative 1

Under the implementation of Alternative 1, target launches would occur from Vandenberg AFB.

4.5.8.2.1 Target

Operation

Target missile components would be built in contractor facilities and delivered to Vandenberg AFB via air or road for system assembly and checkout. Target launch facilities would include existing launch pads/silos, Missile Assembly Building, missile storage, maintenance and storage, and target launch. There would be up to five missile launches per year (combined interceptor and target). Integration and assembly operations would be performed onsite. A typical ramp up over a three month period would be 25, 75, and 150 personnel who would be required to support a target launch. After a launch, a portion of these personnel would immediately depart Vandenberg AFB.

As part of pre-launch and flight activities, a launch hazard area would be established around the launch site. The launch hazard area would result in certain areas of Vandenberg AFB being cleared of personnel in the event of an accident during interceptor launch. Similarly, certain sea-surface areas would also have to be cleared. While the closure areas in question are significant in size their nature is decidedly temporary; land areas would need to be cleared approximately 1 hour before a launch, with sea surface areas cleared approximately 4 hours before a launch. The actual launch is expected last approximately 30 minutes. Upon the Range Safety Officer declaring the area safe after a launch, expected to be within hours, the areas can then be reoccupied. Also, the notice given to the local communities via local newspapers, broadcast media, and commercial fishing and tourist boat trade associations would be extensive. As such, entities with an economic interest in the use of these areas such as the commercial fishing and tourist industries would not be significantly impacted by the proposed clearance areas.

Up to 175 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 Alternative 1 would not cause any displacement of populations, residences, or businesses within the areas surrounding Vandenberg AFB. As outlined in section 3.5.8, there are numerous hotels and motels situated within the surrounding cities of Lompoc, Santa Maria, and Guadalupe and the availability of temporary accommodation are considered to be adequate.

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 communities. The overall impact will 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. No significant socioeconomic impacts would occur through the construction activities associated with Alternative 1.

4.5.8.2.2 Sensors

Operation

Instrumentation associated with the launch of a target missile would include existing range control radar and mobile telemetry equipment. A mobile telemetry site could be located at Pillar Point AFS. The mobile telemetry system would be brought to the vicinity of the launch site approximately 1 to 2 weeks before the launch date, and would remain in position until the launch event has been completed.

The personnel associated with the launch of a target missile would operate these systems; therefore, no additional personnel other than those associated with a target launch would be needed to operate the sensors and the extent of the related economic impacts would remain the same. The proposed activities would not cause any population growth or displacement of populations, residences, or businesses within the areas surrounding Vandenberg AFB. Similarly, no significant impacts to businesses or industries are anticipated. No significant socioeconomic impacts would occur thorough the operational activities associated with Alternative 1.

4.5.8.3 Alternative 2

Under the implementation of Alternative 2, GBI launches would be from Vandenberg AFB instead of KLC. The GBI would require construction of an IDT and modifications to existing support facilities at Vandenberg AFB. The other components described in Alternative 1 would remain the same.

4.5.8.3.1 Ground Based Interceptor

Construction

GBI test flights would utilize the facilities described in section 2.3.2.1.2. LF 21 and LF 23 have already been modified for GBI booster test flights. Other support facilities may require minor modifications.

The construction personnel, by spending money in the local economy, mainly via accommodation and procurement of goods and services, would represent a small but positive temporary economic impact to the local community. Given that construction activities are limited and short term, the overall impact would be slight and would not cause any significant impacts to local businesses or industries. No significant socioeconomic impacts would occur through the construction activities associated with Alternative 2.

Operation

The impact from the launch of interceptor missiles would be similar to the impact from the launch of target missiles. There would be up to five missile launches per year (combined interceptor and target). Integration and assembly operations would be performed onsite. A typical ramp up over a 3-month period would be 65, 150, and 300 personnel who would be required to support a launch. After a launch, a portion of these personnel would immediately depart Vandenberg AFB.

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 communities. The overall impact would 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. Activities related to the implementation of Alternative 2 would not cause any displacement of populations, residences, or businesses within the areas surrounding Vandenberg AFB. No significant socioeconomic impacts would occur through the operational activities associated with Alternative 2.

4.5.8.3.2 IDT

Construction

Implementation of Alternative 2 would result in the construction of an IDT on Vandenberg AFB. Construction equipment, material, and personnel would arrive at Vandenberg as part of the construction of the GBI silos, target launch pads, and associated support equipment. One COMSATCOM would be used as part of the IDT. Approximately 35 construction personnel and related construction equipment and would be involved in the construction of the IDT.

Construction activities related to the implementation of Alternative 2 would not cause any displacement of populations, residences, or businesses. The presence of the construction personnel represents 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 will, however, be slight and would not cause any population growth. No significant impacts to businesses or industries are anticipated during construction activities. No significant socioeconomic impacts would occur through the construction activities associated with Alternative 2.

Operation

An IDT site would require three permanent onsite support personnel when in operation. When not in operation, the onsite backup generators would be tested for approximately 45 minutes every 2 months. The personnel associated with the IDT would be part of the approximately 300 people required to support an interceptor launch and the extent of the related economic impacts would remain the same. The proposed activities would not cause any population growth or displacement of populations, residences, or businesses within the areas surrounding Vandenberg AFB. Similarly, no significant impacts to businesses or industries are anticipated. No significant socioeconomic impacts would occur through the operational activities associated with Alternative 2.

4.5.8.4 Alternative 3

Alternative 3 would combine activities proposed for Alternatives 1 and 2 and would result in impacts that are similar to those discussed under Alternative 1 and Alternative 2.

4.5.8.5 Cumulative Impacts

Based on preliminary planning information for fiscal year 2002 through fiscal year 2007, the Proposed Action of up to five launches (interceptor and target), in conjunction with current planned or anticipated launches could meet or slightly exceed the current limit of 30 launches per year. The addition of the GMD ETR launches to the identified ongoing and future programs in the ROI would result in a positive cumulative socioeconomic impact.

4.5.8.6 Mitigation Measures

No socioeconomic mitigation measures are proposed for the GMD ETR activities at Vandenberg AFB.

4.5.9 TRANSPORTATION—VANDENBERG AIR FORCE BASE

4.5.9.1 No Action Alternative

Under the No Action Alternative, the GMD ETR would not be established and GBI and target launch scenarios would not be tested under operationally realistic conditions. All existing launch areas would continue their current operations. Transportation related impacts from current operations have been evaluated in previous environmental documents and no significant impacts were identified.

4.5.9.2 Alternative 1

Under the implementation of Alternative 1, target launches would occur from Vandenberg AFB.

4.5.9.2.1 Target

Operation

Implementation of Alternative 1 would result in single and dual target launches from Vandenberg AFB. Target missile components would be built in contractor facilities and delivered to Vandenberg AFB via air or road for system assembly and checkout. Target missiles would not be shipped with initiators or other explosive devices. All missile components would be packaged in appropriately designed containers, labeled, and handled in accordance with applicable DOT regulations for the transport of hazardous materials. Some missile components may be shipped to a military airfield near the launch site and transferred to the launch site by vehicle. Trained personnel using only appropriately certified cranes and other materiel handling equipment would handle missile components and handling equipment in accordance with approved SOPs. There would be as many as five target launches per year. Once at Vandenberg, the missile components would be stored in a Missile Assembly Building until they are assembled for launch.

A maximum of approximately 150 personnel (contractor, military, and government civilian) would be required to support a single target launch at Vandenberg AFB. A dual target launch would require approximately 175 personnel. They would travel to Vandenberg AFB via commercial airliner or motor vehicle. Target missile contractor personnel would be housed in motels or hotels in the vicinity and would commute to the launch site daily. Government and military test personnel may use military or commercial lodging if available. This would add approximately 40 to 45 vehicles (assuming 4 persons per vehicle) to the key local roads providing access to Vandenberg AFB such as SR 1, SR 135, Santa Lucia Canyon Road, SR 246, U.S. 101, and Central Avenue during peak hours. Although the local road system would experience a slight increase in traffic, the increase would only minimally change the ADT on key local roads and would not result in an unacceptable Level of Service.

Target missile launches would not require the temporary closure of any roads off Vandenberg AFB. Roads near the launch pads on Vandenberg are all on U.S. Air Force property. Consequently, no off-base traffic would be affected. Thus, no adverse impact to the area's transportation infrastructure is anticipated. Target missile launch activity would have no impact on air traffic in the immediate ROI but has the potential to affect rail traffic and marine traffic. However, at Vandenberg AFB, train movement through the base is monitored by electronic surveillance and radio communication between train engineers, station masters, and Vandenberg AFB launch personnel to minimize the possibility of a launch vehicle overflight (U.S. Army Space and Strategic Defense Command, 1994). This is done routinely at Vandenberg AFB, so the target missile launches would represent a not significant new impact. Similarly, ocean vessels would be notified in advance of launch activity by the appropriate safety office as part of their routine operations through a NOTAM by the 11th Coast Guard District. Again, since this is done on a regular basis already, impacts are expected to be not significant.

4.5.9.3 Alternative 2

Under the implementation of Alternative 2, GBI launches would be from Vandenberg AFB instead of KLC. The GBI would require construction of an IDT and possibly minor modifications of existing support facilities at Vandenberg AFB. The other components described in Alternative 1 would remain the same.

4.5.9.3.1 Ground-Based Interceptors

Construction

Minor modification of existing support facilities, listed in chapter 2.0, may be required. Transportation impacts would be negligible.

Operation

The impact from the launch of interceptor missiles would be similar to the impact from the launch of target missiles. Since existing transportation facilities at Vandenberg AFB would be utilized for the GMD ETR program, the presence of approximately 260 to 300 GMD program personnel during a single launch or dual launch test flight at Vandenberg AFB, would not adversely impact the transportation facilities at Vandenberg AFB.

4.5.9.3.2 In-Flight Interceptor Communication System Data Terminal

Construction

Implementation of Alternative 2 would result in the construction of an IDT on Vandenberg AFB. An all-weather road would be constructed as part of this alternative. Construction equipment, material, and personnel would arrive at Vandenberg AFB as part of the construction of the GBI silos, target launch pads, and associated support equipment. Thus, there would be no additional impact to transportation from construction of an IDT.

Operation

An IDT site would require three permanent on-site support personnel when in operation. When not in operation, the onsite backup generators would be tested for approximately 45 minutes every 2 months. The personnel associated with the IDT would be a part of the approximately 260 to 300 people required to support a single or dual GBI launch and would not be an additional impact to transportation systems.

4.5.9.4 Alternative 3

Alternative 3 would combine activities proposed for Alternatives 1 and 2 and would include GBI launches from both KLC and Vandenberg AFB, and construction of the required support facilities. The impacts from construction of IDTs and minor modifications to existing facilities at Vandenberg AFB would be the same as the impacts described under Alternative 1 and Alternative 2. The impacts from single and dual GBI and single and dual target launches, and operation of range support equipment would also be the same as described under Alternative 1 and Alternative 2.

4.5.9.5 Cumulative Impacts

Based on preliminary planning information for fiscal year 2002 through fiscal year 2007, the Proposed Action of up to five launches (interceptor and target), in conjunction with current planned or anticipated launches could meet or slightly exceed the current limit of 30 launches per year. The addition of the GMD ETR launches to the identified ongoing and future programs in the ROI would result in a minor cumulative impact on transportation.

4.5.9.6 Mitigation Measures

No transportation mitigation measures are proposed for the GMD ETR activities at Vandenberg AFB.

4.5.10 WATER RESOURCES—VANDENBERG AIR FORCE BASE

4.5.10.1 No Action Alternative

Existing operations would continue at Vandenberg AFB under the No Action Alternative and any new impacts associated with the GMD ETR would not occur. Water resources related impacts from current operations have been evaluated in previous environmental documents and no significant impacts were identified.

4.5.10.2 Alternative 1

4.5.10.2.1 Targets

Construction

Target missile-related construction activities at Vandenberg AFB under Alternative 1 would only consist of minor modifications to the interior of launch silos and associated support facilities. Therefore, there would not be any adverse, construction-related water resource impacts under this alternative.

Operation

Deposition of rocket emission products onto surrounding surface waters would occur as a result of target missile launches; however, these impacts would not be significant. These types of impacts are further described in section 4.1.14.2.1. This same issue was assessed for Vandenberg AFB rocket launches in each of the NEPA-related documents listed below. All of these studies reached the conclusion that related water quality impacts would be adverse but not significant.

- EA for Booster Verification Tests (U.S. Department of the Air Force, 1999)
- Final EIS Evolved Expendable Launch Vehicle (U.S. Department of the Air Force, 1998a)
- Theater Missile Defense Extended Test Range, Supplement to the Draft EIS (U.S. Army Space and Strategic Defense Command, 1994)

4.5.10.3 Alternative 2

4.5.10.3.1 Ground-Based Interceptors

The potential water resource impacts of GBI alternate booster verification construction activities at Vandenberg AFB were addressed by the ABV Verification Test EA (U.S. Army Space and Missile Defense Command, 2002c). The ABV EA concluded that potential impacts from construction and launches of these types of missiles would not be significant. Minor modifications to other support facilities would result in negligible impacts to water resources.

4.5.10.3.2 Targets

The target missile-related impacts associated with Alternative 2 would be the same as those described for Alternative 1 in section 4.5.10.2.1.

4.5.10.3.3 In-Flight Interceptor Communication System Data Terminal

Construction of an IDT under Alternative 2 would disturb about 2 hectares (5 acres) at Vandenberg AFB. Construction projects that disturb 5 acres or greater require a Construction Activities Storm Water General Permit from the California State Water Resources Control Board, or its local Central Coast Regional Water Quality Control Board. A related Stormwater Pollution Prevention Plan would also need to be prepared before the commencement of any soil-disturbing activities. All appropriate water quality-related Best Management Practices would be followed during construction, and related water quality impacts would not be significant. Operation of the IDT would not cause water quality impacts and potable water supplies are sufficient to handle the minor increase in potable water demand.

4.5.10.4 Alternative 3

Alternative 3 would require minor modifications to existing GBI launch sites, and the use of existing missile support facilities and radars. These types of impacts are described under Alternatives 1 and 2.

4.5.10.5 Cumulative Impacts

The major cumulative water resource impact in the Vandenberg AFB ROI is an overdraft condition in the Lompoc Terrace aquifer, caused by the groundwater pumping of a number of communities and water users, including Lompoc and Vandenberg AFB. As Vandenberg AFB continues to rely on imported surface water from the California Department of Water Resource's State Water Project, Vandenberg AFB's contribution to this cumulative impact would continue to diminish over time and overdraft conditions in the aquifer should improve.

Cumulative, but minor and temporary, increases in stormwater runoff and related discharges of sediments have also 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 will continue to be minimized by construction SOPs and the other commitments included in the related Stormwater Pollution Prevention Plans. Up to five missile launches per year, in combination with other planned launches, would not result in cumulative impacts to surface water, ground water, or ocean water quality.

4.5.10.6 Mitigation

No water resources mitigation measures are proposed for the GMD ETR activities at Vandenberg AFB.

4.6 PEARL HARBOR—SEA-BASED TEST X-BAND RADAR PRIMARY SUPPORT BASE

4.6.1 AIR QUALITY—SEA-BASED TEST X-BAND RADAR PRIMARY SUPPORT BASE, PEARL HARBOR

4.6.1.1 No Action Alternative

Under the No Action Alternative, the GMD ETR would not be established and interceptor and target launch scenarios would not require the SBX for testing under operationally realistic conditions. Current air emission levels would remain the same, as listed in table 4.6.1.-1. Operations currently conducted at Pearl Harbor would continue.

Table 4.6.1-1: Emissions Recorded Near Barbers Point

	Averaging Time	Hawaii Standards ($\mu g/m^3$)	Federal Primary Standards ($\mu g/m^3$)	West Beach Monitoring Station ($\mu g/m^3$)	Kapolei Monitoring Station ($\mu g/m^3$)
PM-10	24-hour	150	150	21	121
	Annual (arithmetic)	50	50	13	19
Sulfur Dioxide	3-hour	1,300	-	12	24
	24-hour	365	365	5	7
	Annual (arithmetic)	80	80	0.1	2
Carbon Monoxide	1-hour	10,000	40,000	1026	2280
	8-hour	5,000	10,000	456	1596
Nitrogen Dioxide	Annual (arithmetic)	70	100	6	8

Source: State of Hawaii, Department of Health, Clean Air Branch, 2001

4.6.1.2 Alternatives 1, 2, and 3

Construction

Construction and facility modification required to provide support to the SBX would occur in previously disturbed areas. Construction activities would be conducted in accordance with all appropriate regulations and permits. Other than minor, short-term impacts from construction, no exceedances of the NAAQS or state AAQS would be anticipated.

Operation

If the SBX were to use Pearl Harbor as a PSB, the current plan would be to moor the SBX off of Barbers Point as shown in figure 2.3.1-13. If an alternate mooring location is identified for Pearl Harbor, additional siting studies would be performed. Air quality impacts at an alternate location off of Oahu are expected to be similar to those described below for the Barbers Point location, and would be verified prior to SBX operation.

Operational emissions aboard the SBX would be limited to the exhaust produced by generators and maintenance. Maintenance-related emissions would include minimal levels of volatile organic compound emissions that are not expected to have a significant impact on air quality.

65 Percent and Fully Populated SBX

Based on five tests per year the SBX would be at the Pearl Harbor PSB for 7 months. For conservative analysis purposes, 9 months will be used. The SBX is being analyzed as a mobile source with an expected use of 6,600 hours per year (24 hours a day for 9 months) at a single location, approximately 4.8 kilometers (3 miles) from Barbers Point. The SBX on-board power plant planned for use would include six 3.3 MW diesel driven generators. While at the PSB, only three of the generators would be used. One would operate continually while at the mooring location for daily ship functions. The other two generators would be required for powering of the 65 percent or fully populated radar for 3 hours per day. This represents 6,600 hours of operation of one 3.3 MW generator and 1,650 hours of operation for the other two generators that would be in operation at the PSB. Total power output for the three 3.3 MW generators would be 27,225 MW hours for the time the SBX is at the PSB. The SBX would not be considered a stationary source at Pearl Harbor; therefore neither a Prevention of Significant Deterioration review nor a Title V permit would be required.

The remaining 3 months of the year it is expected the SBX would be in transit or at one of the SBX operating areas in the BOA.

4.6.1.3 Cumulative Impacts

No other projects in the ROI have been identified that would have the potential for incremental, additive cumulative impacts to the air quality in the ROI

4.6.1.4 Mitigation Measures

No air quality resources mitigation measures are proposed for GMD ETR activities.

4.6.2 AIRSPACE—SEA-BASED TEST X-BAND RADAR PRIMARY SUPPORT BASE, PEARL HARBOR

4.6.2.1 No Action Alternative

Under the No Action Alternative, the GMD ETR would not be established and interceptor and target launch scenarios would not require the SBX for testing under operationally realistic conditions. Operations currently conducted at Pearl Harbor would continue.

4.6.2.2 Alternatives 1, 2, and 3

The Proposed Action related to airspace would be full power emissions from the SBX while at the mooring location south of Barbers Point. If an alternate mooring location is identified for Pearl Harbor, additional siting studies would be performed. Airspace impacts at an alternate location off of Oahu are expected to be similar to those described below for the Barbers Point location, and would be verified prior to SBX operation. A location outside the approach/departure area for Honolulu International Airport would probably reduce the potential restrictions on SBX operations and simplify the coordination process.

Operation

Controlled and Uncontrolled Airspace

Unrestricted operation of the SBX at the mooring location would have the potential to adversely affect air operations. In order to avoid or minimize adverse effects from EMR/EMI, DoD has established a coordination process with responsible agencies and airspace users. A full EMR/EMI survey and analysis would be conducted by the Joint Spectrum Center, in coordination with the FAA, Department of Transportation, and other potentially affected users. The survey is used in preparing a DoD Form 1494 that would be required as part of the spectrum certification and frequency allocation process. The completed DD Form 1494 that has been processed and approved by the appropriate national and international authorities would be required prior to SBX testing.

The results of the survey would also be used to define the operating area for the SBX (acceptable azimuths and operating angles). The maximum operating area would be all azimuths (360 degrees), and all angles from 2 to 90 degrees. The maximum potential interference distances are listed in table 4.6.2-1 and are shown on figure 3.6.2-1.

Table 4.6.2-1: Electromagnetic Radiation Potential Interference Distances for SBX

Type of Interference	**65 Percent Populated**		**Fully Populated**	
	kilometers	miles	kilometers	miles
Aircraft (air)	12.1	7.5	19	11.8
Electroexplosive Device Presence (ground and air)	4.8	3.0	7.5	4.6
Electroexplosive Device Handling (ground)	1.6	1.0	2.3	1.4
Military Communications/Electronics	4.6	2.9	7.1	4.4
Commercial Communications/Electronics	14.6	9.0	22.4	13.9
Personnel Hazard (Exceeds PEL within)	85 meters	245 feet	15 meters	49 feet

The actual SBX operating area at the mooring location would be restricted in order to minimize impacts to aircraft operations, EEDs, and communication equipment. A high energy radiation area notice would be published on the appropriate aeronautical charts, notifying aircraft of a radio frequency radiation area. The boundaries of the SBX high energy radiation area would be configured to minimize impacts to aircraft operations, EEDs, and communications equipment. The establishment of this SBX high energy radiation area would not impose any new flight restriction requirements.

SBX operations would be coordinated with the FAA and would be scheduled to occur during hours of minimal aircraft operations. In addition, the SBX would utilize a real-time link to the FAA operations radar to insure the airspace is clear of any aircraft prior to operating the SBX.

Consequently, there would be no reduction in the amount of navigable airspace, and thus no impacts to the controlled and uncontrolled airspace in the ROI would result.

Special Use Airspace

There is no special use airspace within the ROI. Consequently, there would be no impacts to special use airspace.

En Route Airways and Jet Routes

Several en route low altitude airways (V15, V12, V4, V16, V8, V2, V20, and V21) cross the 65 percent and fully populated aircraft interference areas. There are additional approach and departure routes within the ROI that would also need to be considered when defining the SBX high energy radiation operating area. The SBX would be programmed to limit RF emissions in the direction of airways that pass within the potential interference distance. In addition, since the radar beam is in constant motion, should an aircraft enter the interference area, it is highly unlikely that the SBX would illuminate an aircraft long enough to affect the on-board electronics.

Airports and Airfields

Honolulu International Airport is located approximately 19 kilometers (11.8 miles) east of the SBX mooring. Kalaeloa (Rodgers) Airport is located approximately 7 kilometers (4.3 miles) northeast of the mooring site, and Wheeler Army Airfield is located several kilometers northeast of the ROI. Traffic control radars at these locations would be major factors in the EMR/EMI survey and analysis and subsequent operating permit. Operation of the SBX has the potential to interfere with both aircraft systems and air navigation systems. However, the SBX high energy radiation area would be configured to not impose any flight restriction requirements, and would not change any airfield/airport arrival and departure traffic flows.

There are a number of air navigation facilities within the airspace ROI. However, they operate at lower frequencies (in the megahertz range) than the X-band SBX, and would not normally experience any interference from the SBX. Nevertheless, there is the potential for interference from the grating (side) lobes and the main beam. Section 4.6.5 (Health and Safety) provides a detailed discussion of the potential for electronic communications (in-band and adjacent band) and harmonic band radio frequency interference, as well as non-frequency-related interference (high power effects).

Emissions from the SBX may also potentially degrade the overall system performance of in-band airborne and ship based systems such as fire control, bomb/navigation in military aircraft, and weather radars in both civilian and military aircraft, which all operate in the X-band (8 to 12 GHz). However, the SBX high energy radiation area would be configured to minimize impacts to these airborne and ship based systems.

4.6.2.3 Cumulative Impacts

Because the SBX operates in different frequency ranges than most aircraft radars, there would be limited potential for an incremental, additive cumulative electromagnetic effect upon the operation of an air navigation facility or the signal used by aircraft. Moreover, the frequency allocation operating permit process would take into consideration potential impacts on other resources in the region and would preclude the potential for cumulative impacts.

No other projects in the airspace ROI have been identified that would have the potential for other incremental, additive cumulative impacts to controlled or uncontrolled airspace, special use airspace, en route airways and jet routes, or airfields and airports in the ROI.

4.6.2.4 Mitigation Measures

The SBX high energy radiation area would be configured to mitigate potential impacts to aircraft and other potentially affected systems, and would be published on aeronautical charts. In addition to charting the SBX high energy radiation area notice,, information would be published in the Airport Facility section of the *FAA Airport Guide*, and local NOTAMs would be issued. Additionally, flight service personnel would brief pilots flying in the vicinity about the SBX high energy radiation area.

4.6.3 BIOLOGICAL RESOURCES—SEA-BASED TEST X-BAND RADAR PRIMARY SUPPORT BASE, PEARL HARBOR

4.6.3.1 No Action Alternative

Under the No Action Alternative, the GMD ETR would not be established and interceptor and target launch scenarios would not require the SBX for testing under operationally realistic conditions. Operations currently conducted at Pearl Harbor would continue.

4.6.3.2 Alternatives 1, 2, and 3

Section 2.1.4 includes a description of the SBX.

Construction

Any construction or facility modification required to provide support to the SBX would occur in previously disturbed areas in accordance with host installation guidelines and regulations. Other than minor, short-term impacts from noise, such as startling and temporary displacement, no adverse effects to biological resources are anticipated.

Operation

If the SBX were to use Pearl Harbor as a PSB, the current plan would be to moor the SBX off of Barbers Point as shown in figure 2.3.1-13. If an alternate mooring location is identified for Pearl Harbor, additional siting studies would be performed. Biological impacts at an alternate location off of Oahu are expected to be similar to those described below for the Barbers Point location, and would be verified prior to SBX operation.

Section 4.3.3.3 includes a general description of the potential for impacts from operation of the SBX. As described in section 2.1.4, the SBX would be mounted on a semi-submersible sea platform. The sea platform would be self-propelled in open water with a cruising speed of approximately 11 to 13 kilometers (6 to 7 knots) per hour, but towed while in port. The SBX would operate at a minimum of elevation of 2 degrees. The grating lobes, which could have the potential for RF emission hazard, would reach the ground/surface at distances of 85 meters (280 feet). The transmit/receive RF emission pattern would be mostly contained within a narrow main beam. The total amount of RF radiation per week would be approximately 5 to 6 hours for mission preparation activities and 3 to 4 hours per week for GMD mission activities. A full EMR/EMI survey and analysis would be conducted by the Joint Spectrum Center, in coordination with the FAA, Department of Transportation, and other potentially affected users. An operating permit would be negotiated based on the results of the EMR/EMI survey.

The radar main beam would normally be located at least 2 degrees above horizontal, which limits the probability of energy absorption by surface-oriented wildlife and would normally be in motion, making it extremely unlikely that a bird would remain within the most intense area of the beam for any considerable length of time. The size of the beam is relatively small, which further reduces the probability of bird species remaining within this limited region of space, even if the beam were still. (Ballistic Missile Defense Organization, 2000)

Analyses 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 may pose a potential for an adverse effect determined that birds are not likely to remain continuously within the radar beam and the power density is not expected to exceed levels stated above that could impact birds, thus the likelihood of harmful exposure is not great. (Ballistic Missile Defense Organization, 2000)

Humpback whales forage and calve during the winter months beyond the 183-meter (600-foot) depth contour. As stated earlier the SBX radar is not expected to radiate lower than 2 degrees and marine mammals would normally be found below the surface of the water. The power density level just below the surface of the ocean would not exceed the permissible exposure level for uncontrolled environments. (U.S. Department of the Navy, 2002a) No adverse impacts would occur to whales, other marine mammals, or sea turtles at least 1.3 centimeters (0.5 inch) below the surface. It is also highly unlikely that an individual would be on or substantially above the surface of the water for a significant amount of time within the main beam or side lobe areas when the SBX radar would be operating. For these reasons, no effects are anticipated on the humpback whale, other marine mammals, or sea turtles that might be present in the vicinity of the homeport and transit locations. Operation of the SBX would not require delays if humpback whales and other marine mammals are observed. Therefore, no further action regarding humpback whales is required pursuant to the Endangered Species Act and the Marine Mammal Protection Act.

The potential for impacts to marine mammals or sea turtles due to an accidental release of diesel fuel is considered low. It is unlikely that the Hawaiian monk seal would be present at the offshore location of the SBX platform. There is evidence that dolphins can identify the presence of diesel fuel and lubricating oil and avoid it (U.S. Department of the Navy, 2001). The relatively slow speed of the SBX platform would preclude the potential for collision with a free-swimming marine mammal. Overall, no adverse impacts to marine mammals are anticipated.

4.6.3.3 Cumulative Impacts

No other projects in the ROI have been identified that would have the potential for incremental, additive cumulative impacts to biological resources in the ROI. As stated above, no effects are anticipated on the humpback whale, other marine mammals, or sea turtles that might be present in the vicinity of the homeport and transit locations.

4.6.3.4 Mitigation Measures

No biological resources mitigation measures are proposed for GMD ETR activities.

4.6.4 HAZARDOUS MATERIALS AND HAZARDOUS WASTE—SEA-BASED TEST X-BAND RADAR PRIMARY SUPPORT BASE, PEARL HARBOR

4.6.4.1 No Action Alternative

Under the No Action Alternative, the GMD ETR would not be established and interceptor and target launch scenarios would not require the SBX for testing under operationally realistic conditions. Operations currently conducted at Pearl Harbor would continue.

4.6.4.2 Alternatives 1, 2, and 3

Construction

Any construction or facility modification required to provide support to the SBX would occur in previously disturbed areas in accordance with host installation guidelines and regulations. Other than minor, short-term increase from the use of potentially hazardous materials such as paints, solvents and fuels, no adverse effects to ongoing hazardous materials storage and handling are anticipated. The small increases in the amount of potentially hazardous materials used during construction activities would result in generation of added wastes. However, this increase is not expected to be significant and would be accommodated in accordance with existing protocol and regulations.

Operation

If the SBX were to use Pearl Harbor as a PSB, the current plan would be to moor the SBX off of Barbers Point as shown in figure 2.3.1-13. If an alternate mooring location is identified for Pearl Harbor, additional siting studies would be performed. Hazardous materials and hazardous waste impacts at an alternate location off of Oahu are expected to be similar to those described below for the Barbers Point location, and would be verified prior to SBX operation.

Shipboard Hazardous Materials and Waste Management

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 SBX vessel will 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.

Range

Increased operations that could take place on Pearl Harbor would be servicing and maintenance of the SBX. The supply barge that would service the SBX vessel would transport potentially hazardous materials and hazardous waste from the SBX to the pier at Pearl Harbor. The quantity of hazardous materials and hazardous waste is not expected to significantly affect the PSB generator status or significantly affect current hazardous materials management or waste disposal practices. There would be no significant operational impacts, and no mitigation would be required.

4.6.4.3 Cumulative Impacts

No other projects in the ROI have been identified that would have the potential for incremental, additive cumulative impacts to existing hazardous materials and waste management practices.

4.6.4.4 Mitigation Measures

No hazardous materials/waste management mitigation measures are proposed.

4.6.5 HEALTH AND SAFETY—SEA-BASED TEST X-BAND RADAR PRIMARY SUPPORT BASE, PEARL HARBOR

4.6.5.1 No Action Alternative

Under the No Action Alternative, the primary support base for the SBX would not be located at Pearl Harbor/Barbers Point. Operations currently conducted at Pearl Harbor would continue.

4.6.5.2 Alternatives 1, 2, and 3

Construction

Any construction or facility modification required to support the SBX would occur in accordance with existing host installation safety protocol/plans and applicable state and Federal requirements. Public access to Pier Victor 3 would be limited. No adverse effects to health and safety of construction contractors or the public are anticipated.

Operations

If the SBX were to use Pearl Harbor as a PSB, the current plan would be to moor the SBX off of Barbers Point as shown in figure 2.3.1-13. If an alternate mooring location is identified for Pearl Harbor, additional siting studies would be performed. Health and safety impacts at an alternate location off of Oahu are expected to be similar to those described below for the Barbers Point location, and would be verified prior to SBX operation.

The SBX is a high-powered radar system that uses a pulsed microwave beam to perform tracking, discrimination, and kill assessments of incoming ballistic missile warheads. This system has the potential for EMR exposure and therefore, consideration has been given to the evaluation of the potential for any adverse impacts that EMR may have on health and safety.

Configuration and general operation of the SBX would occur as described in section 2.1.4. The SBX would operate at a minimum elevation of 2 degrees above horizontal. The grating lobes, which could have the potential for RF emission hazard, would reach the ground/surface at a maximum distance of 85 meters (280 feet). The transmit/receive RF emission pattern would be mostly contained within a narrow main beam. The total duration of RF radiation per week would be approximately 5 to 6 hours for mission preparation activities, and 3 to 4 hours for GMD mission activities.

Before installation and use of any radar or telemetry unit, the U.S. Navy would conduct EMR hazard review that considers hazards of EMR on personnel, fuel, and ordnance. The review provides recommendations for sector blanking and safety systems to minimize exposures. The proposed systems would have the appropriate safety exclusion zones established before operation, and warning lights to inform personnel when the system is in operation and emitting EMR.

Radar systems have mechanical and software stops to prevent the main beam from being directed in specified sectors where it may present a hazard. Powerful radars, such as TRADEX, have computer-controlled interlocks to reduce power output in the direction of approaching aircraft.

Potential health and safety hazards associated with operation of similar radars were analyzed in two previous documents. *Ground Based Radar Family of Radars Environmental Assessment and Finding of No Significant Impact,* (U.S. Army Program Executive Office, Global Protection Against Limited Strikes, 1993); and the *Environmental Assessment for Theater Missile Defense Ground Based Radar Testing Program at Fort Devens, Massachusetts* (U.S. Army Space and Strategic Defense Command, 1994e). The analysis considered both program operational requirements and restrictions and range-required safety procedures. It was concluded that the required implementation of 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.

Radiation Hazards

Human Exposure. The analysis method used to evaluate potential effects of RF radiation is the IEEE MPEL, which defines the maximum time-averaged radio frequency 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 5mW/cm^2 for frequencies greater than 1,500 MHz. (IEEE C95.1-1999) 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) for normal environmental conditions and for incident electromagnetic energy of frequencies from 10 MHz to 100 MHz. This radiation protection guide is 10 mW/cm^2, as averaged over any possible one-hour period. DoD Instruction 6055.11, Protection of DoD Personnel from Exposure to Radiofrequency Radiation established PELs for controlled and uncontrolled environments and for HPM narrow-band and EMP broad-band simulator systems.

Computer models were used to determine the power density received on the ground over an average time of 9.5 minutes. For the fully populated radar at a distance of 150 meters (492 feet), and for the 65 percent populated radar at a distance of 85 meters (279 feet), and an average time of 9.5 minutes, the power density was calculated to be 2.5 mW/cm^2. This power density is significantly less than the 6.33 mW/cm^2 permitted by the IEEE. The IEEE guidelines are more stringent than the EPA guidelines, based on the shorter averaging time, and are therefore used in the analysis.

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.

EEDs. The potential impacts to EEDs from emissions from the XBR are twofold: (1) the EED could be made not to work, or (2) 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. As can be seen from table 4.6.5-1, EEDs in the handling/loading phase are substantially more susceptible to EMR hazards; however, main beam illumination on the ground will not occur. It is assumed that the handling/loading of EEDs will 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 XBR to inform pilots of the potential electromagnetic interference hazard to certain aircraft.

Table 4.6.5-1: Required Separation Distances for EEDs in the Main Beam and Sidelobe of the XBR for the Presence, Shipping, and Handling/Loading Phases

EED Phase	Threshold (volts per meter)	Standard	Main Beam Separation Distance in kilometers (miles)		Grating Lobe Separation Distance in kilometers (miles)	
			Fully Populated	65 Percent Populated	Fully Populated	65 Percent Populated
Presence/Shipping	1,270 (peak)	MIL-STD-464	7.5(4.7)	4.6 (2.9)	0.2 (0.1)	0.1 (0.6)
Handling/Loading	200 (peak)	AFR-127-100	Not applicable	Not applicable	2.3 (1.4)	1.6 (1.0)

Based upon a grating lobe illumination from the fully populated SBX, a separation distance of 0.2 kilometer (0.4 mile) is recommended for EEDs in the presence/shipping phase and 2.3 kilometers (1.4 miles) in the handling/loading phase (table 4.6.5-1). The distances for the 65 percent populated SBX are also shown in table 4.6.5-1. There is no predicted potential for inadvertent initiation of vehicle airbags because the metallic body/frame of the vehicle provides sufficient shielding.

Fuels. Based upon the threshold of 5,000 mW/cm^2 from Technical Order 31Z-10-4, the SBX does not present a radiation hazard to fuels because the SBX does not emit radiation levels that exceed 5,000 mW/cm^2.

Communications–Electronics Frequency-Related Interference

Communications–Electronics In-band Radio Frequency Interference. In-band frequency interference addressed in this EIS is for the X-Band (8,000 to 12,000 MHz). In-band radio frequency interference occurs when two pieces of communications-electronics equipment are located within the same frequency band. Therefore, equipment with frequencies falling within the X-band would most likely be affected.

Communications–Electronics Adjacent Band Interference. Adjacent band radio frequency interference is similar to in-band radio frequency interference. The adjacent bands for the X-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.

Ground-based, airborne, and ship-based systems will be evaluated for in band, adjacent band, and harmonic band interference during the detailed EMR/EMI survey that is underway. Level 2 surveys are planned to be completed in Spring of 2003.

Communications–Electronics Non-frequency-related Interference

High Power Effects. Non-frequency-related interference from the SBX to the electromagnetic environment is 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 will 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. Additional modeling is underway to determine potential interference distances related to high power effects.

Aircraft/Avionics. The potential exists for EMR emissions from the main beam of the SBX 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. Since the FAA average threshold of 300 volts per meter is more conservative, it is the threshold used in this EIS. Interference distance related to aircraft is discussed in the airspace section.

The total amount of radar radiofrequency radiation would be approximately 5 to 6 hours per week during testing. The duration of radar radiofrequency radiation would decrease to 3 to 4 hours per week during actual GMD mission activities. The actual operating area of SBX at the mooring location would be restricted to minimize impacts. SBX operations would be coordinated 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.

4.6.5.3 Cumulative Impacts

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.

4.6.5.4 Mitigations

Limitations imposed on the range of azimuth and angles of operation would preclude potential impacts related to health and safety. Mechanical and software stops would be used to control the radar's operation.

4.6.6 UTILITIES—SEA-BASED TEST X-BAND RADAR PRIMARY SUPPORT BASE, PEARL HARBOR

This section addresses potential environmental impacts caused by changes to the utilities services due to the proposed construction and operation of the SBX element. Potential impacts considered include potential effects from ongoing or planned activities at these sites.

4.6.6.1 No Action Alternative

Under the No Action Alternative, the GMD ETR would not be established and the SBX would not be developed to support interceptor and target launch scenarios, needed for operationally realistic test conditions. Pearl Harbor would continue their current operations.

4.6.6.2 Alternatives 1, 2, and 3

If the SBX were to use Pearl Harbor as a PSB, the current plan would be to moor the SBX off of Barbers Point as shown in figure 2.3.1-13. If an alternate mooring location is identified for Pearl

Harbor, additional siting studies would be performed. Utilities impacts at an alternate location off of Oahu are expected to be similar to those described below for the Barbers Point location, and would be verified prior to SBX operation.

Electrical power requirements for the SBX platform and its various payloads would be approximately 19.8-MW, supplied by six on-board 3.3-MW generators. The SBX would be self-propelled by four steerable 3.5-MW electric thrusters that would effectively propel and maneuver the SBX without assistance. During transportation, the thrusters would consume 14-MW, leaving 5.8-MW available for necessary ship-board operations, as well as the XBR.

The SBX has a fuel capacity of approximately 3,100,000 liters (818,000 gallons). The approximate fuel consumption for transit and radar operation is 54,800 liters (14,500 gallons) per day, which would amount to only 1.8 percent of total fuel capacity daily.

There would be a total of 50 crew members, including 20 marine crew and 30 GMD mission support personnel. Additionally, up to 50 people could be accommodated on board on a temporary daytime basis.

At the intervals between GMD test missions, the SBX would typically return to a PSB for crew rotations, re-supply, and maintenance activities. While at the PSB or an adjacent mooring location, only three of the generators would be used, one operating continually while in port for daily ship functions while the remainder would power the half- or fully populated radar three hours per day.

Pearl Harbor is not deep enough to permit SBX entry; however, the harbor can host a resupply ship to service the SBX, delivering supplies, repair parts, and fuel. The most likely area to moor this ship would be at Pier Victor 3. In this case, the SBX itself would be moored about 4.8 kilometers (3 miles) off Barbers Point (see figure 2.3.1-13). Personnel would be ferried to the SBX each day either by watercraft or helicopter. There would be no direct impacts to area utilities from the self-contained SBX.

A utility hookup would be required for the supply ship to run on board lighting and other basic needs. Supply ships would utilize Pier Victor 3. The pier is currently supplied with a 15-centimeter (6-inch) potable water line (Noborikawa, 2002) and jet fuel, and although there are no shore power dock outlets, power lines run near enough to allow relatively easy modification to provide the platform with primary shore power. Electricity requirements are typically supplied by power lines linking to nearby buildings; as an option, a temporary transformer, tapped into a primary line, can be provided (Noborikawa, 2002). Due to the possibility of cross-contamination, regulations prevent the Public Works Center from providing a wastewater line at Pier Victor 3 (Noborikawa, 2002), and wastewater, as well as solid waste, would have to be containerized and arrangements made with local authorities on an as-needed basis to provide for their disposal.

Should existing facilities at Pearl Harbor be unavailable or inadequate at the PSB to accommodate approximately 25 personnel, construction of new storage and administration facilities would be necessary. If existing facilities were used, security upgrades, environmental controls for storage areas, fueling capability, ship gases handling facilities, computer networks, phone systems, and hazardous material storage and disposal may be added. Ongoing logistics and support operations such as re-supply, fueling and maintenance, and crew/operator training would also occur at the PSB. Warehouses in the same fenced compound as Pier Victor 3 would possibly be renovated for SBX use or new warehouses and administrative facilities could be constructed.

Studies have shown an average 189 liters (50 gallons) per capita per day water consumption and 170 liters (40 gallons) per capita per day of wastewater production. Recent figures indicate that in the United States, the per capita generation of municipal solid waste in 1998 was 2 kilograms (4.46 pounds) per capita per day (U.S. Environmental Protection Agency, 2002). Average daily demand for water, wastewater, and municipal solid waste for a maximum 25 personnel would be estimated as follows, based on typical usage: 4,725 liters (1,250 gallons) water; 4,250 liters (1,000 gallons) wastewater and 50 kilograms (112 pounds) of solid waste. Any new facilities being constructed would be required to facilitate this level of use, as well as to accommodate any energy demand.

4.6.6.3 Cumulative Impacts

At this time, there are no ongoing or foreseeable future programs/plans identified in the region of influence that when combined with the relatively minor SBX utility requirements would result in cumulative impacts to utilities. Therefore, no cumulative impacts are anticipated with Alternatives 1, 2, and 3.

4.6.6.4 Mitigation Measures

No utilities mitigation measures are proposed for the GMD ETR activities.

4.6.7 VISUAL AND AESTHETIC RESOURCES—SEA-BASED TEST X-BAND RADAR PRIMARY SUPPORT BASE, PEARL HARBOR

4.6.7.1 No Action Alternative

Under the no action alternative, the SBX would not be located off-shore at Barber's Point. There would be no alteration of the existing visual setting and the adjacent area. No significant impacts to visual and aesthetic resources would occur.

4.6.7.2 Alternatives 1, 2, and 3

Visual resources could be affected by the proposed SBX off-shore at Barber's Point. The radar would be approximately 5 kilometers (3 miles) away from the beach and approximately 76 meters (250 feet) tall. These figures would account for a 1 degree line-of-sight with the horizon for the SBX radar if the viewer were standing on the shore. This measurement would be comparable to boats and ships passing along the horizon. Therefore visual impacts from shore would be minimal.

Visual resources could also be affected by the SBX if it is in the line-of-sight from boats to the island. However, the SBX would only inhibit the view of the island temporarily, as the boat passes by.

4.6.7.3 Cumulative Impacts

The SBX would be at the mooring location intermittently throughout the year. No other activities have been identified that would contribute to cumulative impacts.

4.6.7.4 Mitigation Measures

No visual resources mitigation measures are proposed for the GMD ETR activities.

4.7 NBVC PORT HUENEME—SEA-BASED TEST X-BAND RADAR PRIMARY SUPPORT BASE

4.7.1 AIR QUALITY—SEA-BASED TEST X-BAND RADAR PRIMARY SUPPORT BASE, NBVC PORT HUENEME

4.7.1.1 No Action Alternative

Under the No Action Alternative, the GMD ETR would not be established and interceptor and target launch scenarios would not require the SBX for testing under operationally realistic conditions. Operations currently conducted at NBVC Port Hueneme/San Nicolas would continue. Table 4.7.1-1 lists the existing emissions at San Nicolas Island.

Table 4.7.1-1: Summary of San Nicolas Island Emissions

Emissions (metric tons [tons]/year)				
CO	NO_x	ROG/HC	SO_x	PM-10
30.77 (33.92)	137.67 (151.75)	10.39 (11.45)	4.69 (5.170	10.57 (11.65)

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

4.7.1.2 Alternatives 1, 2, and 3

Construction

Warehouse and administrative space may be available at NBVC Port Hueneme. If required, construction and facility modification to provide the needed space to would occur in previously disturbed areas. All construction activities would be conducted in accordance with appropriate regulations and permits. Other than minor, short-term impacts from construction no adverse effects to regional air quality are expected.

Operation

Operational emissions aboard the SBX would be limited to the exhaust produced by generators and maintenance. Maintenance-related emissions would include minimal levels of volatile organic compound emissions that are not expected to have a significant impact on air quality.

65 Percent and Fully Populated SBX

Based on five tests per year the SBX would be at the NBVC Port Hueneme PSB for 7 months. For conservative analysis purposes, 9 months will be used. The SBX is being analyzed as a mobile source with an expected use of 6,600 hours per year (24 hours a day for 9 months) at a single location, approximately 1.6 kilometer (1 mile) east of San Nicolas Island. The SBX on-board power plant planned for use would include six 3.3 MW diesel driven generators. While at the mooring location at San Nicolas Island, only three of the generators would be used. One would operate continually while in port for daily ship functions. The other two generators would be required for powering of the 65 percent or fully populated radar for 3 hours per day. This represents 6,600 hours of operation of one 3.3 MW generator and 1,650 hours of operation for the other two generators that would be in operation at the PSB. Total power output for the three 3.3 MW generators would be 27,225 MW hours for the time the SBX is at the PSB. The SBX would not be considered a stationary source at San Nicolas Island; therefore neither a Prevention of Significant Deterioration review nor a Title V permit would be required.

The remaining 3 months of the year it is expected the SBX would be in transit or at one of the SBX operating areas.

Under the provisions of the 40 CFR Parts 51 and 93, federal actions are required to be in conformity with the State Implementation Plan for those areas categorized as nonattainment or maintenance areas for an criteria pollutant. While San Nicolas Island is within Ventura County, which is in nonattainment for federal and state ozone levels and state PM-10 levels, San Nicolas' regional air quality is considered to be in attainment or unclassifiable. The provisions of the General Conformity Rule do not apply to activities occurring at San Nicolas Island. (Department of the Navy, Naval Air Warfare Center, Weapons Division, 2002)

4.7.1.3 Cumulative Impacts

No other projects in the ROI have been identified that would have the potential for incremental, additive cumulative impacts to regional air quality in the ROI.

4.7.1.4 Mitigation Measures

No air quality mitigation measures are proposed for GMD ETR activities.

4.7.2 AIRSPACE—SEA-BASED TEST X-BAND RADAR PRIMARY SUPPORT BASE, PORT HUENEME

4.7.2.1 4.6.3.2.1 No Action Alternative

Under the No Action Alternative, the GMD ETR would not be established and interceptor and target launch scenarios would not require the SBX for testing under operationally realistic conditions. Operations currently conducted at NBVC Port Hueneme and San Nicolas Island would continue.

4.7.2.2 Alternatives 1, 2, and 3

The Proposed Action related to airspace would be full power emissions from the SBX while at the mooring location southeast of San Nicolas Island.

Operation

Controlled and Uncontrolled Airspace

Unrestricted operation of the SBX at the mooring location would have the potential to adversely affect air operations. To avoid or minimize adverse effects from EMR/EMI, DoD has established a coordination process with responsible agencies and airspace users. A full EMR/EMI survey and analysis would be conducted by the Joint Spectrum Center, in coordination with the FAA, Department of Transportation, and other potentially affected users. The survey is used in preparing a DD Form 1494 that would be required as part of the spectrum certification and frequency allocation process. The completed DD Form 1494 that has been processed and approved by the appropriate national and international authorities would be required prior to SBX testing.

The results of the survey would also be used to define the operating area for the SBX (acceptable azimuths and operating angles). The maximum operating area would be all azimuths (360 degrees), and all angles from 2 to 90 degrees. The maximum potential interference distances are listed in table 4.6.2-1 and are shown on figure 3.7.2-1.

The actual SBX operating area at the mooring location would be restricted in order to minimize impacts to aircraft operations, EEDs, and communication equipment. A high energy radiation area notice would be published on the appropriate aeronautical charts, notifying aircraft of a radio frequency radiation area. The boundaries of the SBX high energy radiation area would be configured to minimize impacts to aircraft operations and other potentially affected systems. The operating area would be similar to the existing operating area for the GBR-P radar at Kwajalein (figure 4.3.2-1).

SBX operations would be coordinated with the FAA and NAWCWD and would be scheduled to occur during hours of minimal aircraft operations if possible. Consequently, there would be no reduction in the amount of navigable airspace, and thus no impacts to the controlled and uncontrolled airspace in the ROI would result.

Special Use Airspace

The airspace over San Nicolas Island is within the Point Mugu Sea Range, and is located within Warning Area W-289. This Warning Area is active on an intermittent basis and is activated in coordination with the FAA. Notification is made through NOTAMs issued by the FAA. There is also a restricted airspace R222 located Above San Nicolas Island and extending outward approximately 6 kilometers (3.7 miles). The SBX high energy radiation area would be partially contained within this restricted area and wholly contained within Warning Area W-289. Coordination between the FAA, NAWCWD, and the SBX would mitigate potential conflicts between users of the special use airspace. Consequently, there would be no impacts to special use airspace.

En Route Airways and Jet Routes

En route airways that cross the Point Mugu Sea Range north and south of the proposed mooring area are within special CAE airways. Neither CAE is within the ROI; therefore impacts to the en route airways are not anticipated.

Airports and Airfields

The SBX would be programmed to limit RF emissions in the direction of airways that pass within the potential interference distance. In addition, since the radar beam is in constant motion, it is highly unlikely that the SBX would illuminate an aircraft long enough to affect the on-board electronics. There is one runway on San Nicolas Island. Other runways in the region are located more than 97 kilometers (60 miles) from the mooring location. With the controls placed on the SBX in a manner similar to the GBR-P radar, standard instrument approach and departure procedures at the San Nicolas Island would continue unhindered. Existing airfield arrival and departure traffic flows would also not be affected and access to the airfield would not be curtailed. All arriving and departing aircraft and all participating military aircraft are under the control of the military tower at NAS Point Mugu, thus there would be no airfield conflicts in the ROI under the Proposed Action, and no impact.

4.7.2.3 Cumulative Impacts

Because the SBX operates in different frequency ranges than most aircraft radars, there would be limited potential for an incremental, additive cumulative electromagnetic effect upon the operation of an air navigation facility or the signal used by aircraft. The use of the required scheduling and coordination process, and adherence to applicable DoD directives and regulations concerning radar operations would preclude the potential for significant incremental, additive, cumulative impacts.

No other projects in the airspace ROI have been identified that would have the potential for other incremental, additive cumulative impacts to controlled or uncontrolled airspace, special use airspace, en route airways and jet routes, or airfields and airports in the ROI.

4.7.2.4 Mitigation Measures

The SBX high energy radiation area would be configured to mitigate potential impacts to aircraft and other potentially affected systems, and would be published on aeronautical charts. In addition to charting the SBX high energy radiation area notice, information would be published in the Airport Facility section of the *FAA Airport Guide*, and local NOTAMs would be issued. Additionally, flight service personnel would brief pilots flying in the vicinity about the SBX high energy radiation area.

4.7.3 BIOLOGICAL RESOURCES—SEA-BASED TEST X-BAND RADAR PRIMARY SUPPORT BASE, PORT HUENEME

4.7.3.1 No Action Alternative

Under the No Action Alternative, the GMD ETR would not be established and interceptor and target launch scenarios would not require the SBX for testing under operationally realistic conditions. Operations currently conducted at NBVC Port Hueneme/San Nicolas would continue.

4.7.3.2 Alternatives 1, 2, and 3

Construction

Any construction or facility modification required to provide support to the SBX would occur in previously disturbed areas in accordance with host installation guidelines and regulations. Other than minor, short-term impacts from noise, such as startling and temporary displacement, no adverse effects to biological resources are anticipated.

Operation

Impacts to biological resources from operation of the SBX at NBVC Port Hueneme/San Nicolas would be similar to those described in section 4.6.3.2. No significant long-term adverse impacts are anticipated to seabirds and shorebirds, Guadalupe fur seals, California sea lions, northern elephant and harbor seals, and sea otters or to widely distributed, open-water species such as gray and killer whales.

No adverse impacts as a result of the SBX activities are anticipated to occur within the current Channel Islands National Marine Sanctuary located off the coast south of Vandenberg AFB. Additional consultation will be performed with the National Oceanographic and Atmospheric Administration following their decision on the sanctuary boundary expansion.

4.7.3.3 Cumulative Impacts

No other projects in the ROI have been identified that would have the potential for incremental, additive cumulative impacts to biological resources in the ROI. As stated above, no effects are anticipated on whales, other marine mammals, or sea turtles that might be present in the vicinity of the homeport and transit locations.

4.7.3.4 Mitigation Measures

No biological resources mitigation measures are proposed for the GMD activities.

4.7.4 HAZARDOUS MATERIALS AND HAZARDOUS WASTE—SEA-BASED TEST X-BAND RADAR PRIMARY SUPPORT BASE, NBVC PORT HUENEME

4.7.4.1 No Action Alternative

Under the No Action Alternative, the GMD ETR would not be established and interceptor and target launch scenarios would not require the SBX for testing under operationally realistic conditions. Operations currently conducted at NBVC Port Hueneme/San Nicolas would continue.

4.7.4.2 Alternatives 1, 2, and 3

Construction

Construction of new or modification of existing facilities may result in temporary use of potentially hazardous materials and the generation of small amounts of hazardous waste. The small increases in the amount of potentially hazardous materials used during construction activities would result in an added throughput in the Supply Department. However, this increase is not expected to be significant. The Environmental Materials Management Division has a model facility which would be able to accommodate the increased hazardous materials in accordance with existing regulations.

There is an existing less-than-90-day accumulation area. If it is not adequate to handle construction requirements, other temporary areas may be designated and operated according to RCRA and state regulations. Any temporary sites would be removed at the completion of construction. There would be no significant impact on hazardous waste management from construction activities.

Operation

Shipboard Hazardous Materials and Waste Management

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. Since all portions of the Point Mugu Sea Range are within 370 kilometers (200 nautical miles) of the California coast, shipboard discharge of hazardous materials is prohibited within range. Any hazardous waste disposal at beyond 370 kilometers (200 nautical miles) will comply with OPNAVINST 5090.1 Appendix L. 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 SBX vessel will 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.

Hazardous Materials Management

Range support operations would increase, resulting in a minor increase of hazardous materials use. The support units handling the SBX would have the capacity to do so. The small increases in the amount of hazardous materials used due to increased support operations would result in an added throughput in the Supply Department. However, this increase is not expected to be significant. The Environmental Materials Management Division has a model facility which would be able to accommodate the increased hazardous materials in accordance with existing regulations.

Fuels (jet fuel and unleaded gasoline) are stored in ASTs on San Nicolas Island. Current throughput is approximately 15,142 liters (4,000 gallons) of unleaded gasoline and 189,271 liters (50,000 gallons) of jet fuel per month. Impacts from the Proposed Action are most likely to arise from an increase in the amount of fuel required for SBX support and operation. Impacts to fuel storage and throughput from implementation of the Proposed Action would be less than significant.

Hazardous Waste Management

San Nicolas Island manages approximately 29,813 kilograms (65,689 pounds) of hazardous waste annually (Naval Air Weapons Center Point Mugu 1998e). Hazardous waste generated by the SBX would be stored at one of the eight satellite hazardous waste accumulation areas on the Island before being transported to the less-than-90-day accumulation area. It is expected that these accumulation areas would be able to accommodate the quantity of hazardous waste generated by the SBX. No significant long-term adverse impacts are anticipated to current hazardous waste management practices.

4.7.4.3 Cumulative Impacts

No other projects in the ROI have been identified that would have the potential for incremental, additive cumulative impacts to existing hazardous materials and waste management practices.

4.7.4.4 Mitigation Measures

No hazardous materials/hazardous waste management mitigation measures are proposed for the GMD ETR activities.

4.7.5 HEALTH AND SAFETY—SEA-BASED TEST X-BAND RADAR PRIMARY SUPPORT BASE, PORT HUENEME

4.7.5.1 No Action Alternative

Under the No Action Alternative, the GMD ETR would not be established and interceptor and target launch scenarios would not require the SBX for testing under operationally realistic conditions. Operations currently conducted at NBVC Port Hueneme/San Nicolas would continue.

4.7.5.2 Alternatives 1, 2, and 3

Construction

Any construction or facility modification required to support the SBX would occur in accordance with existing installation safety protocol/plans and applicable state and Federal requirements. No adverse effects to health and safety of construction contractors or the public are anticipated.

Operation

The SBX operating area would be in the vicinity of the mooring location at San Nicolas Island, as shown in figure 2.3.1-14.

Potential health and safety hazards associated with operation of similar radars were analyzed in two previous documents. *Ground Based Radar Family of Radars Environmental Assessment and Finding of No Significant Impact,* (U.S. Army Program Executive Office, global Protection Against Limited Strikes, 1993); and the *Environmental Assessment for Theater Missile Defense Ground Based Radar Testing Program at Fort Devens, Massachusetts* (U.S. Army Space and Strategic Defense Command, 1994e). The analysis considered both program operational requirements and restrictions and range-required safety procedures. It was concluded that the required implementation of 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.

Radiation Hazards

Human Exposure. The analysis method used to evaluate potential effects of RF radiation is the IEEE MPEL, which defines the maximum time-averaged radio frequency 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 5mW/cm^2 for frequencies greater than 1,500 MHz. (IEEE C95.1-1999) 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) for normal environmental conditions and for incident electromagnetic energy of frequencies from 10 MHz to 100 MHz. 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 HPM narrow-band and EMP broad-band simulator systems.

Computer models were used to determine the power density received on the ground over an average time of 9.5 minutes. For the fully populated radar at a distance of 150 meters (492 feet), and for the 65 percent populated radar at a distance of 85 meters (279 feet), and an average time of 9.5 minutes, the power density was calculated to be 2.5 mW/cm^2. This power density is significantly less than the 6.33 mW/cm^2 permitted by the IEEE. The IEEE guidelines are more stringent than the EPA guidelines, based on the shorter averaging time, and are therefore used in the analysis.

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.

EEDs. The potential impacts to EEDs from emissions from the XBR are twofold: (1) the EED could be made not to work, or (2) 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. As can be seen from table 4.7.5-1, EEDs in the handling/loading phase are substantially more susceptible to EMR hazards; however, main beam illumination on the ground will not occur. It is assumed that the handling/loading of EEDs will 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 XBR to inform pilots of the potential electromagnetic interference hazard to certain aircraft.

Based upon a grating lobe illumination from the fully populated SBX, a separation distance of 0.2 kilometer (0.4 mile) is recommended for EEDs in the presence/shipping phase and 2.3 kilometers (1.4 miles) in the handling/loading phase (table 4.7.5-1). The distances for the 65 percent populated SBX are also shown in table 4.7.5-1. There is no predicted potential for inadvertent initiation of vehicle airbags because the metallic body/frame of the vehicle provides sufficient shielding.

Fuels. Based upon the threshold of 5,000 mW/cm^2 from Technical Order 31Z-10-4, the SBX does not present a radiation hazard to fuels because the SBX does not emit radiation levels that exceed 5,000 mW/cm^2.

Table 4.7.5-1: Required Separation Distances for EEDs in the Main Beam and Sidelobe of the XBR for the Presence, Shipping, and Handling/Loading Phases

EED Phase	Threshold (volts per meter)	Standard	Main Beam Separation Distance in kilometers (miles)		Grating Lobe Separation Distance in kilometers (miles)	
			Fully Populated	65 Percent Populated	Fully Populated	65 Percent Populated
Presence/Shipping	1,270 (peak)	MIL-STD-464	7.5(4.7)	4.6 (2.9)	0.2 (0.1)	0.1 (0.6)
Handling/Loading	200 (peak)	AFR-127-100	Not applicable	Not applicable	2.3 (1.4)	1.6 (1.0)

Communications–Electronics Frequency-Related Interference

Communications–Electronics In-band Radio Frequency Interference. In-band frequency interference addressed in this EIS is for the X-Band (8,000 to 12,000 megahertz). In-band radio frequency interference occurs when two pieces of communications-electronics equipment are located within the same frequency band. Therefore, equipment with frequencies falling within the X-band would most likely be affected.

Communications–Electronics Adjacent Band Interference. Adjacent band radio frequency interference is similar to in-band radio frequency interference. The adjacent bands for the X-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.

Ground-based, airborne, and ship-based systems will be evaluated for in band, adjacent band, and harmonic band interference during the detailed EMR/EMI survey that is underway. Level 2 surveys are planned to be completed in Spring of 2003.

Communications–Electronics Non-frequency-related Interference

High Power Effects. Non-frequency-related interference from the SBX to the electromagnetic environment is 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 will 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. Additional modeling is underway to determine potential interference distances related to high power effects.

Aircraft/Avionics. The potential exists for EMR emissions from the main beam of the SBX 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. Since the FAA average threshold of 300 volts per meter is more conservative, it is the threshold used in this EIS. Interference distances related to aircraft is discussed in the airspace section.

Implementation of SBX 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 radiofrequency radiation would be approximately 5 to 6 hours per week during testing. The duration of radar radiofrequency radiation would decrease to 3 to 4 hours per week during actual GMD mission activities. The actual operating area of SBX at the mooring location would be restricted to minimize impacts. SBX operations would be coordinated 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.

4.7.5.3 Cumulative Impacts

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. No other projects in the ROI have been identified that would have the potential for incremental, additive cumulative impacts to health and safety.

4.7.5.4 Mitigations

Limitations imposed on the range of azimuth and angles of operation would preclude potential impacts related to health and safety. Mechanical and software stops would be used to control the radar's operation.

4.7.6 UTILITIES—SEA-BASED TEST X-BAND RADAR PRIMARY SUPPORT BASE, PORT HUENEME

4.7.6.1 No Action Alternative

Under the No Action Alternative, the GMD ETR would not be established and the SBX would not be developed to support interceptor and target launch scenarios, needed for operationally realistic test conditions. NBVC Port Hueneme and San Nicolas Island would continue their current operations.

Energy

Daily average demand for electricity at NBVC Port Hueneme is 8,000 kW, amounting to only 18.2 percent of total capacity. During summer peaks, a demand of 13,000 kW equals approximately 30 percent of capacity.

Water

Potable water consumption at NBVC Port Hueneme is an average of 6.1 million liters (1.6 million gallons) per day, or 27.7 percent of its 22.0-million liter (5.8-million gallon) per day capacity.

Wastewater

Wastewater generation at NBVC Port Hueneme is 1.8 million liters (480,000 gallons) per day, or 12 percent of its total capacity of 22.0 million liters (5.8 million gallons) per day.

Solid Waste

Solid waste disposal at NBVC Port Hueneme is handled by landfill and shipping offsite. It is anticipated the landfill in question will operate for another 30 years at the present rate of waste generation, with its capacity currently at 4 million cubic meters (30 million cubic yards). NBVC Port Hueneme generation levels are at 16 metric tons (18 tons) per day.

4.7.6.2 Alternatives 1, 2, and 3

All of the alternatives would include SBX as one of the components of the Proposed Action. The operation of SBX would require BOA and a PSB.

Electrical power requirements for the SBX platform and its various payloads would be approximately 19.8-MW, supplied by six on-board 3.3-MW generators. The SBX would be self-propelled by four steerable 3.5-MW electric thrusters that would effectively propel and maneuver the SBX without assistance. During transportation, the thrusters would consume 14 MW, leaving 5.8-MW available for necessary ship-board operations, as well as the XBR.

The SBX has a fuel capacity of approximately 3,100,000 liters (818,000 gallons). The approximate fuel consumption for transit and radar operation is 54,800 liters (14,500 gallons) per day, which would amount to only 1.8 percent of total fuel capacity daily.

There would be a total of 50 crew members, including 20 marine crew and 30 GMD mission support personnel. Additionally, up to 50 people could be accommodated on board on a temporary daytime basis.

At the intervals between GMD test missions, the SBX would return to a PSB for crew rotations, re-supply, and maintenance activities. While at the PSB or an adjacent mooring location, only three of the generators would be used, one operating continually while in port for daily ship functions while the remainder would power the half- or fully populated radar 3 hours per day.

NBVC Port Hueneme is not deep enough to permit SBX entry; however, the harbor can host a resupply ship to service the SBX (delivering food, supplies, repair parts, and fuel), which would be moored just off San Nicolas Island. NBVC Port Hueneme routinely provides underway replenishment operations in support of test operations. Personnel would be ferried to the SBX each day either by watercraft or helicopter. Currently there is no fuel pier at San Nicolas Island. Fuel is delivered by pipeline from a moored location. There is a MILCON project for a pier due to be complete in late 2003 that would be suitable for SBX resupply vessel operations.

Existing warehouses at NBVC Port Hueneme would possibly be renovated for SBX use. Should these nearby facilities prove inadequate to accommodate a maximum of 25 personnel, construction of new storage and administration facilities would be necessary. If existing facilities are used, security upgrades, environmental controls for storage areas, fueling capability, ship gases handling facilities, computer networks, phone systems, and hazardous material storage and disposal may be added. Ongoing logistics and support operations such as re-supply, fueling and maintenance, and crew/operator training would also occur at the PSB.

Studies have shown an average 189 liters (50 gallons) per capita per day water consumption and 170 liters (40 gallons) per capita per day of wastewater production. Recent figures indicate that in the United States, the per capita generation of municipal solid waste in 1998 was 2 kilograms (4.46 pounds) per capita per day (U.S. Environmental Protection Agency, 2002). Average daily demand for water, wastewater, and municipal solid waste for a maximum 25 personnel would be estimated as follows, based on typical usage: 4,725 liters (1,250 gallons) water; 4,250 liters (1,000 gallons) wastewater and 50 kilograms (112 pounds) of solid waste. Any new facilities being constructed would be required to facilitate this level of use, as well as to accommodate any energy demand.

Any new facilities being constructed would be required to facilitate this level of use, as well as to accommodate any energy demand.

4.7.6.3 Cumulative Impacts

At this time, there are no ongoing or foreseeable future programs/plans identified in the region of influence that when combined with the relatively minor SBX utility requirements would result in cumulative impacts to utilities. Therefore, no cumulative impacts are anticipated with Alternatives 1, 2, and 3.

4.7.6.4 Mitigation Measures

No utilities mitigation measures are proposed for the GMD ETR activities.

4.8 NAVAL STATION EVERETT—SEA-BASED TEST X-BAND RADAR PRIMARY SUPPORT BASE

4.8.1 AIR QUALITY—SEA-BASED TEST X-BAND RADAR PRIMARY SUPPORT BASE, NAVAL STATION EVERETT

4.8.1.1 No Action Alternative

Under the No Action Alternative, the GMD ETR would not be established and interceptor and target launch scenarios would not require the SBX for testing under operationally realistic conditions. Operations currently conducted at Naval Station Everett would continue. Table 4.8.1-1 lists the existing emissions in the vicinity of Naval Station Everett.

Table 4.8.1-1: Maximum Measured Pollutant in Naval Station Everett Vicinity

Pollutant	Averaging Time	Standard	Location	1992	1993
Carbon Monoxide	8-hour	9 ppm	Everett	9.0 ppm	6.7 ppm
	1-hour	35 ppm	Everett	16.1 ppm	10.2 ppm
PM-10	Annual	50 µg/m^3	Marysville	26 µg/m^3	27 µg/m^3
			Everett	24 µg/m^3	24 µg/m^3
	Maximum 24-hour	150 µg/m^3	Marysville	96 µg/m^3	97 µg/m^3
		50 µg/m^3	Everett	57 µg/m^3	72 µg/m^3
Ozone	Maximum 1-hour	0.12 ppm	Getchell	-	0.093 µg/m^3
			Lake Sammamish	0.094 µg/m^3	0.098 µg/m^3

Source: U.S. Department of the Navy, Puget Sound Naval shipyard, 1995

4.8.1.2 Alternatives 1, 2, and 3

Construction

Construction and facility modification required to provide support to the SBX would occur in previously disturbed areas. Frequent rains common to the area would minimize dust and PM-10 formation. All construction would be conducted in accordance with the appropriate permits and regulations. No exceedences of the NAAQS or state AAQS would be anticipated.

Operation

Operational emissions aboard the SBX would be limited to the exhaust produced by generators and maintenance. Maintenance-related emissions would include minimal levels of volatile organic compound emissions that are not expected to have a significant impact on air quality.

65 Percent and Fully Populated SBX

Based on five tests per year the SBX would be at the Naval Station Everett PSB for 7 months. For conservative analysis purposes, 9 months will be used. The SBX is being analyzed as a mobile source with an expected use of 6,600 hours per year (24 hours a day for 9 months) at a single location, docked at Naval Station Everett when the aircraft carrier is not in port or moored nearby. The SBX on-board power plant planned for use would include six 3.3 MW diesel driven generators. While at the PSB, only three of the generators would be used. One would operate continually while in port for daily ship functions. The other two generators would be required for powering of the 65 percent or fully populated radar for 3 hours per day. This represents 6,600 hours of operation of one 3.3 MW generator and 1,650 hours of operation for the other two generators that would be in operation at the PSB. Total power output for the three 3.3 MW generators would be 27,225 MW hours for the time the SBX is at the PSB. The SBX would not be considered a stationary source at Naval Station Everett; therefore neither a Prevention of Significant Deterioration review nor a Title V permit would be required.

The remaining 3 months of the year it is expected the SBX would be in transit or at one of the SBX operating areas in the BOA.

4.8.1.3 Cumulative Impacts

Cumulative impacts at Naval Station Everett would include the use of generators while the SBX is docked, as well as the possible increase in vehicle trips due to the number of personnel and deliveries required for the SBX. Since Snohamish County has been identified as being in non-attainment, it must be assumed that any emissions have the potential to impact the surrounding area. The Clean Air Act, as amended in 1990, requires that, in non-attainment areas, federal actions conform to the appropriate State Implementation Plan. Conformity to a State Implementation Plan is defined as meaning conforming for the purpose of eliminating or reducing the severity and number of violations of the NAAQS and achieving prompt attainment of these standards.

4.8.1.4 Mitigation Measures

No air quality mitigation measures are proposed for GMD ETR activities.

4.8.2 AIRSPACE—SEA-BASED TEST X-BAND RADAR PRIMARY SUPPORT BASE, NAVAL STATION EVERETT

4.8.2.1 No Action Alternative

Under the No Action Alternative, the GMD ETR would not be established and interceptor and target launch scenarios would not require the SBX for testing under operationally realistic conditions. Operations currently conducted at Naval Station Everett would continue.

4.8.2.2 Alternatives 1, 2, and 3

The Proposed Action related to airspace would be full power emissions from the SBX while at the pier or mooring location at Naval Station Everett.

Operation

Controlled and Uncontrolled Airspace

Unrestricted operation of the SBX at the mooring location would have the potential to adversely affect air operations. In order to avoid or minimize adverse effects from EMR/EMI, DoD has established a coordination process with responsible agencies and airspace users. A full EMR/EMI survey and analysis would be conducted by the Joint Spectrum Center, in coordination with the FAA, Department of Transportation, and other potentially affected users. The survey is used in preparing a DD Form 1494 that would be required as part of the spectrum certification and frequency allocation process. The completed DD Form 1494 that has been processed and approved by the appropriate national and international authorities would be required prior to SBX testing.

The results of the survey would also be used to define the operating area for the SBX (acceptable azimuths and operating angles). The maximum operating area would be all azimuths (360 degrees), and all angles from 2 to 90 degrees. The maximum potential interference distances are listed in table 4.6.2-1 and are shown on figure 3.8.2-1.

The actual SBX operating area at the pier or mooring location would be restricted in order to minimize impacts to aircraft operations, EEDs, and communication equipment. A high energy radiation area notice would be published on the appropriate aeronautical charts, notifying aircraft of a radio frequency radiation area. The boundaries of the SBX high energy radiation area would be configured to minimize impacts to aircraft operations and other potentially affected systems. The establishment of this high energy radiation area would not impose any new flight restriction requirements.

SBX operations would be coordinated with the FAA and would be scheduled to occur during hours of minimal aircraft operations if possible. In addition, the SBX would utilize a real-time link to the FAA operations radar to insure the airspace is clear of any aircraft. Consequently, there would be no reduction in the amount of navigable airspace, and thus no impacts to the controlled and uncontrolled airspace in the ROI would result.

Special Use Airspace

There is no special use airspace within the ROI. Consequently, there would be no impacts to special use airspace.

En Route Airways and Jet Routes

Two Low Altitude air routes (V-23 and V-287) enter the ROI and terminate at Paine Airport.

Both air routes cross the 65 percent and fully populated radar aircraft interference areas. There may be additional approach and departure routes within the ROI that would also need to be considered when defining the SBX operating area. The SBX would be programmed to limit RF emissions in the direction of airways that pass within the potential interference distance. In addition, since the radar beam is in constant motion, should an aircraft enter the interference area, it is highly unlikely that the SBX would illuminate an aircraft long enough to affect the on-board electronics.

Airports and Airfields

Seattle-Tacoma International Airport is located approximately 60 kilometers (37 miles) south of Naval Station Everett outside the ROI. Snohomish County (Paine) Airport is about 8 kilometers (5 miles) southwest of Naval Station Everett. Class D airspace above Paine Airport extends to near Naval Station Everett, with the edge of a class E airspace extension above Naval Station Everett. Several other airfields are located within the ROI including Harvey, Heineck, Large, Frontier, Arlington, and Whidbey.

Airports with traffic control radars would be major factors in the EMR/EMI survey and analysis and subsequent operating permit. Operation of the SBX has the potential to interfere with both aircraft systems and air navigation systems. However, the establishment of the high energy radiation area would not impose any flight restriction requirements, and would not change any airfield/airport arrival and departure traffic flows.

Most air navigation facilities within the airspace ROI would operate at lower frequencies (in the megahertz range) than the X-band SBX, and would not normally experience any interference from the SBX. Nevertheless, there is the potential for interference from the grating (side) lobes and the main beam. Section 4.8.5 (Health and Safety) provides a detailed discussion of the potential for electronic communications (in-band and adjacent band) and harmonic band radio frequency interference, as well as non-frequency-related interference (high power effects).

Emissions from the XBR may also potentially degrade the overall system performance of in-band airborne systems such as fire control, bomb/navigation in military aircraft, and weather radars in both civilian and military aircraft, which all operate in the X-band (8 to 12 GHz). However, the SBX high energy radiation area would be configured to minimize impacts to these airborne and ship based systems.

4.8.2.3 Cumulative Impacts

Because the SBX operates in different frequency ranges than most aircraft radars, there would be limited potential for an incremental, additive cumulative electromagnetic effect upon the operation of an air navigation facility or the signal used by aircraft. Moreover, the frequency allocation operating permit process would take into consideration potential impacts on other resources in the region and would preclude the potential for cumulative impacts.

No other projects in the airspace ROI have been identified that would have the potential for other incremental, additive cumulative impacts to controlled or uncontrolled airspace, special use airspace, en route airways and jet routes, or airfields and airports in the ROI.

4.8.2.4 Mitigation Measures

The actual SBX operating area at the mooring location would be restricted in order to minimize impacts to aircraft operations, EEDs, and communication equipment. In addition to charting the SBX high energy radiation area notice, information would be published in the Airport Facility section of the *FAA Airport Guide*, and local NOTAMs would be issued to notify pilots of the high energy radiation area. The boundaries of the SBX high energy radiation area would be configured to minimize impacts to aircraft operations and other potentially affected systems. Additionally, flight service personnel would brief pilots flying in the vicinity about the SBX high energy radiation area.

4.8.3 BIOLOGICAL RESOURCES—SEA-BASED TEST X-BAND RADAR PRIMARY SUPPORT BASE, NAVAL STATION EVERETT

4.8.3.1 No Action Alternative

Under the No Action Alternative, the GMD ETR would not be established and interceptor and target launch scenarios would not require the SBX for testing under operationally realistic conditions. Operations currently conducted at Naval Station Everett would continue.

4.8.3.2 Alternatives 1, 2, and 3

Construction

Any construction or facility modification required to provide support to the SBX would occur in previously disturbed areas in accordance with host installation guidelines and regulations.

Although eel grass areas could be impacted by the shadow of the SBX, this would not be an issue at the depths to which the SBX is limited. Other than minor, short-term impacts from noise, such as startling and temporary displacement, no adverse effects to biological resources are anticipated.

Operation

Impacts to biological resources from operation of the SBX at Naval Station Everett would be similar to those described above in sections 4.3.3.3 and 4.6.3.2. No significant long-term adverse impacts are anticipated to seabirds, shorebirds (bald eagle), or widely distributed, open-water species such as humpback, blue, fin, sei, and sperm whales; green, leatherback, and loggerhead sea turtles; and steller sea lions.

4.8.3.3 Cumulative Impacts

No other projects in the ROI have been identified that would have the potential for incremental, additive cumulative impacts to biological resources in the ROI. As stated above, no effects are anticipated on whales, other marine mammals, or sea turtles that might be present in the vicinity of the homeport and transit locations.

4.8.3.4 Mitigation Measures

No biological resources mitigation measures are proposed for GMD ETR activities.

4.8.4 HAZARDOUS MATERIALS AND HAZARDOUS WASTE—SEA-BASED TEST X-BAND RADAR PRIMARY SUPPORT BASE, NAVAL STATION EVERETT

4.8.4.1 No Action Alternative

Under the No Action Alternative, the GMD ETR would not be established and interceptor and target launch scenarios would not require the SBX for testing under operationally realistic conditions. Operations currently conducted at Naval Station Everett would continue.

4.8.4.2 Alternatives 1, 2, and 3

Construction

Any construction or facility modification required to provide support to the SBX would occur in previously disturbed areas in accordance with host installation guidelines and regulations. Other than minor, short-term increase from the use of potentially hazardous materials such as paints, solvents and fuels, no adverse effects to ongoing hazardous materials storage and handling are anticipated. The small increases in the amount of potentially hazardous materials used during construction activities would result in generation of added wastes. However, this increase is not expected to be significant and would be accommodated in accordance with existing protocol and regulations.

Operation

Shipboard Hazardous Materials and Waste Management

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. Any hazardous waste disposal beyond 370 kilometers (200 nautical miles) will comply with OPNAVINST 5090.1 Appendix L. 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 - MPCDs) under the Uniform National Discharge Standards (UNDS) provisions of the Clean Water Act. In compliance with UNDS, the SBX vessel will incorporate MPCDs, such as keeping decks clear of debris, cleaning spills and residues and engaging in spill and pollution prevention practices, in design or routine operation.

Range

Increased operations that could take place at Naval Station Everett would be servicing and maintenance of the SBX. This small increase in servicing operations would not significantly affect hazardous materials management or waste disposal. There would be no significant operational impacts.

4.8.4.3 Cumulative Impacts

No other projects in the ROI have been identified that would have the potential for incremental, additive cumulative impacts to existing hazardous materials and waste management practices.

4.8.4.4 Mitigation Measures

No hazardous materials / hazardous waste management mitigation measures are proposed for GMD ETR activities.

4.8.5 HEALTH AND SAFETY—SEA-BASED TEST X-BAND RADAR PRIMARY SUPPORT BASE, NAVAL STATION EVERETT

4.8.5.1 No Action Alternative

Under the No Action Alternative, the primary support base for the SBX would not be located at Naval Station Everett. Operations currently conducted at Naval Station Everett Harbor would continue.

4.8.5.2 Alternatives 1, 2, and 3

Construction

Any construction or facility modification required to support the SBX would occur in accordance with existing installation safety protocol/plans and applicable state and Federal requirements. No adverse effects to health and safety of construction contractors or the public are anticipated.

Operation

An EMR/EMI survey and analysis would be conducted by the Joint Spectrum Center that considers hazards of EMR on personnel, fuel, and ordnance. The analysis provides recommendations for sector blanking and safety systems to minimize exposures. The proposed systems would have the appropriate safety exclusion zones established before operation, and warning lights to inform personnel when the system is in operation and emitting EMR. Mechanical and software stops would be used to prevent the main beam from being directed in specified sectors where it may present a hazard.

Potential health and safety hazards associated with operation of similar radars were analyzed in two previous documents. *Ground Based Radar Family of Radars Environmental Assessment and Finding of No Significant Impact,* (U.S. Army Program Executive Office, Global Protection Against Limited Strikes, 1993); and the *Environmental Assessment for Theater Missile Defense Ground Based Radar Testing Program at Fort Devens, Massachusetts* (U.S. Army Space and Strategic Defense Command, 1994e). The analysis considered both program operational requirements and restrictions and range-required safety procedures. It was concluded that the required implementation of 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.

Radiation Hazards

Human Exposure. The analysis method used to evaluate potential effects of RF radiation is the IEEE MPEL, which defines the maximum time-averaged radio frequency 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. (IEEE C95.1-1999) General public exposure is typically limited to one-fifth of the occupational limits. For non-ionizing radiation, OSHA established (29 CFR 1910.97) a radiation protection guide for normal environmental conditions and for incident electromagnetic energy of frequencies from 10 MHz to 100 MHz. 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 HPM narrow-band and EMP broad-band simulator systems.

Computer models were used to determine the power density received on the ground over an average time of 9.5 minutes. For the fully populated radar at a distance of 150 meters (492 feet), and for the 65 percent populated radar at a distance of 85 meters (279 feet), and an average time of 9.5 minutes, the power density was calculated to be 2.5 mW/cm^2. This power density is significantly less than the 6.33 mW/cm^2 permitted by the IEEE. The IEEE guidelines are more stringent than the EPA guidelines, based on the shorter averaging time, and are therefore used in the analysis.

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.

EEDs. The potential impacts to EEDs from emissions from the XBR are twofold: (1) the EED could be made not to work, or (2) 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. As can be seen from table 4.8.5-1, EEDs in the handling/loading phase are substantially more susceptible to EMR hazards; however, main beam illumination on the ground will not occur. It is assumed that the handling/loading of EEDs will 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 XBR to inform pilots of the potential electromagnetic interference hazard to certain aircraft.

Table 4.8.5-1: Required Separation Distances for EEDs in the Main Beam and Sidelobe of the XBR for the Presence, Shipping, and Handling/Loading Phases

EED Phase	Threshold (volts per meter)	Standard	Main Beam Separation Distance in kilometers (miles)		Grating Lobe Separation Distance in kilometers (miles)	
			Fully Populated	65 Percent Populated	Fully Populated	65 Percent Populated
Presence/Shipping	1,270 (peak)	MIL-STD-464	7.5(4.7)	4.6 (2.9)	0.2 (0.1)	0.1 (0.6)
Handling/Loading	200 (peak)	AFR-127-100	Not applicable	Not applicable	2.3 (1.4)	1.6 (1.0)

Based upon a grating lobe illumination from the fully populated SBX, a separation distance of 0.2 kilometer (0.4 mile) is recommended for EEDs in the presence/shipping phase and 2.3 kilometers (1.4 miles) in the handling/loading phase (table 4.8.5-1). The distances for the 65 percent populated SBX are also shown in table 4.8.5-1. There is no predicted potential for inadvertent initiation of vehicle airbags because the metallic body/frame of the vehicle provides sufficient shielding.

Fuels. Based upon the threshold of 5,000 mW/cm^2 from Technical Order 31Z-10-4, the SBX does not present a radiation hazard to fuels because the SBX does not emit radiation levels that exceed 5,000 mW/cm^2.

Communications–Electronics Frequency-Related Interference

Communications–Electronics In-band Radio Frequency Interference. In-band frequency interference addressed in this EIS is for the X-Band (8,000 to 12,000 MHz). In-band radio frequency interference occurs when two pieces of communications-electronics equipment are located within the same frequency band. Therefore, equipment with frequencies falling within the X-band would most likely be affected.

Communications–Electronics Adjacent Band Interference. Adjacent band radio frequency interference is similar to in-band radio frequency interference. The adjacent bands for the

X-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.

Ground-based, airborne, and ship-based systems will be evaluated for in band, adjacent band, and harmonic band interference during the detailed EMR/EMI survey that is underway. Level 2 surveys are planned to be completed in Spring of 2003.

Communications–Electronics Non-frequency-related Interference

High Power Effects. Non-frequency-related interference from the SBX to the electromagnetic environment is 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 will 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. Additional modeling is underway to determine potential interference distances related to high power effects.

Aircraft/Avionics. The potential exists for EMR emissions from the main beam of the SBX 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. Since the FAA average threshold of 300 volts per meter is more conservative, it is the threshold used in this EIS. Interference distance related to aircraft is discussed in the airspace section.

The total amount of radar radiofrequency radiation would be approximately 5 to 6 hours per week during testing. The duration of radar radiofrequency radiation would decrease to 3 to 4 hours per week during actual GMD mission activities. The actual operating area of SBX at the mooring location would be restricted to minimize impacts. SBX operations would be coordinated 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.

4.8.5.3 Cumulative Impacts

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.

4.8.5.4 Mitigations

Limitations imposed on the range of azimuth and angles of operation would preclude potential impacts related to health and safety. Mechanical and software stops would be used to control the radar's operation.

4.8.6 TRANSPORTATION—SEA-BASED TEST X-BAND RADAR PRIMARY SUPPORT BASE, NAVAL STATION EVERETT

4.8.6.1 No Action Alternative

Under the No Action Alternative, the GMD ETR would not be established and interceptor and target launch scenarios would not require the SBX for testing under operationally realistic conditions. Operations at Port Everett would continue as currently conducted.

4.8.6.2 Alternatives 1, 2, and 3

All of the alternatives would include SBX as one of the component of the Proposed Action.

Construction

Any construction or facility modification required to provide support to the SBX would occur in previously disturbed areas in accordance with host installation guidelines and regulations. As excess warehouse and administrative space if available, there is the possibility that no new construction will be necessary. No adverse effects to transportation resources are anticipated.

Operation

The SBX will be required to meet environmental requirements for commercial vessels.

At Port Everett, a 16-meter (54-foot) pier, Pier Alpha, is utilized for *USS Abraham Lincoln*, a Nimitz-class aircraft carrier. Coordination with local port authorities and/or the U.S. Coast Guard would be required to schedule usage of Pier Alpha by the SBX at times when *USS Abraham Lincoln* is out of port. This occurs some six months out of each year. There are other potential mooring sites at piers wherein the depths exceed 30.5 meters (100 feet) and which are outside of traffic lanes. Harbor depths would allow the SBX to submerse to operating levels, if needed.

Naval Station Everett is located close to the port and provides and easy access to the main channel of Puget Sound. At least two tugboats would be required to assist the SBX when in port. Naval Station Everett has no tugboat complement, and thus tugs used at the port are primarily commercial (GlobalSecurity.org, 2002b).

Such activities are typical for Port Everett and, as with all such shipping issues, would require cooperation with the U.S. Coast Guard. Requests for tugs must be made 72 hours in advance of anticipated time of movement, and are handled by the Senior Officer Present Afloat (SOPA) (Admin) Puget Sound (GlobalSecurity.org, 2002b). Adequate coordination would prevent any conflicts with tribal fishing areas (Miller, 2002), and would prevent any impacts on current shipping schedules, ship-borne commerce or general transit. Any requirements for security would also be coordinated with Coast Guard representatives.

Some 20 people would be instated at the PSB. As many as 50 personnel could leave the SBX for onshore activities. Even given a maximum, and extreme case, of 50 automobile trips per day, this level would be less than a 0.59 percent over the current level of 8,520 vehicle trips generated by Naval Station Everett per day. No impacts to area roadways are expected.

Cumulative Impacts

No other projects in the ROI have been identified that would have the potential for incremental, additive cumulative impacts to transportation in the ROI.

Mitigation Measures

No transportation mitigation measures are proposed for GMD ETR activities.

4.8.7 UTILITIES—SEA-BASED TEST X-BAND RADAR PRIMARY SUPPORT BASE, NAVAL STATION EVERETT

4.8.7.1 No Action Alternative

Under the No Action Alternative, the GMD ETR would not be established and the SBX would not be developed to support interceptor and target launch scenarios, needed for operationally realistic test conditions. Naval Station Everett would continue their current operations.

Energy

Daily average demand for electricity at the Naval Station Everett waterfront site is 36,000 kVA, some 45 percent of the available 80,000 kVA.

Water

Potable water consumption at the Naval Station Everett waterfront site is typically 3.4 million liters (900,000 gallons) per day, or 33.3 percent of the total available capacity of 10.2 million liters (2.7 million gallons) per day.

Wastewater

Wastewater generation at Naval Station Everett's sanitary sewer system is typically 3.8 million liters (990,000 gallons) per day, or 33.3 percent of the available capacity of 11.4 million liters (3 million gallons) per day.

Solid Waste

Solid waste disposal at Naval Station Everett is handled by landfill and shipping offsite. The average level generated at the waterfront site and by transient Navy ships is 4.6 metric tons (4.5 tons) per day.

4.8.7.2 Alternatives 1, 2, and 3

All of the alternatives would include SBX as one of the components of the Proposed Action. The operation of SBX would require BOA and a PSB.

Electrical power requirements for the SBX platform and its various payloads would be approximately 19.8-MW, supplied by six on-board 3.3-MW generators. The SBX would be self-propelled by four steerable 3.5-MW electric thrusters that would effectively propel and maneuver the SBX without assistance. During transportation, the thrusters would consume 14-MW, leaving 5.8-MW available for necessary ship-board operations, as well as the XBR.

The SBX has a fuel capacity of approximately 3,100,000 liters (818,000 gallons). The approximate fuel consumption for transit and radar operation is 54,800 liters (14,500 gallons) per day, which would amount to only 1.8 percent of total fuel capacity daily.

There would be a total of 50 crew members, including 20 marine crew and 30 GMD mission support personnel. Additionally, up to 50 people could be accommodated on board on a temporary daytime basis.

At the intervals between GMD test missions, the SBX would return to a PSB for crew rotations, re-supply, and maintenance activities. While at the PSB or an adjacent mooring location, only three of the generators would be used, one operating continually while in port for daily ship functions while the remainder would power the half- or fully populated radar three hours per day.

There is ample room for mooring near Naval Station Everett piers. Mooring locations maintain depths of 30.5-plus meters (100-plus feet), out of the traffic lanes. However, scheduling for SBX activity would have to work around scheduling for *USS Abraham Lincoln*, which is out of port some 6 months out of the year. It is only during this time that the SBX could conduct pier-side operations. A utility hookup would be required for the supply ship to run on board lighting and other basic needs. Utility levels would be typical of that for other ships supplied by the area piers and considered routine.

At any other times, a re-supply vessel would be required for the SBX, to transport materials (food, supplies, repair parts, and fuel) from the piers to the mooring site. Personnel would be ferried to the SBX each day either by watercraft or helicopter. During such times, there would be no direct impacts to area utilities from the self-contained SBX.

Currently, there is no excess warehouse or administrative space available for the PSB; however there is adequate space for the construction of new storage and administration facilities for a maximum of 25 personnel. Due to this limited space, a new 900- to 1,500-square-meter (3,000- to 5,000-square foot) environmentally controlled warehouse would potentially be required for SBX operations.

Studies have shown an average 189 liters (50 gallons) per capita per day water consumption and 170 liters (40 gallons) per capita per day of wastewater production. Recent figures indicate that in the United States, the per capita generation of municipal solid waste in 1998 was 2 kilograms (4.46 pounds) per capita per day (U.S. Environmental Protection Agency, 2002). Average daily demand for water, wastewater, and municipal solid waste for a maximum 25 personnel would be estimated as follows, based on typical usage: 4,725 liters (1,250 gallons) water; 4,250 liters (1,000 gallons) wastewater and 50 kilograms (112 pounds) of solid waste. Any new facilities being constructed would be required to facilitate this level of use, as well as to accommodate any energy demand.

4.8.7.3 Cumulative Impacts

At this time, there are no ongoing or foreseeable future programs/plans identified in the region of influence that when combined with the relatively minor SBX utility requirements would result in cumulative impacts to utilities. Therefore, no cumulative impacts are anticipated with Alternatives 1, 2, and 3.

4.8.7.4 Mitigation Measures

No utilities mitigation measures are proposed for GMD ETR activities.

4.8.8 VISUAL AND AESTHETIC RESOURCES—SEA-BASED TEST X-BAND RADAR PRIMARY SUPPORT BASE, NAVAL STATION EVERETT

4.8.8.1 No Action Alternative

Under the No Action Alternative, the SBX radar would not be located at Naval Station Everett. There would be no alteration of the existing visual setting and the adjacent area. No significant impacts to visual and aesthetic resources would occur.

4.8.8.2 Alternatives 1, 2, and 3

Visual resources could be affected by the proposed SBX at Naval Station Everett. The SBX would be approximately 76 meters (250 feet) tall and the SBX platform would be 119 meters (390 feet) long and 73 meters (238 feet) wide. The SBX would be located at Naval Station Everett for about 6 weeks at a time, a total of 7 months per year.

The potential impacts to visual and aesthetics related to the SBX would be the view of the waterfront from nearby residential areas. However, Naval Station Everett is home to *USS Abraham Lincoln*, a naval aircraft carrier which has approximate dimensions of 63 meters (206 feet) tall, 333 meters (1,092 feet) long, and 78 meters (257 feet) wide and is comparable to the SBX. In addition, Naval Station Everett is surrounded by industrial areas which inhibit the view of the waterfront. Therefore, significant impacts to visual and aesthetic resources are not anticipated due to the Proposed Action.

4.8.8.3 Cumulative Impacts

The SBX would be at the mooring location intermittently throughout the year. No other activities have been identified that would contribute to cumulative impacts.

4.8.8.4 Mitigation Measures

No visual resources mitigation measures are proposed for GMD ETR activities.

4.9 PORT ADAK—SEA-BASED TEST X-BAND RADAR PRIMARY SUPPORT BASE

4.9.1 AIR QUALITY—SEA-BASED TEST X-BAND RADAR PRIMARY SUPPORT BASE, PORT ADAK

4.9.1.1 No Action Alternative

Under the No Action Alternative the home port for the SBX would not be located at Port Adak. Current air emission levels would remain the same, stemming primarily from regional volcanic activity.

4.9.1.2 Alternatives 1, 2, and 3

Construction

Construction and facility modification required to provide support to the SBX would occur in previously disturbed areas. Construction activities would be conducted in accordance with all appropriate regulations and permits. Other than minor, short-term impacts from construction, no exceedances of the NAAQS or state AAQS would be anticipated.

Operation

Operational emissions aboard the SBX would be limited to the exhaust produced by generators and maintenance. Maintenance-related emissions would include minimal levels of volatile organic compound emissions that are not expected to have a significant impact on air quality.

65 Percent and Fully Populated SBX

Based on five tests per year the SBX would be at the Port Adak PSB for 7 months. For conservative analysis purposes, 9 months will be used. The SBX is being analyzed as a mobile source with an expected use of 6,600 hours per year (24 hours a day for 9 months) at a single location, approximately 3.5 kilometers (2.2 miles) from Port Adak in Finger Bay. The SBX on-board power plant planned for use would include six 3.3 MW diesel driven generators. While at the PSB mooring location, only three of the generators would be used. One would operate continually while in port for daily ship functions. The other two generators would be required for powering of the 65 percent or fully populated radar for 3 hours per day. This represents 6,600 hours of operation of one 3.3 MW generator and 1,650 hours of operation for the other two generators that would be in operation at the PSB. Total power output for the three 3.3 MW generators would be 27,225 MW hours for the time the SBX is at the PSB. The SBX would not be considered a stationary source at Port Adak; therefore neither a Prevention of Significant Deterioration review nor a Title V permit would be required.

The remaining 3 months of the year it is expected the SBX would be in transit or at one of the SBX operating areas.

It is also anticipated that the emissions would not impact the Maritime National Wildlife Refuge located on the southern portion of Adak. Due to the speed and frequency of wind on and around the island, it is expected that the emissions would disperse quickly before reaching this area.

4.9.1.3 Cumulative Impacts

Due to the limited industrialization of Adak and the surrounding environment, the potential cumulative impacts to air quality due to the proposed mooring of the SBX would not be substantial. No other projects in the ROI have been identified that would have the potential for incremental, additive cumulative impacts to the air quality in the ROI

4.9.1.4 Mitigation Measures

No air quality mitigation measures are proposed for GMD ETR activities.

4.9.2 AIRSPACE—SEA-BASED TEST X-BAND RADAR PRIMARY SUPPORT BASE, PORT ADAK

4.9.2.1 No Action Alternative

Under the No Action Alternative, the GMD ETR would not be established and interceptor and target launch scenarios would not require the SBX for testing under operationally realistic conditions.

4.9.2.2 Alternatives 1, 2, and 3

The Proposed Action related to airspace would be full power emissions from the SBX while at the mooring location at Finger Bay, south of Port Adak.

Operation

Controlled and Uncontrolled Airspace

Unrestricted operation of the SBX at the mooring location would have the potential to adversely affect air operations. In order to avoid or minimize adverse effects from EMR/EMI, DOD has established a coordination process with responsible agencies and airspace users. A full EMR/EMI survey and analysis would be conducted by the Joint Spectrum Center, in coordination with the FAA, and other potentially affected users. The survey is used in preparing a DD Form 1494 that would be required as part of the spectrum certification and frequency allocation process. The completed DD Form 1494 that has been processed and approved by the appropriate national and international authorities would be required prior to SBX testing.

The results of the survey would also be used to define the operating area for the SBX (acceptable azimuths and operating angles). The maximum operating area would be all azimuths (360 degrees), and all angles from 2 to 90 degrees. The maximum potential interference distances are listed in table 4.6.2-1 and on figure 3.9.2-1.

The actual SBX operating area at the mooring location would be restricted in order to minimize impacts to aircraft operations, EEDs, and communication equipment. A high energy radiation area notice would be published on the appropriate aeronautical charts, notifying aircraft of a radio frequency radiation area. The boundaries of the SBX high energy radiation area would be configured to minimize impacts to aircraft operations and other potentially affected systems. The establishment of this SBX high energy radiation area would not impose any new flight restriction requirements.

SBX operations would be coordinated with the FAA and would be scheduled to occur during hours of minimal aircraft operations. Coordination with the Anchorage Air Route Traffic Control Center would occur prior to and during each test. Consequently, there would be no reduction in the amount of navigable airspace, and thus no impacts to the controlled and uncontrolled airspace in the ROI would result.

Special Use Airspace

There is no special use airspace within the ROI. Consequently, there would be no impacts to special use airspace.

En Route Airways and Jet Routes

The two en route low altitude airways (G8 and G1), three high altitude jet routes (J 115, J600, and J120), two great circle routes from North America to the Far East (R 336 and R451), and One military route (V 480) would be considered in defining the SBX operating area. There are additional approach and departure routes within the ROI that would also need to be considered when defining the SBX operating area. The SBX would be programmed to limit RF emissions in the airways that pass through the ROI. In addition, since the radar beam is in constant motion, should an aircraft enter the interference area, it is highly unlikely that the SBX would illuminate an aircraft long enough to affect the on-board electronics.

Airports and Airfields

Adak Airfield is located approximately 5.5 kilometers (3.4 miles) north of the proposed mooring location. With the restrictions placed on the SBX in a manner similar to the GBR-P radar at RTS, standard instrument approach and departure procedures at the airfield would continue unhindered. Existing airfield or airport arrival and departure traffic flows would also not be affected and access to the airfield would not be curtailed. All arriving and departing aircraft and are under the control of the Adak Airfield Control Tower, thus there would be no airfield conflicts in the ROI under the Proposed Action, and no impact.

There are a number of air navigation facilities within the airspace ROI. However, they operate at lower frequencies (in the megahertz range) than the X-band SBX, and would not normally experience any interference from the SBX. Nevertheless, there is the potential for interference from the grating (side) lobes and the main beam. Section 4.9.5 (Health and Safety) provides a detailed discussion of the potential for electronic communications (in-band and adjacent band) and harmonic band radio frequency interference, as well as non-frequency-related interference (high power effects).

Emissions from the SBX may also potentially degrade the overall system performance of in-band airborne and ship based systems such as fire control, bomb/navigation in military aircraft, and weather radars in both civilian and military aircraft, which all operate in the X-band (8 to 12 GHz). However, the SBX high energy radiation area would be configured to minimize impacts to these airborne and ship based systems.

4.9.2.3 Cumulative Impacts

Because the SBX operates in different frequency ranges than most aircraft radars, there would be limited potential for an incremental, additive cumulative electromagnetic effect upon the operation of an air navigation facility or the signal used by aircraft. The use of the required scheduling and coordination process, and adherence to applicable DoD directives and U.S. Army regulations concerning radar operations would preclude the potential for significant incremental, additive, cumulative impacts.

No other projects in the airspace ROI have been identified that would have the potential for other incremental, additive cumulative impacts to controlled or uncontrolled airspace, special use airspace, en route airways and jet routes, or airfields and airports in the ROI.

4.9.2.4 Mitigation Measures

The actual SBX operating area at the mooring location would be restricted in order to minimize impacts to aircraft operations, EEDs, and communication equipment. In addition to charting the SBX high energy radiation area notice, information would be published in the Airport Facility section of the *FAA Airport Guide*, and local NOTAMs would be issued to notify pilots of the high energy radiation area. The boundaries of the SBX high energy radiation area would be configured to minimize impacts to aircraft operations and other potentially affected systems. Additionally, flight service personnel would brief pilots flying in the vicinity about the SBX high energy radiation area.

4.9.3 BIOLOGICAL RESOURCES—SEA-BASED TEST X-BAND RADAR PRIMARY SUPPORT BASE, PORT ADAK

4.9.3.1 No Action Alternative

Under the No Action Alternative, the GMD ETR would not be established and interceptor and target launch scenarios would not require the SBX for testing under operationally realistic conditions. Operations currently conducted at Port Adak would continue.

4.9.3.2 Alternatives 1, 2, and 3

Construction

Any construction or facility modification required to provide support to the SBX would occur in previously disturbed areas in accordance with host installation guidelines and regulations. Other than minor, short-term impacts from noise, such as startling and temporary displacement, no adverse effects to biological resources are anticipated.

Operation

Impacts to biological resources from operation of the SBX at Port Adak would be similar to those described above in sections 4.3.3.3 and 4.6.3.2. No significant long-term adverse impacts are anticipated to area seabirds and water fowl or widely distributed, open-water species such as Steller sea lions, sea otters, harbor seals, and whales that occur around Adak Island.

4.9.3.3 Cumulative Impacts

No other projects in the ROI have been identified that would have the potential for incremental, additive cumulative impacts to biological resources in the ROI. As stated above, no effects are anticipated on whales, other marine mammals, or birds that might be present in the vicinity of the homeport and transit locations.

4.9.3.4 Mitigation Measures

No biological resources mitigation measures are proposed for GMD ETR activities at Adak.

4.9.4 HAZARDOUS MATERIALS AND HAZARDOUS WASTE—SEA-BASED TEST X-BAND RADAR PRIMARY SUPPORT BASE, PORT ADAK

4.9.4.1 No Action Alternative

Under the No Action Alternative, the GMD ETR would not be established and interceptor and target launch scenarios would not require the SBX for testing under operationally realistic conditions. Operations currently conducted at Port Adak would continue.

4.9.4.2 Alternatives 1, 2, and 3

Construction

Any construction or facility modification required to provide support to the SBX would occur in previously disturbed areas in accordance with Port Adak guidelines and regulations. Other than minor, short-term increase from the use of potentially hazardous materials such as paints, solvents and fuels, no adverse effects to ongoing hazardous materials storage and handling are anticipated. The small increases in the amount of potentially hazardous materials used during construction activities would result in generation of added wastes. However, this increase is not expected to be significant and would be accommodated in accordance with existing Port Adak protocol and applicable state and Federal regulations.

Operation

Increased operations that could take place at Port Adak would be servicing and maintenance of the SBX. Purchase and use of potentially hazardous materials associated with SBX operation and maintenance would be handled in accordance with ongoing materials management practices. Routine and preventative maintenance activities associated with the SBX will result in the generation of small quantities of potentially hazardous waste. The types of waste generated are not expected to dramatically differ from existing waste generated at the Port Adak and these wastes would be handled in accordance with ongoing Port Adak procedures. SBX operation is not expected to significantly impact ongoing hazardous waste management or disposal practices.

4.9.4.3 Cumulative Impacts

The use of the required scheduling and coordination process and adherence to applicable Port Adak and APSC procedures and DoD directives concerning radar operations would preclude the potential for significant incremental, additive cumulative impact to hazardous materials and waste management practices.

4.9.4.4 Mitigation Measures

No hazardous materials/hazardous materials management mitigation measures are proposed for GMD ETR activities at Port Adak.

4.9.5 HEALTH AND SAFETY—SEA-BASED TEST X-BAND RADAR PRIMARY SUPPORT BASE, PORT ADAK

4.9.5.1 No Action Alternative

Under the No Action Alternative, the GMD ETR would not be established and interceptor and target launch scenarios would not require the SBX for testing under operationally realistic conditions. Operations currently conducted at Port Adak would continue.

4.9.5.2 Alternatives 1, 2, and 3

Construction

Any construction or facility modification required to support the SBX would occur in accordance with existing host installation safety protocol/plans and applicable state and Federal requirements. No adverse effects to health and safety of construction contractors or the public are anticipated.

Operation

An EMR/EMI survey and analysis would be conducted by the Joint Spectrum Center that considers hazards of EMR on personnel, fuel, and ordnance. The analysis provides recommendations for sector blanking and safety systems to minimize exposures. The proposed systems would have the appropriate safety exclusion zones established before operation, and warning lights to inform personnel when the system is in operation and emitting EMR. Mechanical and software stops would be used to prevent the main beam from being directed in specified sectors where it may present a hazard.

Potential health and safety hazards associated with operation of similar radars were analyzed in two previous documents. *Ground Based Radar Family of Radars Environmental Assessment and Finding of No Significant Impact,* (U.S. Army Program Executive Office, Global Protection Against Limited Strikes, 1993); and the *Environmental Assessment for Theater Missile Defense Ground Based Radar Testing Program at Fort Devens, Massachusetts* (U.S. Army Space and Strategic Defense Command, 1994e). The analysis considered both program operational requirements and restrictions and range-required safety procedures. It was concluded that the required implementation of 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.

Radiation Hazards

Human Exposure. The analysis method used to evaluate potential effects of RF radiation is the IEEE MPEL, which defines the maximum time-averaged radio frequency 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. (IEEE C95.1-1999) General public exposure is typically limited to one-fifth of the occupational limits. For non-ionizing radiation, OSHA established (29 CFR 1910.97) a radiation protection guide for normal environmental conditions and for incident electromagnetic energy of frequencies from 10 MHz to 100 MHz. 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 HPM narrow-band and EMP broad-band simulator systems.

Computer models were used to determine the power density received on the ground over an average time of 9.5 minutes. For the fully populated radar at a distance of 150 meters (492 feet), and for the 65 percent populated radar at a distance of 85 meters (279 feet), and an average time of 9.5 minutes, the power density was calculated to be 2.5 mW/cm^2. This power density is significantly less than the 6.33 mW/cm^2 permitted by the IEEE. The IEEE guidelines are more stringent than the EPA guidelines, based on the shorter averaging time, and are therefore used in the analysis.

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.

EEDs. The potential impacts to EEDs from emissions from the XBR are twofold: (1) the EED could be made not to work, or (2) 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. As can be seen from table 4.9.5-1, EEDs in the handling/loading phase are substantially more susceptible to EMR hazards; however, main beam illumination on the ground will not occur. It is assumed that the handling/loading of EEDs will 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 XBR to inform pilots of the potential electromagnetic interference hazard to certain aircraft.

Based upon a grating lobe illumination from the fully populated SBX, a separation distance of 0.2 kilometer (0.4 mile) is recommended for EEDs in the presence/shipping phase and 2.3 kilometers (1.4 miles) in the handling/loading phase (table 4.9.5-1). The distances for the 65 percent populated SBX are also shown in table 4.9.5-1. There is no predicted potential for inadvertent initiation of vehicle airbags because the metallic body/frame of the vehicle provides sufficient shielding.

Table 4.9.5-1: Required Separation Distances for EEDs in the Main Beam and Sidelobe of the XBR for the Presence, Shipping, and Handling/Loading Phases

EED Phase	Threshold (volts per meter)	Standard	Main Beam Separation Distance in kilometers (miles)		Grating Lobe Separation Distance in kilometers (miles)	
			Fully Populated	65 Percent Populated	Fully Populated	65 Percent Populated
Presence/Shipping	1,270 (peak)	MIL-STD-464	7.5(4.7)	4.6 (2.9)	0.2 (0.1)	0.1 (0.6)
Handling/Loading	200 (peak)	AFR-127-100	Not applicable	Not applicable	2.3 (1.4)	1.6 (1.0)

Fuels. Based upon the threshold of 5,000 mW/cm^2 from Technical Order 31Z-10-4, the SBX does not present a radiation hazard to fuels because the SBX does not emit radiation levels that exceed 5,000 mW/cm^2.

Communications–Electronics Frequency-Related Interference

Communications–Electronics In-band Radio Frequency Interference. In-band frequency interference addressed in this EIS is for the X-Band (8,000 to 12,000 MHz). In-band radio frequency interference occurs when two pieces of communications-electronics equipment are located within the same frequency band. Therefore, equipment with frequencies falling within the X-band would most likely be affected.

Communications–Electronics Adjacent Band Interference. Adjacent band radio frequency interference is similar to in-band radio frequency interference. The adjacent bands for the X-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.

Ground-based, airborne, and ship-based systems will be evaluated for in band, adjacent band, and harmonic band interference during the detailed EMR/EMI survey that is underway. Level 2 surveys are planned to be completed in Spring of 2003.

Communications–Electronics Non-frequency-related Interference

High Power Effects. Non-frequency-related interference from the SBX to the electromagnetic environment is 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 will 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. Additional modeling is underway to determine potential interference distances related to high power effects.

Aircraft/Avionics. The potential exists for EMR emissions from the main beam of the SBX 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. Since the FAA average threshold of 300 volts per meter is more conservative, it is the threshold used in this EIS. Interference distance related to aircraft is discussed in the airspace section.

The total amount of radar radiofrequency radiation would be approximately 5 to 6 hours per week during testing. The duration of radar radiofrequency radiation would decrease to 3 to 4 hours per week during actual GMD mission activities. The actual operating area of SBX at the mooring location would be restricted to minimize impacts. SBX operations would be coordinated 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.

4.9.5.3 Cumulative Impacts

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.

4.9.5.4 Mitigation Measures

Limitations imposed on the range of azimuth and angles of operation would preclude potential impacts related to health and safety. Mechanical and software stops would be used to control the radar's operation.

4.9.6 UTILITIES—SEA-BASED TEST X-BAND RADAR PRIMARY SUPPORT BASE, PORT ADAK

A project may have substantial effects on infrastructure and utilities if it increases demand in excess of utility system capacity to the point that substantial expansion would be necessary. Environmental impacts could also result from system deterioration due to improper maintenance or extension of service beyond its useful life.

4.9.6.1 No Action Alternative

Under the No Action Alternative, the GMD ETR would not be established and the SBX would not be developed to support interceptor and target launch scenarios, needed for operationally realistic test conditions. Port Adak would continue their current operations.

Energy

Daily average demand for electricity at City of Adak is 1 MW. This is 6.9 percent of the maximum capacity of the electrical service, 14.5 MW.

Water

Potable water consumption at Adak is approximately 1.1 million liters (300,000 gallons) per day. This is 30 percent of the maximum available amount of potable water, 3.8 million liters (1 million gallons) per day.

Wastewater

Recent wastewater generation at Adak amounted to approximately 1 percent of the total water flow into Kuluk Bay, or 30,283 liters (8,000 gallons) per day.

Solid Waste

Solid waste disposal at Adak is handled by landfill and burning.

4.9.6.2 Alternatives 1, 2, and 3

All of the alternatives would include SBX as one of the components of the Proposed Action. The operation of SBX would require BOA and a PSB.

Electrical power requirements for the SBX platform and its various payloads would be approximately 19.8-MW, supplied by six on-board 3.3-MW generators. The SBX would be self-propelled by four steerable 3.5-MW electric thrusters that would effectively propel and maneuver the SBX without assistance. During transportation, the thrusters would consume 14-MW, leaving 5.8-MW available for necessary ship-board operations, as well as the XBR.

The SBX has a fuel capacity of approximately 3,100,000 liters (818,000 gallons). The approximate fuel consumption for transit and radar operation is 54,800 liters (14,500 gallons) per day, which would amount to only 1.8 percent of total fuel capacity daily.

There would be a total of 50 crew members, including 20 marine crew and 30 GMD mission support personnel. Additionally, up to 50 people could be accommodated on board on a temporary daytime basis.

At the intervals between GMD test missions, the SBX would return to a PSB for crew rotations, re-supply, and maintenance activities. However, for SBX with fixed thrusters, a supply ship would deliver food, supplies, repair parts, and fuel from the PSB. While at the PSB or an adjacent mooring location, only three of the generators would be used, one operating continually while in port for daily ship functions while the remainder would power the half- or fully populated radar three hours per day.

Although the piers at Adak do not offer adequate depth to accommodate the draft of the SBX, the vessel can potentially moor at nearby Finger Bay. A re-supply vessel could be required. Personnel would be ferried to the SBX each day either by watercraft or helicopter. There would be no direct impacts to area utilities from the self-contained SBX.

Should existing facilities at Port Adak be unavailable or inadequate at the PSB to accommodate approximately 25 personnel, construction of new, environmentally controlled storage and administration facilities would be necessary. A potential location for a new warehouse would be adjacent to building 2310. Ongoing logistics and support operations such as re-supply, fueling and maintenance, and crew/operator training would also occur at the PSB.

Studies have shown an average 189 liters (50 gallons) per capita per day water consumption and 170 liters (40 gallons) per capita per day of wastewater production. Recent figures indicate that in the United States, the per capita generation of municipal solid waste in 1998 was 2 kilograms (4.46 pounds) per capita per day (U.S. Environmental Protection Agency, 2002). Average daily demand for water, wastewater, and municipal solid waste for a maximum 25 personnel would be estimated as follows, based on typical usage: 4,725 liters (1,250 gallons) water, or 0.125 percent of current capacity; 4,250 liters (1,000 gallons) wastewater, or 0.125 percent of current capacity; and 50 kilograms (112 pounds) of solid waste. Any new facilities being constructed at Port Adak would be required to facilitate this level of use, as well as to accommodate any energy demand. Utilities at Adak were originally designed for a much larger population than that currently residing in the ROI since base closure took place. Consequently, current demand levels, as opposed to capacity, remain comparatively low and utilities systems would easily be able to accommodate the increased demand from SBX-related activities.

4.9.6.3 Cumulative Impacts

At this time, there are no ongoing or foreseeable future programs/plans identified in the ROI that when combined with the relatively minor SBX utility requirements would result in cumulative impacts to utilities. Therefore, no cumulative impacts are anticipated with Alternatives 1, 2, and 3.

4.9.6.4 Mitigation Measures

No utilities mitigation measures are proposed for GMD ETR activities at Adak.

4.9.7 VISUAL AND AESTHETIC RESOURCES—SEA-BASED TEST X-BAND RADAR PRIMARY SUPPORT BASE, PORT ADAK

4.9.7.1 No Action Alternative

Under the no action alternative, the SBX radar would not be located at Adak. There would be no alteration of the existing visual setting and the adjacent area. No significant impacts to visual and aesthetic resources would occur, and no mitigation measures are proposed.

4.9.7.2 Alternatives 1, 2, and 3

Visual resources could possibly be affected by the proposed SBX radar at Adak. The radar would be approximately 76 meters (250 feet) tall and the SBX platform would be 119 meters (390 feet) long and 73 meters (238 feet) wide. Potentially the SBX radar would be located at Adak intermittently over a period of seven months per year.

The potential mooring site is located within Finger Bay which is separated from Adak by a small peninsula known as Lucky Point. This peninsula has an elevation of approximately150 meters (492 feet) which would inhibit the view of the SBX from Adak. Also, the visibility in Adak is typically limited to 1.6 kilometers (1 mile) horizontally and the potential SBX mooring site is approximately 3.7 kilometers (2.3 miles) from Port Adak. Therefore, adverse impacts to the visual and aesthetic resources of Adak are not anticipated.

4.9.7.3 Cumulative Impacts

The SBX would be moored temporarily and intermittently, therefore, cumulative impacts due to the SBX are not anticipated.

4.9.7.4 Mitigation Measures

No visual resources mitigation measures are proposed for GMD ETR activities at Adak.

4.10 PORT OF VALDEZ—SEA-BASED TEST X-BAND RADAR PRIMARY SUPPORT BASE

4.10.1 AIR QUALITY—SEA-BASED TEST X-BAND RADAR PRIMARY SUPPORT BASE, PORT OF VALDEZ

4.10.1.1 No Action Alternative

Under the No Action Alternative the GMD ETR would not be established and interceptor and target launch scenarios would not require the SBX for testing under operationally realistic conditions. Current air emission levels would remain the same, as listed in table 4.10.1-1. Operations currently conducted at the Port of Valdez would continue.

Table 4.10.1-1: Summary of Emissions of Regulated Air Pollutants in the Port of Valdez (metric tons [tons] per year)

	PM-10	Sulfur Dioxide	Carbon Monoxide	Nitrogen Dioxide	Volatile Organic Compounds
Valdez Marine Terminal	252.2 (278)	1593.9 (1,757)	124.3 (137)	1,431.5 (1,578)	3142.5 (3,464)
Adjacent Facilities[a]	27.2 (30)	116.1 (128)	NA	100.7 (111)	NA

Source: U.S. Department of the Interior, Bureau of Land Management, 2002b
a = includes the Petro Star Refinery, the City of Valdez and the Valdez Airport
NA = Not Available

4.10.1.2 Alternatives 1, 2, and 3

Construction

Construction and facility modification required to provide support to the SBX would occur in previously disturbed areas. Construction activities would be conducted in accordance with all appropriate regulations and permits. Other than minor, short-term impacts from construction, no exceedances of the NAAQS or state AAQS would be anticipated.

Operation

Operational emissions aboard the SBX would be limited to the exhaust produced by generators and maintenance. Maintenance-related emissions would include minimal levels of volatile organic compound emissions that are not expected to have a significant impact on air quality.

65 Percent and Fully Populated SBX

Based on five tests per year the SBX would be at the Port of Valdez PSB for 7 months. For conservative analysis purposes, 9 months will be used. The SBX is being analyzed as a mobile source with an expected use of 6,600 hours per year (24 hours a day for 9 months) at a single location, approximately 3.5 kilometers (2.2 miles) from Port Adak in Finger Bay. The SBX on-board power plant planned for use would include six 3.3 MW diesel driven generators. While at the PSB, only three of the generators would be used. One would operate continually while in port for daily ship functions. The other two generators would be required for powering of the 65 percent or fully populated radar for 3 hours per day. This represents 6,600 hours of operation of one 3.3 MW generator and 1,650 hours of operation for the other two generators that would be in operation at the PSB. Total power output for the three 3.3 MW generators would be 27,225 MW hours for the time the SBX is at the PSB. The SBX would not be considered a stationary source at the Port of Valdez; therefore neither a Prevention of Significant Deterioration review nor a Title V permit would be required.

The remaining three months of the year it is expected the SBX would be in transit or at one of the SBX operating areas.

4.10.1.3 Cumulative Impacts

Other emission sources within the proposed ROI include the Valdez Marine Terminal, which is the largest emission producer in the area. The TAPS owners are currently in the process of producing an EIS for a 30-year continuation of an Agreement and Grant of Right-of-Way for the Trans-Alaska Pipeline, which includes the Valdez Marine Terminal. Current analysis has determined that current and future levels of emissions at the Valdez Terminal would be within Alaska Department of Environmental Conservation operating permits. It is anticipated that the addition of emissions from the SBX in the vicinity of the Valdez Marine Terminal would not exceed NAAQS or AAQS levels.

4.10.1.4 Mitigation Measures

No air quality mitigation measures are proposed for GMD ETR activities.

4.10.2 AIRSPACE—SEA-BASED TEST X-BAND RADAR PRIMARY SUPPORT BASE, PORT OF VALDEZ

4.10.2.1 No Action Alternative

Under the No Action Alternative, the GMD ETR would not be established and interceptor and target launch scenarios would not require the SBX for testing under operationally realistic conditions.

4.10.2.2 Alternatives 1, 2, and 3

The Proposed Action related to airspace would be full power emissions from the SBX while at the mooring location south of Valdez in the Port of Valdez.

Operation

Controlled and Uncontrolled Airspace

Unrestricted operation of the SBX at the mooring location would have the potential to adversely affect air operations. In order to avoid or minimize adverse effects from EMR/EMI, DOD has established a coordination process with responsible agencies and airspace users. A full EMR/EMI survey and analysis would be conducted by the Joint Spectrum Center, in coordination with the FAA, and other potentially affected users. The survey is used in preparing a DD Form 1494 that would be required as part of the spectrum certification and frequency allocation process. The completed DD Form 1494 that has been processed and approved by the appropriate national and international authorities would be required prior to SBX testing.

The results of the survey would also be used to define the operating area for the SBX (acceptable azimuths and operating angles). The maximum operating area would be all azimuths (360 degrees), and all angles from 2 to 90 degrees. The maximum potential interference distances are listed in table 4.6.2-1 and on figure 3.10.2-1.

The actual SBX operating area at the mooring location would be restricted in order to minimize impacts to aircraft operations, EEDs, and communication equipment. A high energy radiation area notice would be published on the appropriate aeronautical charts, notifying aircraft of a radio frequency radiation area. The boundaries of the SBX high energy radiation area would be configured to minimize impacts to aircraft operations and other potentially affected systems. The establishment of this SBX high energy radiation area would not impose any new flight restriction requirements.

SBX operations would be coordinated with the FAA and would be scheduled to occur during hours of minimal aircraft operations. Coordination with the Anchorage ARTCC would occur prior to and during each test. Consequently, there would be no reduction in the amount of navigable airspace, and thus no impacts to the controlled and uncontrolled airspace in the ROI would result.

Special Use Airspace

There is no special use airspace within the ROI. Consequently, there would be no impacts to special use airspace.

En Route Airways and Jet Routes

The two en route low altitude airways (A7, V 481), one high altitude jet route (J167), and two great circle routes from North America to the Far East (NCA 13 and NCA 20), would be considered in defining the SBX operating area. There are additional approach and departure routes for the Valdez Pioneer Airport that would also need to be considered when defining the SBX high energy radiation area. The SBX would be programmed to limit RF emissions in the direction of airways that pass within the potential interference distance. In addition, since the radar beam is in constant motion, should an aircraft enter the interference area, it is highly unlikely that the SBX would illuminate an aircraft long enough to affect the on-board electronics.

Airports and Airfields

Valdez Pioneer Airport is located approximately 12 kilometers (7.5 miles) northeast of the proposed mooring location. With the restrictions placed on the SBX in a manner similar to the GBR-P radar at RTS, standard instrument approach and departure procedures at the airfield would continue unhindered. Existing airfield or airport arrival and departure traffic flows would also not be affected and access to the airfield would not be curtailed.

There are a number of air navigation facilities within the airspace ROI. However, they operate at lower frequencies (in the megahertz range) than the X-band SBX, and would not normally experience any interference from the SBX. Nevertheless, there is the potential for interference from the grating (side) lobes and the main beam. Section 4.10.5 (Health and Safety) provides a detailed discussion of the potential for electronic communications (in-band and adjacent band) and harmonic band radio frequency interference, as well as non-frequency-related interference (high power effects).

Emissions from the SBX may also potentially degrade the overall system performance of in-band airborne and ship based systems such as fire control, bomb/navigation in military aircraft, and weather radars in both civilian and military aircraft, which all operate in the X-band (8 to 12 GHz). However, the SBX high energy radiation area would be configured to minimize impacts to these airborne and ship based systems.

4.10.2.3 Cumulative Impacts

Because the SBX operates in different frequency ranges than most aircraft radars, there would be limited potential for an incremental, additive cumulative electromagnetic effect upon the operation of an air navigation facility or the signal used by aircraft. Moreover, the frequency allocation operating permit process would take into consideration potential impacts on other resources in the region and would preclude the potential for cumulative impacts. The use of the required scheduling and coordination process, and adherence to applicable DoD directives concerning radar operations would also preclude the potential for significant incremental, additive, cumulative impacts.

No other projects in the airspace ROI have been identified that would have the potential for other incremental, additive cumulative impacts to controlled or uncontrolled airspace, special use airspace, en route airways and jet routes, or airfields and airports in the ROI.

4.10.2.4 Mitigation Measures

The actual SBX operating area at the mooring location would be restricted in order to minimize impacts to aircraft operations, EEDs, and communication equipment. In addition to charting the SBX high energy radiation area notice, information would be published in the Airport Facility section of the *FAA Airport Guide*, and local NOTAMs would be issued to notify pilots of the high energy radiation area. The boundaries of the SBX high energy radiation area would be configured to minimize impacts to aircraft operations and other potentially affected systems. Additionally, flight service personnel would brief pilots flying in the vicinity about the SBX high energy radiation area.

4.10.3 BIOLOGICAL RESOURCES—SEA-BASED TEST X-BAND RADAR PRIMARY SUPPORT BASE, PORT OF VALDEZ

4.10.3.1 No Action Alternative

Under the No Action Alternative, the GMD ETR would not be established and interceptor and target launch scenarios would not require the SBX for testing under operationally realistic conditions. Operations currently conducted at the Port of Valdez would continue.

4.10.3.2 Alternatives 1, 2, and 3

Construction

Any construction or facility modification required to provide support to the SBX would occur in previously disturbed areas in accordance with host installation guidelines and regulations. Other than minor, short-term impacts from noise, such as startling and temporary displacement, no adverse effects to biological resources are anticipated.

Operation

Impacts to biological resources from operation of the SBX at the Port of Valdez would be similar to those described above in sections 4.3.3.3 and 4.6.3.2. No significant long-term adverse impacts are anticipated to Essential Fish Habitat, area seabirds and water fowl, or widely distributed, open-water species such as humpback, killer, and minke whales, sea otters, Steller sea lions, harbor seals, and Dall and harbor porpoise that occur in Prince William Sound.

4.10.3.3 Cumulative Impacts

No other projects in the ROI have been identified that would have the potential for incremental, additive cumulative impacts to biological resources in the ROI. As stated above, no effects are anticipated on whales, other marine mammals, or birds that might be present in the vicinity of the homeport and transit locations.

4.10.3.4 Mitigation Measures

No biological resources mitigation measures are proposed for GMD ETR activities at the Port of Valdez.

4.10.4 HAZARDOUS MATERIALS AND HAZARDOUS WASTE—SEA-BASED TEST X-BAND RADAR PRIMARY SUPPORT BASE, PORT OF VALDEZ

4.10.4.1 No Action Alternative

Under the No Action Alternative, the GMD ETR would not be established and interceptor and target launch scenarios would not require the SBX for testing under operationally realistic conditions. Operations currently conducted at the Port of Valdez would continue.

4.10.4.2 Alternatives 1, 2, and 3

Construction

Any construction or facility modification required to provide support to the SBX would occur in previously disturbed areas in accordance with host installation guidelines and regulations. Other than minor, short-term increase from the use of potentially hazardous materials such as paints, solvents and fuels, no adverse effects to ongoing hazardous materials storage and handling are anticipated. The small increases in the amount of potentially hazardous materials used during construction activities would result in generation of added wastes. However, this increase is not expected to be significant and would be accommodated in accordance with existing APSC protocol and applicable state and federal regulations.

Operation

Increased operations that could take place at the Port of Valdez would be servicing and maintenance of the SBX. Purchase and use of potentially hazardous materials associated with SBX operation and maintenance would be controlled within the APSC HAZCORE system. Recycling and reuse of spent and excess materials can be expected to maintain the level of hazardous material usage at or near current conditions. Routine and preventative maintenance activities associated with the SBX will result in the generation of small quantities of potentially hazardous waste. The quantity of waste generated would not change the Port's generator status. The types of waste generated are not expected to dramatically change. Wastes would be handled in accordance with TAPS Environmental Protection Manual, EN-43-2 procedures.

SBX operation is not expected to significantly impact ongoing hazardous waste management or disposal practices.

4.10.4.3 Cumulative Impacts

The use of the required scheduling and coordination process and adherence to applicable Port and APSC procedures and DoD directives concerning radar operations would preclude the potential for significant incremental, additive cumulative impact to hazardous materials and waste management practices.

4.10.4.4 Mitigation Measures

No hazardous materials/hazardous waste management mitigation measures are proposed for GMD ETR activities at the Port of Valdez.

4.10.5 HEALTH AND SAFETY—SEA-BASED TEST X-BAND RADAR PRIMARY SUPPORT BASE, PORT OF VALDEZ

4.10.5.1 No Action Alternative

Under the No Action Alternative, the GMD ETR would not be established and interceptor and target launch scenarios would not require the SBX for testing under operationally realistic conditions. Operations currently conducted at the Port of Valdez would continue.

4.10.5.2 Alternatives 1, 2, and 3

Construction

Any construction or facility modification required to support the SBX would occur in accordance with existing host installation safety protocol/plans and applicable state and federal requirements. No adverse effects to health and safety of construction contractors or the public are anticipated.

Operation

An EMR/EMI survey and analysis would be conducted by the Joint Spectrum Center that considers hazards of EMR on personnel, fuel, and ordnance. The analysis provides recommendations for sector blanking and safety systems to minimize exposures. The proposed systems would have the appropriate safety exclusion zones established before operation, and warning lights to inform personnel when the system is in operation and emitting EMR. Mechanical and software stops would be used to prevent the main beam from being directed in specified sectors where it may present a hazard.

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Radiation Hazards

Human Exposure. The analysis method used to evaluate potential effects of RF radiation is the IEEE MPEL, which defines the maximum time-averaged radio frequency 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. (IEEE C95.1-1999) General public exposure is typically limited to one-fifth of the occupational limits. For non-ionizing radiation, OSHA established (29 CFR 1910.97) a radiation protection guide for normal environmental conditions and for incident electromagnetic energy of frequencies from 10 MHz to 100 MHz. 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 HPM narrow-band and EMP broad-band simulator systems.

Computer models were used to determine the power density received on the ground over an average time of 9.5 minutes. For the fully populated radar at a distance of 150 meters (492 feet), and for the 65 percent populated radar at a distance of 85 meters (279 feet), and an average time of 9.5 minutes, the power density was calculated to be 2.5 mW/cm^2. This power density is significantly less than the 6.33 mmW/cm^2 permitted by the IEEE. The IEEE guidelines are more stringent than the EPA guidelines, based on the shorter averaging time, and are therefore used in the analysis.

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.

EEDs. The potential impacts to EEDs from emissions from the XBR are twofold: (1) the EED could be made not to work, or (2) 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. As can be seen from table 4.10.5-1, EEDs in the handling/loading phase are substantially more susceptible to EMR hazards; however, main beam illumination on the ground will not occur. It is assumed that the handling/loading of EEDs will 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 XBR to inform pilots of the potential electromagnetic interference hazard to certain aircraft.

Table 4.10.5-1: Required Separation Distances for EEDs in the Main Beam and Sidelobe of the XBR for the Presence, Shipping, and Handling/Loading Phases

EED Phase	Threshold (volts per meter)	Standard	Main Beam Separation Distance in kilometers (miles)		Grating Lobe Separation Distance in kilometers (miles)	
			Fully Populated	65 Percent Populated	Fully Populated	65 Percent Populated
Presence/Shipping	1,270 (peak)	MIL-STD-464	7.5(4.7)	4.6 (2.9)	0.2 (0.1)	0.1 (0.6)
Handling/Loading	200 (peak)	AFR-127-100	Not applicable	Not applicable	2.3 (1.4)	1.6 (1.0)

Based upon a grating lobe illumination from the fully populated SBX, a separation distance of 0.2 kilometer (0.4 mile) is recommended for EEDs in the presence/shipping phase and 2.3 kilometers (1.4 miles) in the handling/loading phase (table 4.10.5-1). The distances for the 65 percent populated SBX are also shown in table 4.10.5-1. There is no predicted potential for inadvertent initiation of vehicle airbags because the metallic body/frame of the vehicle provides sufficient shielding.

Fuels. Based upon the threshold of 5,000 mW/cm^2 from Technical Order 31Z-10-4, the SBX does not present a radiation hazard to fuels because the SBX does not emit radiation levels that exceed 5,000 mW/cm^2.

Communications–Electronics Frequency-Related Interference

Communications–Electronics In-band Radio Frequency Interference. In-band frequency interference addressed in this EIS is for the X-Band (8,000 to 12,000 MHz). In-band radio frequency interference occurs when two pieces of communications-electronics equipment are located within the same frequency band. Therefore, equipment with frequencies falling within the X-band would most likely be affected.

Communications–Electronics Adjacent Band Interference. Adjacent band radio frequency interference is similar to in-band radio frequency interference. The adjacent bands for the X-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.

Ground-based, airborne, and ship-based systems will be evaluated for in band, adjacent band, and harmonic band interference during the detailed EMR/EMI survey that is underway. Level 2 surveys are planned to be completed in Spring of 2003.

Communications–Electronics Non-frequency-related Interference

High Power Effects. Non-frequency-related interference from the SBX to the electromagnetic environment is 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 will 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. Additional modeling is underway to determine potential interference distances related to high power effects.

Aircraft/Avionics. The potential exists for EMR emissions from the main beam of the SBX 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. Since the FAA average threshold of 300 volts per meter is more conservative, it is the threshold used in this EIS. Interference distance related to aircraft is discussed in the airspace section.

The total amount of radar radiofrequency radiation would be approximately 5 to 6 hours per week during testing. The duration of radar radiofrequency radiation would decrease to 3 to 4 hours per week during actual GMD mission activities. The actual operating area of SBX at the mooring location would be restricted to minimize impacts. SBX operations would be coordinated 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.

4.10.5.3 Cumulative Impacts

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.

4.10.5.4 Mitigation Measures

Limitations imposed on the range of azimuth and angles of operation would preclude potential impacts related to health and safety. Mechanical and software stops would be used to control the radar's operation.

4.10.6 TRANSPORTATION—SEA-BASED TEST X-BAND RADAR PRIMARY SUPPORT BASE, PORT OF VALDEZ

4.10.6.1 No Action Alternative

Under the No Action Alternative, the GMD ETR would not be established and interceptor and target launch scenarios would not require the SBX for testing under operationally realistic conditions. Operations currently conducted at the Port of Valdez would continue.

4.10.6.2 Alternatives 1, 2, and 3

Construction

Any construction or facility modification required to provide support to the SBX would occur in previously disturbed areas, such as the Container Dock staging area or the "Old Town" area, in accordance with guidelines and regulations. No adverse effects to transportation resources are anticipated.

Operation

The SBX will be required to meet environmental requirements for commercial vessels.

At the Port of Valdez, the City Dock is incapable of accommodating either cruise ships or the SBX, although the City of Valdez is upgrading this dock to allow its usage by the former. At high tide, the nearby North Pacific Fuel Dock is deep enough to accommodate the SBX. At the Container Dock, pier-side operations could be carried out in areas wherein depths exceed 15.2 meters (50 feet).

Pier space would not be available year-round at the Container Dock, however, as the space would be yielded to cruise shipping during the May-September tourism season. Other activities at the container dock could also interfere with the SBX potential for utilizing it, including occasional barge use. However, there are mooring locations near the Container Dock and across the port near the terminus of the Alaska Pipeline.

A Security Area or restricted area could be required for the mooring location at Valdez and would require coordination with the U.S. Army Corps of Engineers; a secure area currently exists near the oil tanker site. A moving Security Zone could be established around the SBX when it is underway. An Alaska Department of Natural Resources permit would be required for all actions within 4.8 kilometers (3 miles) of the shoreline, including mooring sites.

Coordination with local Native American groups such as the Tatitlick would be necessary to prevent any impacts to native fishing areas, particularly during the August salmon run and during other peak fishing seasons (such as halibut). Mooring locations would also be required to avoid the area wherein two major communication cables are located.

Transit to and from Prince William sound could necessitate the use of at least two tugs for assistance. In addition, the Ship Escort and Response Vessel System provides emergency responders to escort ships in and out of the Port of Valdez.

Coordination would be required with the U.S. Coast Guard to lessen requirements for channel (Valdez Narrows) closure and preclude potential delays of oil tankers utilizing the area, as well as to establish any required security zone. Completion of a vessel response plan, to be approved by the U.S. Coast Guard, could be required.

Some 20 people would be instated at the PSB. As many as 50 personnel could leave the SBX for onshore activities. Even given a maximum, and extreme case, of 50 automobile trips per day, this level would be an approximate 0.9-percent increase over the minimum current AADT level at MP3 on Richardson Highway at Valdez of 5,540 vehicles. No impacts to area roadways are expected.

4.10.6.3 Cumulative Impacts

No other projects in the ROI have been identified that would have the potential for incremental, additive cumulative impacts to transportation resources in the ROI.

4.10.6.4 Mitigation Measures

No transportation mitigation measures are proposed for GMD ETR activities at the Port of Valdez.

4.10.7 UTILITIES—SEA-BASED TEST X-BAND RADAR PRIMARY SUPPORT BASE, PORT OF VALDEZ

4.10.7.1 No Action Alternative

Under the No Action Alternative, the GMD ETR would not be established and the SBX would not be developed to support interceptor and target launch scenarios, needed for operationally realistic test conditions. The Port of Valdez would continue its current operations.

Energy

Daily availability of electricity for Valdez via Copper Valley Electric Association is 13 MW, with 9.25 MW of backup power through its diesel station.

Water

Potable water hookups at Port of Valdez allow for demands exceeding approximately 245,185 liters (64,771 gallons).

Wastewater

Recent wastewater generation at the City of Valdez amounted to approximately 3.3 million liters (0.87 million gallons) per day. This amounts to 69.6 percent of the processing capacity of the City of Valdez Wastewater Treatment Plant over 4.73 million liters (1.25 million gallons) per day.

Solid Waste

Solid waste disposal at Port of Valdez is handled by private contractor.

4.10.7.2 Alternatives 1, 2, and 3

All of the alternatives would include SBX as one of the component of the Proposed Action. Electrical power requirements for the SBX platform and its various payloads would be approximately 19.8-MW, supplied by six on-board 3.3-MW generators. The SBX would be self-propelled by four steerable 3.5-MW electric thrusters that would effectively propel and maneuver the SBX without assistance. During transportation, the thrusters would consume 14-MW, leaving 5.8-MW available for necessary ship-board operations, as well as the XBR.

The SBX has a fuel capacity of approximately 3,100,000 liters (818,000 gallons). The approximate fuel consumption for transit and radar operation is 54,800 liters (14,500 gallons) per day, which would amount to only 1.8 percent of total fuel capacity daily.

There would be a total of 50 crew members, including 20 marine crew and 30 GMD mission support personnel. Additionally, up to 50 people could be accommodated on board on a temporary daytime basis.

At the intervals between GMD test missions, the SBX would return to a PSB for crew rotations, re-supply, and maintenance activities. However, for SBX with fixed thrusters, a supply ship would deliver food, supplies, repair parts, and fuel from the PSB. While at the PSB or an adjacent mooring location, only three of the generators would be used, one operating continually while in port for daily ship functions while the remainder would power the half- or fully populated radar three hours per day.

Valdez can not commit to year-round pier-space year for the SBX, but allows for numerous mooring locations near the container dock which would suffice for project operations. Thus a re-supply vessel would probably not be required. Power hookups, if needed, would have to be constructed, as there are no hookups currently available at the docks. The power plant serving Valdez is well below capacity and could allow for the limited demands of the otherwise self-contained SBX. Potable water levels at the port are capable of sustaining large cruise ships and would accommodate the SBX demands. Wastewater and solid waste needs would be handled by existing services, which charge on a per truck (wastewater) and per dumpster (solid waste) basis. Such services would be considered routine and would pose no impacts to the port infrastructure; construction of power hookups would actually be a positive impact.

A new environmentally controlled warehouse would potentially be required for SBX operations to accommodate a maximum 25 personnel. Ongoing logistics and support operations such as re-supply, fueling/maintenance, and crew/operator training would also occur at the PSB.

Studies have shown an average 189 liters (50 gallons) per capita per day water consumption and 170 liters (40 gallons) per capita per day of wastewater production. Recent figures indicate that in the United States, the per capita generation of municipal solid waste in 1998 was 2 kilograms (4.46 pounds) per capita per day (U.S. Environmental Protection Agency, 2002). Average daily demand for water, wastewater, and municipal solid waste for a maximum 25 personnel would be estimated as follows, based on typical usage: 4,725 liters (1,250 gallons) water; 4,250 liters (1,000 gallons) wastewater and 50 kilograms (112 pounds) of solid waste. Any new facilities being constructed would be required to facilitate this level of use, as well as to accommodate any energy demand.

4.10.7.3 Cumulative Impacts

At this time, there are no ongoing or foreseeable future programs/plans identified in the region of influence that when combined with the relatively minor SBX utility requirements would result in cumulative impacts to utilities. Therefore, no cumulative impacts are anticipated with Alternatives 1, 2, and 3.

4.10.7.4 Mitigation Measures

No significant impacts would be anticipated with Alternatives 1, 2, and 3; therefore, no mitigation measures would be required or proposed.

4.10.8 VISUAL AND AESTHETIC RESOURCES—SEA-BASED TEST X-BAND RADAR PRIMARY SUPPORT BASE, PORT OF VALDEZ

4.10.8.1 No Action Alternative

Under the No Action Alternative, the SBX would not be located at Valdez. There would be no alteration of the existing visual setting and the adjacent area. No significant impacts to visual and aesthetic resources would occur, and no mitigation measures are proposed.

4.10.8.2 Alternatives 1, 2, and 3

Visual resources could possibly be affected by the proposed SBX at Valdez. The SBX would be approximately 76 meters (250 feet) tall and the SBX platform would be 119 meters (390 feet) long and 73 meters (238 feet) wide. The SBX would be located at Valdez intermittently for approximately 7 months per year. The remaining five months of the year it is expected the SBX would be in transit or at one of the SBX operating areas.

The size of a midsize oil tanker is approximately 305 meters (1,000 feet) long and 61 meters (200 feet) wide. This is very comparable to the SBX. Because Valdez is the site of the terminus of the Trans-Alaska Pipeline, numerous oil tankers are consistently entering Prince William Sound. Therefore, the impacts to the visual resources of Valdez and Prince William Sound are expected to be minimal and adverse impacts are not anticipated.

4.10.8.3 Cumulative Impacts

The SBX would be moored temporarily and intermittently; therefore, cumulative impacts due to the SBX are not anticipated.

4.10.8.4 Mitigation Measures

No visual resources mitigation measures are proposed for GMD ETR activities at the Port of Valdez.

4.11 BROAD OCEAN AREA

This section describes the potential impacts within the BOA that may occur as a result of the GMD ETR activities. The BOA includes those areas that are outside the U.S. territorial waters, and as such this section of the document complies with Executive Order 12114, Environmental Effects Abroad of Major Federal Activities. The information contained in this section is summarized from the *Theater Missile Defense Extended Test Range Supplemental Environmental Impact Statement* (U.S. Department of the Air Force, 1998), *PMRF Enhanced Capability Environmental Impact Statement* (Pacific Missile Range Facility, Barking Sands, 1998), *North Pacific Targets Program Environmental Assessment* (U.S. Army Space and Missile Defense Command, 2001b), and from the *Development and Demonstration of the Long Range Air-Launch Target Environmental Assessment* (U.S. Department of Defense, 2002). These documents included environmental analysis of potential impacts from missile launches and other military actions in the Gulf of Mexico and the Central and North Pacific. As appropriate, additional information used to develop this section is referenced accordingly.

Airspace, biological resources, health and safety, and transportation were identified as resource areas with potential impacts in the BOA. Water quality and noise are included in the analysis, from the standpoint of potential impacts on marine life.

With the BOA being the ROI, there is no potential for impacts to cultural resources, land use, soils, and groundwater. Similarly, since the BOA is well removed from islands and population centers, no impacts to the human noise environment, socioeconomics, and utilities, are anticipated. Impacts to air quality from similar missiles have been determined to be insignificant.

4.11.1 AIRSPACE—BROAD OCEAN AREA

4.11.1.1 Gulf of Mexico

No Action Alternative

Under the No Action Alternative, the SBX would not be developed and the proposed SBX test activities in the Gulf of Mexico would not take place.

Proposed Action

The Gulf of Mexico ROI is defined as the overwater area that would be potentially affected by the Proposed Action using portions of the international airspace over the Gulf of Mexico. This includes the entire northern Gulf of Mexico within the Houston, Jacksonville, and Miami ARTCCs, and the Houston and Miami Oceanic CTA/FIR. The Proposed Action in the Gulf of Mexico would include sea trials of the SBX platform and full power testing of the SBX radar. The location of testing has not been determined, however full power radar testing would be conducted in areas that would minimize impacts to airspace.

A full EMR/EMI survey and analysis would be conducted by the Joint Spectrum Center, in coordination with the FAA, Department of Transportation, and other potentially affected users. The survey is used in preparing a DD Form 1494 that would be required as part of the spectrum certification and frequency allocation process. The completed DD Form 1494 that has been processed and approved by the appropriate national and international authorities would be required prior to SBX testing.

The results of the survey would also be used to define the operating area for the SBX (acceptable azimuths and operating angles). The maximum operating area would be all azimuths (360 degrees), and all angles from 2 to 90 degrees. The maximum potential interference distances are listed in table 4.6.2-1.

Special Use Airspace

Full power radar testing would be planned to take place within existing special use airspace such as warning areas, and under conditions controlled to eliminate hazards to non-participating aircraft. Coordination with the FAA would be required before testing.

En Route Airways and Jet Routes

Full power radar testing would be planned to take place in an area that would minimize potential impacts to en route airways and jet routes. The specific testing location would be coordinated with the FAA to avoid en route airways and jet routes. By avoiding these routes the proposed activities would not require a change to: an existing or planned IFR minimum flight altitude, a published or special instrument procedure, or an IFR departure procedure; or, require a change to a VFR operation from a regular flight course or altitude. The SBX would be programmed to limit RF emissions in the direction of airways that pass within the potential interference distance. In addition, since the radar beam is in constant motion, should an aircraft enter the interference area, it is highly unlikely that the SBX would illuminate an aircraft long enough to affect the on-board electronics. Consequently, no impacts to the surrounding low altitude airways or high altitude jet routes would occur from the SBX testing.

4.11.1.2 En Route Gulf of Mexico to Pacific Ocean

No Action Alternative

Under the No Action Alternative, the GMD ETR would not be developed and the proposed transit of the SBX from the Gulf of Mexico to the Pacific Ocean would not take place.

Proposed Action

The en route ROI is defined as the over water area that would be potentially affected by the Proposed Action using portions of the international airspace along the route from the Gulf of Mexico to the Pacific Ocean. The Proposed Action would include transit and testing of the SBX to include full power testing of the SBX radar. The location of testing has not been determined, however full power radar testing would be conducted in areas that would minimize impacts to airspace.

As described in the previous section, an EMR/EMI survey and analysis and DD Form 1494 would be required as part of the spectrum certification and frequency allocation process. A completed DD Form 1494, that has been processed and approved by the appropriate national and international authorities, would be required before SBX testing.

Potential impacts to en route airways and special use airspace would be minimal and similar to those described for the Gulf of Mexico.

4.11.1.3 Pacific Ocean

No Action Alternative

Under the No Action alternative, the GMD ETR would not be developed and the proposed full range of GMD flight test activities in the Pacific BOA would not take place. Ongoing missile flight test activities would continue to use the existing special use airspace and other areas in the Pacific BOA. The continuing activities would not conflict with any airspace use plans, policies, and controls.

Proposed Action

The Pacific BOA ROI is defined as the overwater area that would be potentially affected by the Proposed Action using portions of the international airspace over the Pacific Ocean. This includes the entire northern Pacific BOA within the Oakland and Anchorage ARTCCs Oceanic CTA/FIR. The Proposed Action in the Pacific BOA 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 impacts that would be essentially the same as the ground launched missiles.

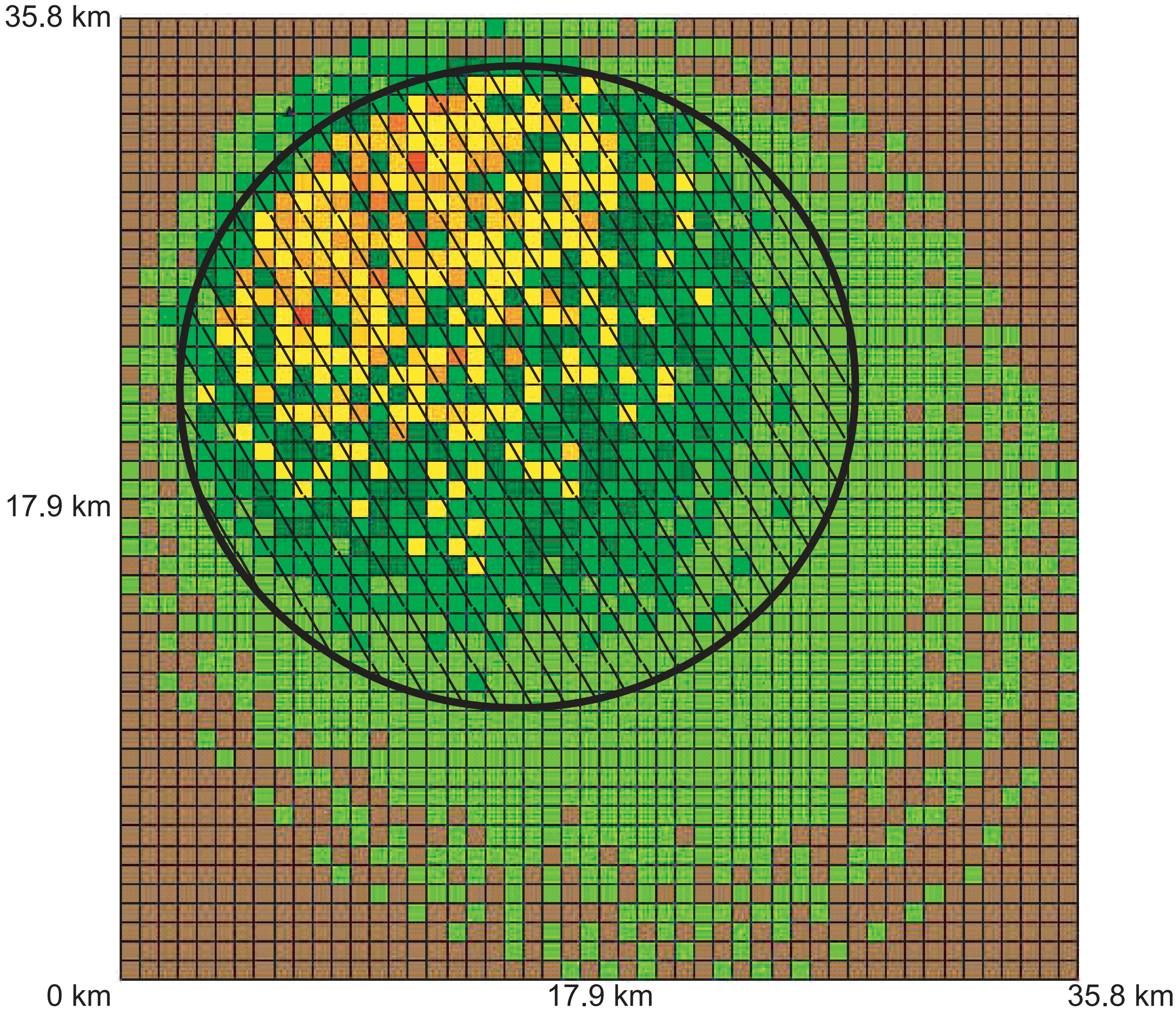
The Proposed Action would also include transit of the SBX from a PSB to the appropriate SBX performance region, SBX operations within the performance region in support of GMD flight tests, and transit back to a PSB.

Controlled and Uncontrolled Airspace

The airspace in the ROI outside territorial limits lies in international airspace and, consequently, is not part of the NAS. Because the area is in international airspace, the procedures of ICAO, outlined in ICAO Document 444, *Rules of the Air and Air Traffic Services*, are followed. ICAO Document 444 is the equivalent air traffic control manual to FAA Handbook 7110.65, *Air Traffic Control*. The FAA acts as the U.S. agent for aeronautical information to the ICAO, and air traffic in the over-water ROI is managed by the Honolulu, Oakland, and Anchorage ARTCCs.

After launch, typically the GBI and target missiles would be above 18,290 meters (60,000 feet) within seconds of launch. As such, all other local flight activities would occur at sufficient distance and altitude that the target missile and GBI missiles would be little noticed. However, activation of stationary ALTRV procedures, where the FAA provides separation between non-participating aircraft and the missile flight test activities, 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 most of the intercept debris areas is not heavily used by commercial aircraft, and is far removed from the en route airways and jet routes crossing the North Pacific, the impacts to controlled/ uncontrolled airspace would be minimal.

However, the intercept scenarios with targets from KLC and GBIs from Vandenberg AFB (figure 2.1.8-3) may have moderate impacts to airspace due to the potential impacts from intercept debris. It has been determined that intercept debris as small as 1 gram could cause significant damage to a commercial aircraft traveling at cruising speed and altitude. The probability of fatality for a 737 aircraft flying through a target missile debris cloud is depicted in figure 4.11.1-1. The figure shows the debris cloud is approximately 35 kilometers (22 miles) in diameter, and the area



Source: 3D Research Corporation, 2001a (modified).

EXPLANATION

- 1.014×10^{-8}
- 7.411×10^{-5}
- 1.482×10^{-4}
- 2.223×10^{-4}
- 2.964×10^{-4}
- 3.705×10^{-4}
- 4.446×10^{-4}
- 5.187×10^{-4}
- 5.928×10^{-4}
- 6.669×10^{-4}
- 7.41×10^{-4}
- 8.151×10^{-4}
- 8.892×10^{-4}
- 9.633×10^{-4}

Risk less than 1.0×10^{-20}

Probability of Fatality Greater Than One in One Million. (Risk Exceeds Guidelines)

Note: Overhead View 30,000 feet Altitude Commercial Airspace

NORTH

Scale
0 3.35 6.7 kilometer
0 2.1 4.2 miles

Probability of Fatality Per Cell for 737 (Model Representative Output)

Figure 4.11.1-1

12-20-02 Fatality Prob

where the probability of fatality is greater than one in one million is approximately 22 kilometers (13.6 miles) in diameter. This area of higher risk would need to be avoided by all aircraft. The time for the intercept debris to pass through commercial airspace cruising altitudes is approximately 3 hours after the intercept. All en route airways and jet routes that are predicted to pass through the target missile or GBI missile intercept debris areas would need to be identified before a test to allow sufficient coordination with the FAA to determine if the aircraft on those routes would be affected and if so if they would need to be re-routed or rescheduled.

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 sea-launch platform. Such a restricted area would marginally reduce the amount of navigable airspace in the BOA 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 North Pacific, the impacts to controlled and uncontrolled airspace would be minimal.

As described in the section 4.11.1.1, an EMR/EMI survey and analysis and DD Form 1494 would be required as part of the spectrum certification and frequency allocation process. A completed DD Form 1494, that has been processed and approved by the appropriate national and international authorities, would be required prior to SBX operations in the Pacific Ocean. The spectrum certification process would identify coordination requirements that would be followed by the SBX for all operations.

Special Use Airspace

GMD ETR missile intercepts and intercept debris would generally occur outside special use airspace areas. As such, the Proposed Action would not represent a direct special use airspace impact. Similarly, the use of ALTRV procedures as authorized by the Central Altitude Reservation Function, an air traffic service facility, or appropriate ARTCC (in this case the Oakland ARTCC) for airspace utilization under prescribed conditions 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 as may be authorized by FAA approval procedures.

The primary responsible test range would coordinate with the Oakland ARTCC military operations specialist assigned to handle such matters and the airspace coordinator at the Honolulu Center or other appropriate Radar Approach Center using ALTRV request procedures. After receiving the proper information on each test flight, a hazard pattern would be constructed and superimposed on a chart depicting the area of operations. Ensuring that the hazard pattern would not encroach any land mass, this area is then plotted using minimum points (latitude-longitude) to form a rectangular area. This plotted area is then faxed to the military operations specialist at Oakland ARTCC requesting airspace with the following information: area point (latitude-longitude); date and time for primary and backup (month, day, year, zulu time); and, altitude. A copy would be sent to the Honolulu Center or other appropriate Radar Approach Center. A follow-up phone call would be made after 48 hours to verify receipt of the fax. When approval of the request of the airspace is received from the military operations specialist at Oakland ARTCC, the primary responsible test range would submit an ALTRV request to Central Altitude Reservation Function who publishes the ALTRV 72 hours before the flight test.

Full power radar testing would generally not take place within existing special use airspace such as warning areas. However, operations would be conducted in coordination with the FAA to minimize potential hazard to non-participating aircraft.

En Route Airways and Jet Routes

The numerous airways and jet routes that crisscross the Pacific BOA airspace use ROI have the potential to be affected by the Proposed Action. However, target and GBI missile launches and missile intercepts would be conducted 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" (DoD Directive 4540.1, E5, 1981).

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

In addition to the reasons cited above, minimal adverse impacts to the en route airways and jet routes are identified because of the required coordination with the FAA. Schedules are provided to the appropriate FAA facility (Honolulu, Anchorage, and Oakland ARTCCs) 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.

The FAA ARTCCs are responsible for air traffic flow control or management to transition air traffic. The ARTCCs provide separation services to aircraft operating on IFR 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 by using ALTRV procedures, non-participating traffic are advised or separated accordingly, thus avoiding substantial adverse impacts to the low altitude airways and high altitude jet routes in the ROI.

If a 3.7-kilometer (2-nautical-mile) radius temporary Warning Area, extending from the surface to 18,200 meters (60,000 feet) mean sea level is proposed over the sea-launch platform, it would not have an impact on the en route airways and jet routes in Pacific BOA. The sea-launch platform would be positioned to avoid the en route airways and jet routes that cross the North Pacific.

SBX operating areas include several air routes as shown on figure 4.11.1-2. As described in section 4.11.1.1, an EMR/EMI survey and analysis and DD Form 1494 would be required as part of the spectrum certification and frequency allocation process. A completed DD Form 1494, that has been processed and approved by the appropriate national and international authorities, would be required prior to SBX operations in the Pacific Ocean. The spectrum certification process would identify coordination requirements that would be followed by the SBX for all operations. The SBX would generally be able to operate from a location within the SBX performance region that does not interfere with the air routes that cross the region. The specific testing location would be coordinated with the FAA to avoid en route airways and jet routes. If the SBX were to operate in an air route location, non participating aircraft could be routed around the SBX operating area. Such a diversion would generally be less than 20 kilometers (12.4 miles), a minor distance for the routes being flown.

Cumulative Impacts

GMD testing would request clearance of various areas of airspace, and may cause rerouting or rescheduling of flights, for periods of as much as 3 to 4 hours, five times a year. This could result in as much as 20 hours of direct effect on air traffic access per year. However, most impacts would be in remote areas that would have little effect on air traffic. Other missile test programs could also have similar, minor impacts in the same areas.

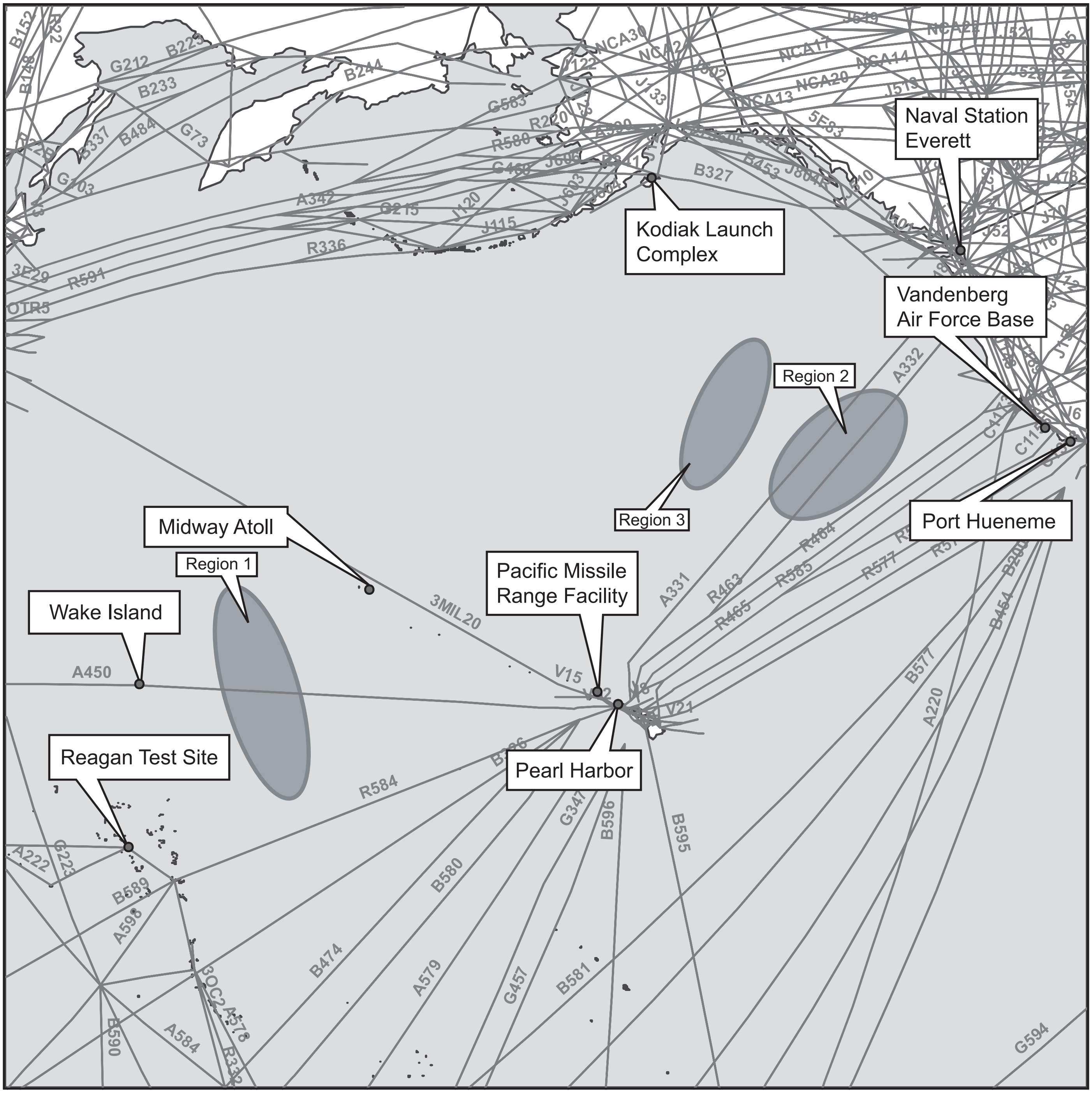
Therefore, GMD flight tests with intercepts in the vicinity of en route airways and jet routes, when combined with other missile test programs, could lead to cumulative impacts to airspace in the form of flight delays. The required scheduling process for the use of airspace would help to minimize these potential adverse cumulative impacts.

Mitigations Considered

Coordination with the FAA, scheduling GMD flight tests during hours of low aircraft traffic, and the implementation of positive air traffic control are the primary practices employed to avoid impacts to airspace. Therefore additional airspace mitigation measures are not proposed for GMD ETR activities in the BOA.

4.11.2 BIOLOGICAL RESOURCES—BROAD OCEAN AREA

Potential impacts of construction, building modification, and missile launches on terrestrial and marine biological resources within the Gulf of Mexico and open ocean ROI were addressed in detail in the *Theater Missile Defense ETR Supplemental EIS-Eglin Gulf Test Range* (U.S. Department of the Air Force, 1998), *PMRF Enhanced Capability EIS* (Pacific Missile Range Facility, Barking Sands, 1998), *USAKA EIS* (U.S. Army Strategic Defense Command, 1989), *USAKA Supplemental EIS* (U.S. Army Space and Strategic Defense Command, 1993a), *Theater Missile Defense Extended Test Range EIS* (U.S. Army Space and Strategic Defense Command, 1994), and *Kwajalein Atoll Temporary ETR EA* (U.S. Army Space and Strategic Defense Command, 1995). The finding of these studies are incorporated by reference and summarized in the following sections. Based on the prior analysis done and the effects of past interceptor and target launch activities, the potential impacts of activities related to missile test flights on biological resources are expected to be minimal, as discussed below. Dual GBI and target missile launches could potentially occur. Impacts from these dual launches would in some cases be slightly greater than, but similar, to those analyzed below for single launches.



EXPLANATION

Air Routes High Altitude

SBX Performance Regions

High Altitude Air Routes With Potential SBX Performance Regions

Pacific Ocean

Figure 4.11.1-2

Scale
0 571 1,142 kilometers
0 355 710 miles

NORTH

12-20-02 Air Routes SBX

4.11.2.1 Gulf of Mexico

As described in section 4.6.3.2, in terms of the potential for EMR impacts to wildlife, the power densities emitted from the SBX radar are unlikely to cause any biological effects in marine animals or birds.

4.11.2.2 En Route Gulf of Mexico to Pacific Ocean

Existing shipping routes would be used along the coast of South America to move the SBX from the Gulf of Mexico to the Pacific Ocean. The potential for impacts to marine mammals due to an accidental release of diesel fuel is considered low. There is evidence that dolphins can identify the presence of diesel fuel and lubricating oil and avoid it (U.S. Department of the Navy, 2001). The relatively slow speed of the SBX platform would preclude the potential for collision with a free-swimming marine mammal. Overall, no adverse impacts to marine mammals or other biological resources are anticipated.

4.11.2.3 Pacific Ocean

The proposed flight test operations 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 for both PMRF and RTS. 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 potential for impacts exists from the GBI and target missile booster's fall to the ocean surface and from the target payload fall 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 or direct contact, ingestion of toxic solutions generated from the unburned propellant mixed with seawater, and ingestion of pieces of unburned propellant. The potential effects to marine biological resources from installation and operation of the SBX would be similar to those described in section 4.6.3.2.

Hazardous Materials Deposition

The National Aeronautics and Space Administration conducted a thorough 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. 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 immediately 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, 2002). 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 contaminant 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, 2000) 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. The results are presented in the KLC Water Resources section, table 4.1.14-2. As shown in the table, 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. (U.S. Department of the Navy, 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 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 after the event. (U.S. Department of the Navy, 1998)

No solid propellant would remain in the spent Long-Range Air Launched Target 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 or ingests the toxic solutions. (U.S. Department of the Air Force, 2002)

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. (U.S. Department of the Navy, 1998)

Debris

Debris impact and booster drops in the BOA could occur within the 322-kilometer (200-mile) limit of the Exclusive Economic Zone of affected islands. 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 Point Mugu Sea Range EIS, 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. The range area at Point Mugu is smaller (93,200 square kilometers [27,183 square nautical miles]) than the PMRF range area (144,000 square kilometers [42,000 square nautical miles]), and the density of marine mammals at Point Mugu is larger than the density found at PMRF. It is reasonable to conclude that the probability of a marine mammal being injured or killed by missile or debris impact from U.S. Navy testing at PMRF is even more remote than at Point Mugu, since the area at PMRF is larger and the density of marine mammals is smaller. Following formal consultation, the National Marine Fisheries Service concluded that the Proposed Action is not likely to adversely affect any marine mammal species. (U.S. Department of the Navy, 1998)

The splashdown of the first- and second-stage target missile boosters and defensive 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. (U.S. Department of the Navy, 1998)

Following the Long-Range 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, 2002)

The eight parachutes used to extract and prepare the Long-Range 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, 2002)

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 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. 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 one or two 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 I micropascal are repeated. (Department of the Navy, Naval Air Warfare Center Weapons Division, 2002)

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 BOA. 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 will attenuate in deep water at a rate much lower (slower) than those predicted by Sawyers theory for a flat (non-wavy) ocean, and will 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 (Space and Missile Systems Center, Environmental Management Branch, 2002).

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, 2001b)

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.

4.11.2.4 Cumulative Impacts

No substantial impacts to the Gulf of Mexico or 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. GMD ETR-related tests would be discrete, short-term events and no adverse cumulative impacts are anticipated.

4.11.2.5 Mitigation Measures

No biological resources mitigation measures are proposed for GMD ETR activities conducted in the Gulf of Mexico or the open ocean area. These activities would adhere to the terms and conditions imposed by the National Marine Fisheries Service on missile launches.

4.11.3 HEALTH AND SAFETY—BROAD OCEAN AREA

4.11.3.1 Gulf of Mexico

No Action Alternative

Under the No Action Alternative, the GMD ETR would not be developed and the proposed test activities in the Gulf of Mexico would not occur.

Proposed Action

The Gulf of Mexico ROI is defined as the overwater area that would be potentially affected by the initial sea trials of the SBX platform and full power testing of the SBX radar. The sea trials are designed to ensure maneuverability and control of the vessel. The total amount of radar radiofrequency radiation would be approximately 5 to 6 hours per week during testing. The location of the testing has not been determined; however, it would be conducted in areas that would minimize impacts to aircraft and marine vessels. SBX 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 surface vessels of the testing. Therefore, no health and safety impacts to airspace/aircraft or mariners are anticipated.

As described in section 4.11.1.1, an EMR/EMI survey and analysis and DD Form 1494 would be required as part of the spectrum certification and frequency allocation process. A completed DD Form 1494 that has been processed and approved by the appropriate national and international authorities, would be required before SBX testing. No impact to health and safety is expected.

4.11.3.2 Enroute from Gulf of Mexico to Pacific Ocean

No Action Alternative

Under the No Action Alternative, the GMD ETR would not be developed and the proposed test activities en route from the Gulf of Mexico to the Pacific Ocean would not occur.

Proposed Action

The SBX would use existing shipping routes along the coast of South America to get from the Gulf of Mexico to the Pacific Ocean. Full power testing of the SBX radar would occur during this transit period. The total amount of radar radiofrequency radiation would be approximately 5 to 6 hours per week during testing. The location of the testing has not been determined; however, it would be conducted in areas that would minimize impacts to aircraft and marine vessels. SBX 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 the testing. Therefore, no health and safety impacts to airspace/aircraft or mariners are anticipated.

As described in section 4.11.1.1, an EMR/EMI survey and analysis and DD Form 1494 would be required as part of the spectrum certification and frequency allocation process. A completed DD

Form 1494, that has been processed and approved by the appropriate national and international authorities, would be required before SBX testing.

4.11.3.3 Pacific Ocean

No Action Alternative

Under the No Action alternative, the GMD ETR would not be developed and the proposed full range of GMD flight test activities in the Pacific BOA would not take place. Ongoing missile flight test activities would continue to use the existing special use airspace and other areas in the Pacific BOA. The continuing activities would not conflict with any commercial shipping lanes or airspace use plans, policies, and controls.

Proposed Action

The Proposed Action in the Pacific BOA 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. The Proposed Action would also include transit of the SBX from a PSB to the appropriate SBX performance region, SBX operations within the performance region in support of GMD flight tests, and transit back to a PSB.

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. GMD ETR activities have the potential for intercept and target debris impacts to waters normally occupied by commercial shipping. The majority of international trade crossing the Pacific between Asia and North America uses routes of least-distance, usually via the Great Circle. Depending upon the individual scenarios, the actual debris impact area would be small.

SBX 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 the radar testing/operation. SBX tests would be conducted in areas that would minimize impacts to marine transportation. The SBX would generally be able to operate from a location that does not interfere with the air routes crossing the region. If the SBX were to operate in an air route location, non-participating aircraft could be routed around the SBX operating area. Continued monitoring of testing areas for other marine vessels would take place to ensure such areas remain clear.

As described in the section 4.11.1.1, an EMR/EMI survey and analysis and DD Form 1494 would be required as part of the spectrum certification and frequency allocation process. A completed DD Form 1494, that has been processed and approved by the appropriate national and international authorities, would be required prior to SBX operations in the Pacific Ocean. The spectrum certification process would identify coordination requirements that would be followed by the SBX for all operations.

4.11.3.4 Cumulative Impacts

The Proposed Action would result in up to five launches (target and GBI combined) per year. 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 and SBX test is a discreet short term event, no population centers would be in the affected areas and the Proposed Action would require the administration of NOTAMs and NOTMARs to warn aircraft and surface vessels of the potentially hazardous areas and allow them ample time to avoid hazards. Other missile test programs that could potentially affect the same area as the GMD ETR would also be short term events and would not occur at the same time as the GMD ETR tests. Therefore, the potential for additive, incremental cumulative impacts from debris hazards or electromagnetic radiation exposure is extremely limited.

4.11.3.5 Mitigation Measures

Coordination between range personnel and with the FAA, Coast Guard, and other groups or agencies, as well as issuance of NOTMARs and NOTAMs, would be routine part of the Proposed Action. Additional health and safety mitigation measures are not proposed for GMD ETR activities.

4.11.4 TRANSPORTATION—BROAD OCEAN AREA

4.11.4.1 Gulf of Mexico

The initial sea trials would take place in the Gulf of Mexico, and are designed to ensure maneuverability and control of the vessel. Since these tests may be run in parallel with the payload installation and checkout tests, mass simulators may be used to represent uninstalled portions during the stability and control evaluations. The emphasis would be on identifying and correcting problem operating conditions, such as vibrations that result from the installation of diesel and electric generators above the main deck or the vessel’s electric thrusters. These activities would not affect commercial shipping routes.

4.11.4.2 Enroute from Gulf of Mexico to Pacific Ocean

The SBX would use existing shipping routes along the coast of South America to get from the Gulf of Mexico to the Pacific Ocean. During this transit period, periodic testing of the SBX at predetermined locations would occur. Appropriate NOTMARs and NOTAMs would be issued to warn aircraft and surface vessels of the testing.

4.11.4.3 Pacific Ocean

GMD ETR activities have the potential for intercept and target debris impacts to waters normally occupied by commercial shipping. The majority of international trade crossing the Pacific between Asia and North America uses routes of least-distance, usually via the great circle. Depending upon the individual scenarios, the actual debris impact area would be small.

Prior warning of GMD ETR activities would enable commercial shipping to follow alternative routes away from the test area. The process is simplified by the lack of any formal shipping lanes in the northern Pacific. Safety procedures would be employed to determine that the impact areas are clear of surface vessels to ensure that no impact to ocean transportation would occur.

During the transit period into and through the Pacific Ocean area, periodic testing by the SBX (satellite and calibration device tracking) at predetermined locations would occur. Appropriate

NOTMARs and NOTAMs would be issued to warn aircraft and surface vessels of the testing, and those tests would be conducted in areas that would minimize impacts to marine transportation. The SBX would generally be able to operate from a location within the SBX performance region that does not interfere with the air routes crossing the region. If the SBX were to operate in an air route location, non-participating aircraft could be routed around the SBX operating area. Continued monitoring of testing areas for other marine vessels would take place to ensure such areas remain cleared. As mentioned previously, a completed DD Form 1494 would be required prior to SBX operations in the Pacific Ocean, and would assist in defining the operating area for the SBX.

4.11.4.4 Cumulative Impacts

Cumulative impacts would be minimized through early notification of aircraft and surface vessels through NOTMARs and NOTAMs, allowing commercial shipping to find alternative routes if necessary.

4.11.4.5 Mitigation Measures

Coordination between range personnel and with the FAA, Coast Guard, and other groups or agencies, as well as the aforementioned issuance of NOTMARs and NOTAMs, would be a routine part of the Proposed Action. No additional transportation mitigation measures are proposed.

4.12 CONFLICTS WITH FEDERAL, STATE, AND LOCAL LAND USE PLANS, POLICIES, AND CONTROLS FOR THE AREA CONCERNED

The proposed program activities at KLC, Midway, RTS, PMRF, Vandenberg AFB, Pearl Harbor, NBVC Port Hueneme/San Nicolas Island, Naval Station Everett, Port Adak, and the Port of Valdez would be consistent with the existing land use. The proposed activities would not alter the use of the sites that currently support missile and rocket testing. Development of the SBX PSB would be in accordance with federal, state, and local planning plans and policies. All activities at RTS would comply with federal laws and regulations, the UES, the Compact of Free Association between the Republic of the Marshall Islands and the United States, and with regional and local land uses, policies, and regulation agreements. PMRF maintains federal jurisdiction for on-base land use; therefore, state and local land use laws are preempted.

Any potential conflicts with land use plans, policies, and controls would be a primary focus of agreements that would be negotiated with all affected federal, state, regional, and local agencies as applicable before implementation of the Proposed Action. Any closure of state recreational areas would be short-term, episodic events.

4.13 ENERGY REQUIREMENTS AND CONSERVATION POTENTIAL

Anticipated energy requirements of the GMD ETR program 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. No additional power generation capacity other than the potential use of generators would be required for any of the GMD ETR activities.

4.14 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.

4.15 ADVERSE ENVIRONMENTAL EFFECTS THAT CANNOT BE AVOIDED

In general, most known adverse effects resulting from implementation of the GMD ETR program would be mitigated through project planning and design measures, consultation with appropriate agencies, and the use of Best Management Practices. As a result, most potential adverse effects would be avoided, and those that could not be avoided should not result in a significant impact to the environment.

Adverse environmental effects that cannot be avoided include removal of vegetation at the proposed construction sites; minor short-term noise impacts to and startling of wildlife; the release of small amounts of pollutants into the atmosphere, the ground, and ocean; and minor increased generation of hazardous materials at program-related sites. Consultation with the appropriate agency would assist in developing mitigation measures to minimize the potential impacts to wetlands. Some short-term program-related impacts to air quality, soils, and water resources may occur. Any hazardous waste generated would be managed in compliance with DoD, and other applicable federal, state, and local regulations.

EMR levels would not exceed safety guidance and would not affect the public. During the construction phase there would be temporary disturbance to the immediate area around new fiber optic cable line routes; however, once the cable is installed, there would be no long-term impacts.

4.16 RELATIONSHIP BETWEEN SHORT-TERM USE OF THE HUMAN ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Proposed GMD ETR activities would take advantage of existing facilities and infrastructure to the extent practicable. The use of land on Midway for an IDT and COMSATCOM would not eliminate options for continued and future use of the island. The uses of the sites at locations which were, or are, to support missile and rocket launches, would not be altered. Therefore, the Proposed Action does not eliminate any options for future use of the environment for the locations under consideration.

4.17 IRREVERSIBLE OR IRRETRIEVABLE COMMITMENT OF RESOURCES

The Proposed Action is not expected to result in the loss of threatened or endangered species and no loss of cultural resources, such as archaeological or historic sites. There would be the use of irretrievable resources (e.g., construction materials, fuel, and labor). There would be some minor loss of biological habitat and wetlands, but impacts would be minimized through the implementation of mitigation measures. Sensitive biological habitat would be avoided to the maximum extent practicable. Proposed activities would not irreversibly curtail the range of potential uses of the environment. Moreover, there would be no preclusion of development of underground mineral resources that were not already constrained.

Although the proposed activities would result in some irreversible or irretrievable commitment of resources such as various construction materials, 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.

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

This EIS 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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