3.0 - 4.0 Affected Environment, Environmental Impacts, and Mitigations

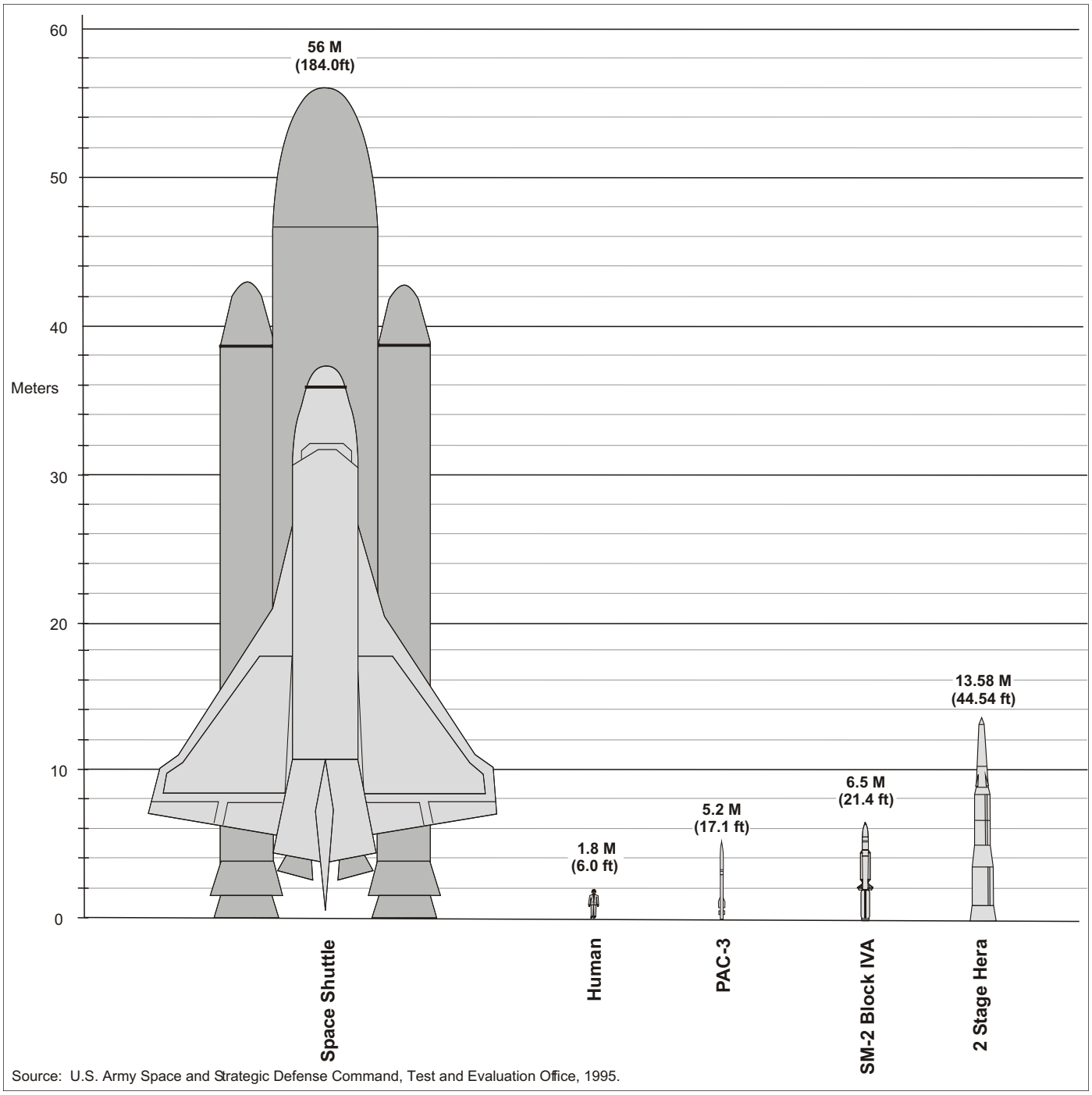
3.0 – 4.0 AFFECTED ENVIRONMENT, ENVIRONMENTAL IMPACTS, AND MITIGATIONS

NEPA and its implementing regulations require that for major Federal actions significantly affecting the human environment, the proponent of the action prepare an EIS describing the proposal and its effects on the environment. This requirement applies to Federal actions occurring in or affecting U.S. territory. EO 12114 requires that for similar actions and effects occurring outside the territorial limits of the United States, within the global commons, the proponent prepare an EIS describing its effects on the environment of the global commons. While the EO does not require exactly the same procedure and formality as NEPA, the substantive analysis required is comparable. In the interest of brevity and efficiency, this document will not identify each instance in which the analysis is conducted pursuant to NEPA or in which it is conducted pursuant to the EO. Rather, it will simply identify the action and its impacts and the location of each. The SEIS is being prepared using the procedures applicable to NEPA, including the required public notices and involvement within the United States.

The analysis of the potential environmental consequences and mitigation measures evaluates the impacts from the no-action alternative, site preparation activities, flight testing activities, cumulative impacts, and mitigation measures. The no-action alternative is the level of activity at the location if neither the proposed action nor other alternatives were implemented. Site preparation activities would include those steps necessary to bring the various sites to operational readiness. The analysis of flight testing activities centers on the potential impacts due to the launch, tracking, and interception of both the interceptor and the target missiles, but also includes those actions required prior to and following the actual launches. The cumulative impacts section analyzes the potential overall impact of the proposed actions in concert with other foreseeable, ongoing, and planned activities within the Region of Influence (ROI). The discussion of mitigation measures proposes possible mitigation that may be undertaken to reduce the potential impact of the proposed action or other alternatives considered.

Although the proposal to conduct TMD missile testing and training has some conventional construction-related environmental impacts, the greatest concern focuses on the launching of missiles. The transport and fate of launch emissions and the launch noise levels are of most concern as they affect many of the resource areas being studied.

The National Aeronautics and Space Administration (NASA) has been launching rockets for more than 30 years, and analyzing the environmental consequences for almost as long. Many of these studies will be referred to later in the analysis. This section describes the differences in scale among the TMD missiles and some of the NASA rockets. Figure 3.0-1 graphically illustrates the differences among the rocket motors, and table 3.0-1 tabulates the relative sizes, durations, emission amounts, exhaust concentrations, and deposition rates of the solid rocket motors. Table 3.0-2 compares the proportional amounts of the constituents of the rocket emissions.



Source: U.S. Army Space and Strategic Defense Command, Test and Evaluation Office, 1995.

EXPLANATION

PAC	=	PATRIOT Advanced Capability
SM	=	Standard Missile
M	=	Meters
ft	=	Feet

Note: The Space Shuttle is included for size comparison only.

Missile Size Comparison

Figure 3.0-1

Table 3.0-1: Solid Rocket Motor Comparisons

Descriptor	Health Threshold	PAC-3 (Interceptor)	Hera (Target)	ASRM[1] (Ground Test)	STS (Space Shuttle)
Fuel Mass[2]		0.113 metric tons (0.124 tons)	6.28 metric tons (6.93 tons)	547 metric tons (603 tons)	1100 metric tons (1210 tons)
Thrust Duration[3]		5 seconds	24 seconds	120 seconds	10 seconds
Number of Launches		48/year (10-year period)	24/year (10-year period)	4/year (30 year period)	43/10 years
Particulate Exhaust[3]		0.041 metric tons (0.045 tons)	1.8 metric tons (1.9 tons)	200 metric tons (220 tons)	28 metric tons (31 tons)
Hydrogen Chloride[3]		0.023 metric tons (0.026 tons)	1.4 metric tons (1.5 tons)	120 metric tons (130 tons)	17 metric tons (19 tons)
Maximum Airborne Particulate Concentration[4]	5.0 mg/m^3	0.059 mg/m^3	0.92 mg/m^3	0.4 mg/m^3	41 mg/m^3
Maximum Airborne Hydrogen Chloride Concentration[4]	1.5 mg/m^3	0.034 mg/m^3	0.73 mg/m^3	0.24 mg/m^3	25 mg/m^3

[1]Environmental Impact Statement Space Shuttle Advanced Solid Rocket Motor Program (National Aeronautics and Space Administration, 1990).
[2]STS fuel mass does not include Space Shuttle liquid propellant
[3]Value for activity under maximum mixing height only
[4]Airborne concentrations for PAC-3, Hera, and STS are derived from TSCREEN/PUFF EPA screening program using a 200-meter (656-foot) release height
mg/m^3 = milligrams per cubic meter

Two studies relevant to this TMD analysis are the Advanced Solid Rocket Motor (ASRM) EIS and the Space Shuttle EIS. These two analyze the impacts of solid rocket motor (SRM) test firing or launches in environmental settings similar to those of the TMD proposal setting.

For each of these studies, the single and cumulative effects of numerous SRM test firings or Space Shuttle launches on air quality, wildlife, soils, and water are addressed. Both of the NASA programs are for test events or Space Shuttle launches that are far larger in scale than the TMD program.

Of the missiles that would potentially be used, the Hera missile is the largest and is predicted to have the loudest launch noise (McInerny, 1989; 1992). Noise measurements were taken during a 1996 launch of a Hera at WSMR (Noble, 1997). All launch noise analyses use values derived from these measurements (table 3.0-3), as the noise levels from all other proposed missiles would be less.

Table 3.0-2: Single Missile Exhaust Components of Proposed Missiles Compared to the Space Shuttle

Exhaust Product	Liquid Fueled	Solid Fueled			
	Lance kilograms (pounds)	PAC-3 kilograms (pounds)	SM-2 IVA kilograms (pounds)	Hera (Stage 1) kilograms (pounds)	Space Shuttle[1] kilograms (pounds)
Aluminum Oxide	0	40.7 (89.7)	176 (389)	1,766 (3,893)	344,000 (758,000)
Hydrogen Chloride	<1 (<2)	23.5 (51.8)	95.7 (211)	1,402 (3,090)	209,000 (461,000)
Carbon Monoxide	20 (44)	26.1 (57.5)	95.7 (211)	1,328 (2,928)	258,000 (569,000)
Nitrogen	191 (420)	9.9 (22)	39 (86)	546 (1,203)	101,000 (223,000)
Carbon Dioxide	211 (465)	2.7 (6.0)	11 (24)	287 (634)	46,000 (101,000)
Hydrogen	1 (2)	2.7 (6.0)	10 (22)	118 (260)	22,000 (48,000)
Water	254 (560)	7.6 (16.8)	36 (79)	776.8 (1713)	121,000 (267,000)
Nitrogen Dioxide	2 (4)	0	<1 (<2)	0	<1,000 (<2,000)
Lead	<1 (<2)	0	0	0	0
Others	16 (35)	0	4.5 (10)	11.82 (26.1)	1,000 (2,000)
Total Exhaust	697 (1,535)	113.2 (249.8)	469 (1,034)	6,235.6 (13,747.1)	1,103,000 (2,431,000)

[1]Exhaust components are only for boosters and are derived based upon first 10 seconds of solid propellant fuel burn extrapolated to 123-second estimated burn time.
Sources: National Aeronautics and Space Administration, Office of Space Science, 1995; U. S. Army Corps of Engineers, Mobile District, 1992; U.S. Department of the Air Force, 1997; White Sands Missile Range, Environmental Services Division 1995.

Table 3.0-3: Monitored Noise Data from October 1996 Launch of a Hera Missile

Distance from launch site	0.5 kilometer (0.3 mile)	1.0 kilometer (0.6 mile)	2.0 kilometers (1.2 miles)	4.0 kilometers (2.5 miles)	8.0 kilometers (5.0 miles)
Peak (dBA)	112	107	98	92	77
Leq (dBA)	86 for 41 seconds	86 for 44 seconds	80 for 49 seconds	75 for 55 seconds	68 for 43 seconds
Sound Exposure Level (dBA) [outdoor]	102	103	97	92	84
Peak (dBC)	127	118	112	102	93
Leq (dBC)	106 for 41 seconds	99 for 44 seconds	94 for 49 seconds	89 for 55 seconds	85 for 43 seconds
Peak (dB)	124	121	115	104	93
Leq(dB)	102 for 41 seconds	100 for 44 seconds	96 for 49 seconds	90 for 55 seconds	85 for 43 seconds

3.1 Eglin Air Force Base Sites

3.1 EGLIN AIR FORCE BASE SITES PREFERRED ALTERNATIVE

3.1.1 AIR QUALITY

The proposed action would not cause an exceedance of the National Ambient Air Quality Standards (NAAQS), would not be subject to Prevention of Significant Deterioration (PSD) review, and would not expose the public or operational personnel to hazardous levels of Hazardous Air Pollutants (HAPs).

3.1.1.1 Resource Description and Evaluative Methods

For purposes of this environmental impact analysis, air quality is defined as the concentrations of various pollutants in the atmosphere. This concentration is expressed in terms of either parts per million (ppm) by volume or mass per cubic meter (milligrams per cubic meter [mg/m^3] or micrograms per cubic meter [$\mu g/m^3$]). Actual concentrations of each pollutant vary by the type and amount of airborne emissions, the size and topography of the air basin, and weather conditions.

Federal, state, and sometimes local government agencies have developed air quality standards. These standards establish concentration limits for specific pollutants. Generally, two sets of standards are addressed. Primary standards are established to protect public health within an adequate margin of safety. Secondary standards are established to protect public welfare from adverse effects of pollutants.

Federal ambient air quality standards (AAQS) have been established by the U.S. Environmental Protection Agency (USEPA), and are termed the National Ambient Air Quality Standards (NAAQS). The NAAQS were established to protect public health and welfare. These standards establish maximum concentrations for six criteria pollutants: ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, lead, and particulate matter with an aerodynamic diameter of less than or equal to 10 microns (PM-10). Additionally, the USEPA has finalized a new standard for particulate matter with an aerodynamic diameter of less than or equal to 2.5 microns (PM-2.5). However, this regulation will not be in effect for several years, and current measurements do not reflect data for PM-2.5. As such, this analysis uses PM-10 as the sole particulate standard.

In addition to the pollutants addressed by the NAAQS, HAPs are also addressed in this analysis. Under Federal law, HAPs are those air pollutants to which no ambient air quality standard is applicable and which were established by Congress in the list in section 112 of the Clean Air Act (CAA). There are currently 188 HAPs listed. This list of HAPs incorporates, but is not limited to the pollutants controlled by the National Emissions Standards for Hazardous Air Pollutants (NESHAP) program. The State of Florida incorporates the Federal rules regarding HAPs as they are promulgated. (Glunn, 1998)

Within the study area, the Florida Department of Environmental Protection (FDEP) has adopted the NAAQS to regulate pollutant levels. Additionally, the FDEP has also promulgated state AAQS (Florida Department of Environmental Protection, Chapter 62-272) that are nearly identical to the NAAQS (Florida Department of Environmental

Protection, 1997). The Florida AAQS are more stringent than the NAAQS for sulfur dioxide emissions. A comparison of the two standards is found in table 3.1.1-1.

Table 3.1.1-1: National and Florida Ambient Air Quality Standards

			National Standards[a]	
Pollutants	**Averaging Time**	**Florida Standards[a]**	**Primary[b,c]**	**Secondary[b,d]**
Carbon monoxide	8-hour	10 mg/m^3 (9 ppm)	10 mg/m^3 (9 ppm)	None
	1-hour	40 mg/m^3 (35 ppm)	40 mg/m^3 (35 ppm)	None
Lead	Quarterly	1.5 µg/m^3	1.5 µg/m^3	Same as primary standard
Nitrogen dioxide	Annual	100 µg/m^3 (0.05 ppm)	100 µg/m^3 (0.053 ppm)	Same as primary standard
Ozone (as volatile organic compounds)	1-hour 8-hour	0.12 ppm 0.08 ppm	0.12 ppm 0.08 ppm	Same as primary standard
Sulfur dioxide	Annual	60 µg/m^3 (0.02 ppm)	80 µg/m^3 (0.03 ppm)	None
	24-hour	260 µg/m^3 (0.1 ppm)	365 µg/m^3 (0.14 ppm)	None
	3-hour	1,300 µg/m^3 (0.5 ppm)	None	1,300 µg/m^3 (0.5 ppm)
PM–10	Annual	50 µg/m$^{3\,(e)}$	50 µg/m$^{3(e)}$	Same as primary standard
	24-hour	150 µg/m^3	150 µg/m^3	Same as primary standard

Notes:
[a]Both Florida and national standards, other than ozone and those based on annual averages or annual arithmetic means, are not to be exceeded more than once a year. The ozone standard is attained when the expected number of days per calendar year, with maximum hourly average concentrations above the standard, is equal or less than 1.
[b]Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based on a reference temperature of 25°C and a reference pressure of 760 millimeters of mercury. All measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 millimeters of mercury (1,013.2 millibar); ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.
[c]National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.
[d]National Secondary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public welfare from any known or anticipated adverse effects of a pollutant.
[e]Calculated as arithmetic mean
Source: Clean Air Act, 42 USC 7401 et seq.; Florida Department of Environmental Protection, 1997.

Section 176(c)(1) of the Clean Air Act, known as the General Conformity provision, as implemented by USEPA's general conformity regulations, is a mandate for Federal agencies intended to aid states in achieving and maintaining the NAAQS. In an air quality region that has been designated as a nonattainment area for any of the six NAAQS, or a former nonattainment area that has now achieved the NAAQS and was redesignated a maintenance area, a Federal agency action must not cause or contribute to any new violation, or delay the timely attainment of any air quality standard or milestone in the state implementation plan (SIP). Appendix B contains further information regarding general conformity.

No areas under consideration are in nonattainment or maintenance areas. As such, the general conformity provision described above does not apply in a regulatory sense to the proposed action.

Figure 3.1.1-1 shows the relative locations of the FDEP State districts, the locations of pertinent air monitoring stations in the Northwest and Southwest Districts, and the locations of the four Class I areas in the State of Florida.

Air pollution emissions due to activities on Eglin AFB are monitored and restricted in accordance with a Title V air permit. This permit requires Eglin AFB to maintain emissions below a specified level for each pollutant. Any significant changes to this permit are subject to both regulatory review and public notification. While Eglin AFB is the managing agency for both the proposed Santa Rosa Island and Cape San Blas sites, only Santa Rosa Island is covered by the established Title V permit. Cape San Blas is specifically excluded from the permit due to its geographical separation from Eglin AFB.

It was determined whether the proposed activity sites are located within attainment or non-attainment areas. Along with this, a determination was made as to the applicability of Prevention of Significant Deterioration review requirements. Further analysis determined whether the proposed action has the potential to cause an exceedance of the NAAQS or applicable HAPs requirements. For those pollutants with no applicable regulatory restrictions, analysis of applicable health-base guidance levels was conducted.

Determination as to whether a specific area is in an attainment or non-attainment area was made through consultation with regulatory agency officials and research of existing air monitoring data. Appendix K includes recent air quality monitoring data for the counties within the ROI.

Determination of applicability of PSD review is based solely on stationary source emissions. That is, mobile sources do not contribute to this portion of the air quality analysis. A determination was made for each proposed activity and location as to whether the planned source would be a major stationary source. A stationary source is a major stationary source if (1) it can be classified in one of 28 named source categories listed in Section 169 of the CAA and it would emit or have the potential to emit 90,720 kilograms (100 tons) per year or more of any regulated pollutant, or (2) if it would be any other stationary source (i.e. would not fall within one or more of the 28 listed source categories) that emits or has the potential to emit 226,800 kg (250 tons) per year or more of any regulated pollutant. Very few of the 28 listed source categories have been precisely defined by the USEPA.

If the planned source were determined to be a major source, an additional determination would then be made as to whether it would emit or have the potential to emit significant amounts of pollutant. It is important to note that the use of the term "significant" in this section is used as defined in CAA. The significant emission thresholds are defined in two ways. First, in terms of emission rates, as indicated in table 3.1.1-2. The second emissions threshold is defined as an emission rate at a planned major

Source: Florida Department of Environmental Protection, Division of Air Resources Management, 1997; Hanks, 1997; U.S. Army Space and Strategic Defense Command, 1994a.

EXPLANATION

- Pertinent Air Monitoring Site
- Class 1 Areas
- State Boundary
- Florida Department of Environmental Protection (FDEP) District

Scale 1:6,000,000

0 50 100 Miles

0 100 200 Kilometers

NORTH

Air Quality Region of Influence and FDEP Districts, Air Quality Monitoring, and Class I Areas

Eastern Gulf of Mexico

Figure 3.1.1-1

stationary source that is to be located within 10 kilometers (6 miles) of a Class I area and which would increase the 24-hour average concentration of any regulated pollutant in that area by 1 $\mu g/m^3$ or more.

Table 3.1.1-2: PSD Significant[a] Major Stationary Source Threshold Emission Rates

Parameter	Threshold (tpy)
Carbon Monoxide	100
Oxides of Nitrogen	40
Sulfur Dioxide	40
Particulate Matter with a nominal aerodynamic diameter less than or equal to 10 micrometers.	15
Particulate Matter	25
Ozone (Volatile Organic Compounds)	40
Lead	0.6
Asbestos	0.007
Beryllium	0.0004
Mercury	0.1
Vinyl Chloride	1
Fluorides	3
Sulfuric Acid Mist	7
Hydrogen Sulfide	10
Total Reduced Sulfur	10
Reduced Sulfur Compounds	10

[a]The term "significant" is used with regards to the usage defined in the Clean Air Act
tpy = tons per year
Source: Derived from USEPA Prevention of Significant Deterioration regulations (40 CFR 51.160-169 and 52.21)

If the planned source is determined to emit significant levels of pollutants (as defined in CAA) it may be required to perform additional analysis determining its potential impact on any Class I area within approximately 100 kilometers (62 miles) of the source.

The stationary source of emissions that would be likely to result from the proposed action is the release of Volatile Organic Compounds (VOC) through the use of solvents, cleaners, and surface coatings during maintenance or launch preparation activities. The maximum amount of VOC emissions is anticipated to be less than 10 kilograms (22 pounds) per launch. There would be a maximum of 24 launch events per year at any site, and even in the event that each of these launches included two interceptor missiles, the maximum potential VOC emissions anticipated would be less than 480 kilograms (1,060 pounds). Therefore, the proposed action would not be a major stationary emission source or modification at any of the planned activity sites. As such, the PSD review process does not apply in a regulatory sense to the proposed action.

The single source of emissions that would be likely to result due to the proposed action would be the exhaust of the missile during launch. However, missiles are not considered stationary sources, and thus are not subject to the PSD review process.

The safety section addresses potential impacts that could result from exposure to the three major chemicals proposed for use which would be considered HAPs. These include triethyl phosphate (TEP), unsymmetrical dimethylhydrazine (UDMH), and Inhibited Red Fuming Nitric Acid (IRFNA). The safety analysis is presented in section 3.1.9 (Safety) and further in 3.1.6 (Hazardous Materials and Hazardous Waste).

The air quality analysis considers the potential impacts to air quality of major missile exhaust products which would be HAPs. This includes the analysis of potential impacts due to dispersion of aluminum oxide and hydrogen chloride.

No NESHAP, current or proposed, has been identified that would potentially affect the proposed action. (Glunn, 1998) Since there are no National Emissions Standards for Hazardous Air Pollutants (NESHAPs) applicable to the proposed action, applicable health-based standards were used to determine potential impacts to the populace which could result from exposure to these chemicals. Aluminum oxide is considered non-toxic and poses a health hazard mainly on the basis of being a respiration hazard (similar to fine dust). A portion of the aluminum oxide would be small enough to be respirable. In order to provide conservative results, the analysis of aluminum oxide dispersion assumed the entire amount of aluminum oxide is respirable. Since a fraction of the aluminum oxide would be small enough to be considered respirable, the actual potential impact would be less than that presented in this analysis.

Hydrogen chloride is mainly a hazard due to its corrosive nature. Hydrogen chloride reacts with water to form hydrochloric acid (similar to stomach acid). The applicable health-based guidance level was determined to be the Short-term Public Emergency Guidance Level (SPEGL) established by the National Research Council. This guidance level was established specifically for accidental public exposure. It is likely that a small portion of the hydrogen chloride would settle out of the exhaust as a particulate. In order to present conservative results in the air quality analysis, the analysis presents the maximum potential concentrations and actual concentrations would be expected to be lower. Table 3.1.1-3 lists the appropriate exposure guidance levels for both aluminum oxide and hydrogen chloride.

Table 3.1.1-3: Exposure Guidance for Potential Solid Propellant-related Hazardous Air Pollutants

Pollutant	Duration of Exposure	Exposure Guidance	Primary Application	Establishing Organization
Aluminum Oxide (as Aluminum Dust)	8 Hour Time-Weighted Average (Threshold Limit)	5 mg/m^3	Workplace	OSHA
Hydrogen Chloride	1 Hour Short-term Public Emergency Guidance Level (SPEGL)	1.5 mg/m^3 (1.0 ppm)	Public	NRC

Sources: U.S. Department of Health and Human Services, 1994.

The analysis shows the maximum potential amounts of hydrogen chloride that could be deposited. Actual deposition would be expected to be less during normal launch operations. Potential impacts due to acidic deposition are presented in sections 3.1.3 (Biological Resources), 3.1.5 (Geology and Soils), and 3.1.14 (Water Resources).

3.1.1.2 Region of Influence

Identifying the region of influence for an air quality assessment requires knowledge of the pollutant types, source emissions rates and release parameters, proximity relationships of the proposed source to other emission sources, and local and regional meteorological conditions.

When determining the air quality region of influence, inert pollutants and reactive pollutants with delayed impacts are considered. Inert pollutants include the majority of air pollutants with the exception of ozone and its precursors (VOC) and oxides of nitrogen [NO_X]) and have a measurable impact on air quality that is generally limited to an area extending a few kilometers (miles) downwind from the source.

Ozone and its precursors may impact a more extensive region due to the delayed impact to air quality presented by the ozone precursors. In general, precursors are chemically activated by solar radiation and stimulate the generation of ozone in the lower atmosphere. This effect is most pronounced beyond the immediate area of the emission and often occurs hours after the initial release. This delay makes it difficult to determine a specific location which may be impacted by each emission source. The pollutant(s) may actually be transported into another air region before having the maximum impact on air quality. This is termed a "transport effect" and its impact to air quality can be quite dramatic depending upon the local geography. Therefore, an extended area of potential impact must be considered for ozone and its precursors than that described for inert pollutants.

The ROI for air quality analysis of the proposed action is the existing geographical airshed surrounding each of the activity sites. For regulatory purposes, project emissions were compared with emissions generated in Okaloosa, Gulf, or Monroe county, according to the county in which the particular portion of the action would take place.

The air quality analysis of section 3.2 addresses potential ozone depletion in the stratosphere. It is important to note here that ozone in the ambient air is considered a pollutant. It is one of the major components that contribute to the generation of smog. However, at stratospheric altitudes, ozone absorbs harmful radiation and protects the environment. Therefore, depending upon its location within the atmosphere, ozone may either be considered as a pollutant or as a beneficial component of the atmosphere.

3.1.1.3 Affected Environment

3.1.1.3.1 Santa Rosa Island

Regional Climate

The climate of the northern region of Florida, including Eglin AFB, Santa Rosa Island, and Cape San Blas, is characterized by an abundance of sunshine and rainfall,

warm and humid summers, and mild winters. Temperatures throughout the Florida Panhandle are typical of a humid semitropical climate with mid-summer maximum temperatures near 32° Celsius (C) (90° Fahrenheit [F]) and mid-winter minimum temperatures near 6.1°C (43°F).

Annual rainfall averages approximately 145 to 152 centimeters (57 to 60 inches), falling mainly in late winter or early spring, and in the summer. While winter storms can be quite violent, most summer rain is in the form of frequent scattered showers and cloudbursts of short duration and high intensity. Prevailing winds are usually from the north in winter and from the south in summer. March is the windiest month (average hourly velocity), while August has the lowest average velocity winds. During summer a moderate sea breeze usually blows from the Gulf of Mexico, and occasional strong winds come from thunderstorms.

One of the terms used when describing air pollution is the mixing height. The mixing height is an altitude below which the most vigorous initial mixing of air pollutants takes place. The mixing height, while variable, is determinable based on weather, seasonal variation, and topography. Daytime mixing heights for the northwestern portion of Florida are higher than for most of the continental United States. Average morning mixing heights range from 500 to 700 meters (1,640 to 2,297 feet) above ground level (AGL) in winter to 500 to 1,000 meters (1,640 to 3,281 feet) AGL in summer. Average afternoon mixing heights range from 800 to 1,000 meters (2,625 to 3,281 feet) AGL in winter to 1,400 to 1,600 meters (4,593 to 5,249 feet) AGL in summer.

Air pollution in the region may be exacerbated by strong ground-based inversions that trap pollutants near the ground. These effects may be moderated by wind. Ground-based inversions occur in the vicinity of Eglin AFB main, Santa Rosa Island, and Cape San Blas nearly every morning. The inversions normally break sometime during the morning due to surface heating. On average there are 5 to 7 days each winter during which the inversion does not break. Most often, this is due to a deep layer of sea fog retarding the surface heating.

A second phenomenon, which occurs occasionally during winter, is a persistent low-level inversion that also traps pollutants near the ground. An inversion may remain in the area for several days due to subsiding air in a stationary high-pressure area. The Eglin AFB area is normally on the fringe of such a high-pressure area. When this is the case, the inversion is likely not to subside all the way to the surface, as may be the case in the center of the high-pressure area. In addition to the damping effect of the inversion, wind speeds in these situations are generally low. However, wind speeds, while low, are somewhat higher on the fringe than in areas near the high-pressure center. The proximity of the Gulf of Mexico also ensures some air motion due to horizontal land-sea-air temperature contrast.

Regional Air Quality

All air quality regions in Florida are currently in attainment (or unclassifiable) for all Federal, state, and local AAQS. As noted above, the areas around Eglin AFB and Santa Rosa Island have a limited tolerance to high pollution due to the potential for ground-level

inversions. These airsheds are more capable of dispersing air pollutants than adjacent areas to the north, but not so much so that winter air pollution episodes could not occur. Low-velocity winds and inversion conditions contribute to short-duration, high-level concentrations of air pollution, especially in areas with high traffic concentrations. However, no specific air pollution problem has been identified in the area by the FDEP, probably in part because the area is not heavily industrialized.

Air Pollution Emissions Sources

Eglin AFB maintains an emissions inventory in conjunction with its proposed Title V permit. There are no other known emission inventories for any of the three counties in which the base is located. Rocket and missile testing has been conducted at Eglin AFB since the 1940s. In particular, the BOMARC air defense defensive missile was tested and flown there from the 1950s through 1985.

3.1.1.3.2 Cape San Blas

Regional Climate

The regional climate around Cape San Blas is similar to that of Santa Rosa Island and the Eglin AFB properties as described in section 3.1.1.3.1.

Regional Air Quality

Due to relative population density and industry levels, Port St. Joe and Panama City are expected to have more emission sources, such as cars and boilers, than does Cape San Blas; therefore, the air quality data recorded at Port St. Joe and Panama City were used as a conservative representation of existing air quality in the Cape San Blas area. The monitored levels are well below the AAQS. Appendix K has specifics regarding recorded levels.

Air Pollution Emissions Sources

Other than several Aboveground Storage Tanks (ASTs), there are no specific emission sources in the immediate vicinity of the potential launch site at Cape San Blas. Additionally, there are no known emission inventories for either Cape San Blas or Gulf County. The population in the Cape San Blas area is relatively sparse; therefore, a very low emission level is expected from cars and other residential sources of emissions.

3.1.1.4 Environmental Impacts and Mitigations

3.1.1.4.1 Santa Rosa Island

The proposed action would not cause an exceedance of the NAAQS, would not be subject to PSD review, and would not expose the public or operational personnel to hazardous levels of HAPs.

No-action Alternative

The Santa Rosa Island sites are currently used for other Eglin AFB operations such as monitoring in-air flight testing and training in the Gulf of Mexico and providing electronic countermeasures training. The no-action alternative assumes continued use of these sites at their current operational levels with no potential for air quality impacts due to the proposed action. Continuing Eglin AFB operations including monitoring of flight testing and training, and electronic countermeasures would have negligible effects on air quality.

Site Preparation Activities

Interceptor

If Site A-15 is selected as an interceptor missile launch site, no site modification or construction would be required due to the mobile, self-contained launch systems that would be used. Therefore, no air quality impacts are anticipated due to interceptor launch site preparation.

Target

If Site A-15 is selected as a target missile launch site, a variety of potential construction projects would be undertaken to upgrade the site to the required operational state. Air quality impacts due to site preparation activities would be limited to minimal fugitive dust emissions, exhaust emissions from construction equipment, and minimal VOC emissions due to paints, solvents, and cleansers. All emissions would be temporary and would disperse quickly.

Flight Test Activities

Interceptor and Target

Activities prior to each launch may include, but not be limited to, transport, assembly, and preflight testing of the missile, operational tests of command, control, and communication (C^3) equipment and remote instrumentation equipment, and moving the missile to the launch pad. Potential air quality emission sources during these activities include transport vehicle emissions, emission of VOCs from solvents and lubricants during missile assembly and pre-flight testing, and generator emissions from C^3 equipment vans or remote instrument trailers.

Storage of the missile components on Eglin AFB sites will follow established safety procedures. If liquid-fueled missiles are selected as target missiles, there would be a remote possibility for spills of either or both the oxidizer or fuel. UDMH and IRFNA are two of the more common components. UDMH acts as the fuel and IRFNA as the oxidizer. UDMH, IRFNA and potential impacts to air quality due to mishaps are addressed in section 3.1.6 (Hazardous Materials and Hazardous Waste), and 3.1.9 (Safety).

Pre-flight activities could result in air quality impacts from mobile sources such as range clearance aircraft or boats, transport vehicles, personal vehicles, and mobile

generators; from point sources such as existing storage tanks; and from support activities such as missile assembly and preparation and site maintenance activities.

For the air quality analysis, vehicles equivalent to 12 tractor-trailers were assumed to be involved in missile transport operations. Potential emissions due to missile transport activities would be negligible when measured in the context of the local traffic levels. Use of solvents, lubricants, and cleaners which could result in VOC emissions would not be anticipated to generate more than 10 kilograms (22 pounds) of VOC emissions per launch. The maximum number of missiles which would be prepared for launch at any site on an annual basis is 48 (24 launches of 2 interceptors each). This would result in a potential for less than 480 kilograms (1,056 pounds) of VOC emitted per year due to missile preparation activities. Emissions of this level would be anticipated to have negligible impact to air quality.

Diesel generators may be used to supply power during flight test activities. Only portable generators with internal tanks would be used. The use of portable generators on Eglin AFB-controlled properties would be subject to established base policies regarding use and required permits. These generators emit relatively low levels of pollutants and would be operated intermittently for short periods. Normal weather conditions would tend to rapidly disperse the resulting emissions. Further specifics regarding representative emissions is located in appendix K.

Launch Activities

Interceptor and Target

Both interceptor and target missile launches are proposed for the Santa Rosa Island and Cape San Blas sites. The single source of emissions that would be likely to result due to the proposed action would be the exhaust of the missile during launch. However, the missiles are not considered stationary sources, and thus are not subject to the PSD review process. Air quality impacts due to launch activities would result primarily from the combustion of the missile fuel.

Solid-fuel rocket motors generally use ammonium perchlorate, aluminum, and an inert binder as the source of their propulsion. The major exhaust products are carbon monoxide, water, hydrogen chloride, nitrogen dioxide, and aluminum oxide.

The Hera missile is the solid-fuel missile used in the air quality analysis. This missile was selected due to the greater amount of exhaust from the Hera. In order to present conservative results, the air quality analysis used the maximum number of target launches at each site and assumed each of these targets launched was a Hera missile. Thus, the air quality analysis presents the maximum potential impact rather than the probable impact.

Liquid-fuel rocket motors use a fuel and oxidizer which, when mixed, spontaneously combust. The major exhaust products are carbon monoxide, carbon dioxide, water, and nitrogen. Minor emissions of lead and oxides of nitrogen are also generated.

The Lance missile is the only liquid-fuel missile proposed. Of the major exhaust products, carbon monoxide poses a potential health hazard. The Hera emits approximately 60 times more than the Lance. Therefore, the air quality analysis is based on Hera data.

A higher concentration of pollutants will be emitted near the launch pad than at any other portion of its trajectory. This initial ground cloud is the subject of the air quality analysis. For the purpose of air quality analysis, this ground cloud is assumed to contain all emissions released below the mixing height. Although this results in greater emission concentrations than would be anticipated, it is a conservative representation of the actual emissions.

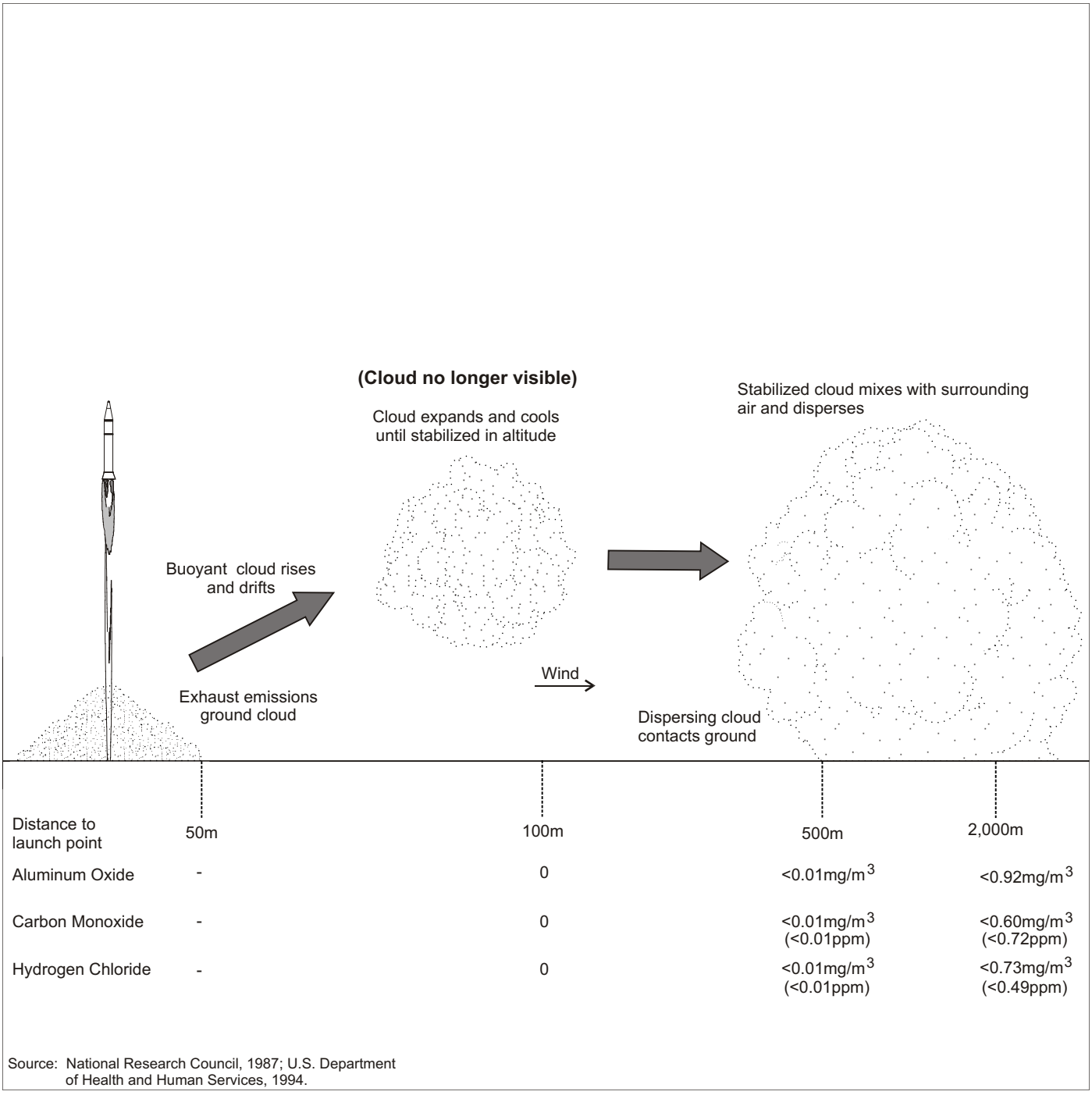
Due to the initial heat generated by combustion, the exhaust plume tends to rise and drift while cooling. Once it reaches stabilization altitude, it begins to disperse while continuing to drift. The stabilization altitude is where the initial heat has dissipated enough so the cloud is no longer rising. The cloud cools and disperses. Eventually, some portion of this cloud reaches the ground (or an elevated receptor) (figure 3.1.1-2). Finally, the cloud disperses beyond the point at which it has measurable impact on ambient air.

The most vigorous, initial mixing of components in the air occurs at elevations below the mixing height. Mixing heights vary depending upon the weather, air currents, pressure systems, and topography. Annually, the mixing heights in the vicinity of Eglin AFB vary from 500 to 1,600 meters (1,600 to 5,200 feet). Pollutants released above the mixing height will take considerable time (and distance) to reach the lower altitudes. Therefore, only that portion of the exhaust released below the mixing height would have an impact on ambient air quality.

Following USEPA guidance as presented in Appendix W of the 40 CFR 51, the air quality analysis of potential impacts due to the missile launches used initial screening to establish whether the proposed action has the potential to cause an exceedance of the NAAQS (or health-based guidance levels for those pollutants not addressed in the NAAQS) in areas to which the general public would have access.

In instances where the initial screening indicated no potential for exceedances beyond the LHA, no further analysis was conducted because the edge of the LHA is the closest location to which the general public would have access during launch operations. Where the initial screening indicated there may be potential for exceedances beyond the LHA, additional refined analysis was undertaken to determine the extent to which air quality could be impacted. As indicated below, this refined modeling was required only for the analysis of the mishap scenarios and is addressed in section 3.1.9 (Safety).

The Hera missile is the proposed missile with the greatest mass of exhaust emissions per missile and was therefore selected as the representative missile for analyzing air quality impacts due to launch operations.



Distance to launch point	50m	100m	500m	2,000m
Aluminum Oxide	-	0	<0.01mg/m^3	<0.92mg/m^3
Carbon Monoxide	-	0	<0.01mg/m^3 (<0.01ppm)	<0.60mg/m^3 (<0.72ppm)
Hydrogen Chloride	-	0	<0.01mg/m^3 (<0.01ppm)	<0.73mg/m^3 (<0.49ppm)

Source: National Research Council, 1987; U.S. Department of Health and Human Services, 1994.

Representative Exhaust Plume

Figure 3.1.1-2

Not to Scale

Screening of potential impacts to air quality was conducted using the USEPA-approved TSCREEN PUFF model. Required input data included physical state and mass of pollutant emitted, release height, initial dispersion values, and concentration averaging time. The screening indicated there was no potential for exceedances of the NAAQS or health-based guidance levels beyond the LHA for any pollutants during normal launch operations. Therefore, no further analysis was required for the normal launch scenarios. Table 3.1.1-4 indicates the maximum exposure level predicted for each of the three pollutants of concern for normal launch operations. Further details of the modeling conducted for the screening analysis can be found in appendix K.

Table 3.1.1-4: TSCREEN PUFF Screening Results

Normal Launch Conditions (24 seconds of combustion)

Pollutant (exhaust mass)		Health-based Exposure Guidance Level	Potential Maximum Hourly Time-weighted Average Concentration (mg/m^3) at specified Distance from Launch Point					
			Maximum Exposure (at 1.94km)	0.50 km	1.0 km	3.0 km	5.0 km	7.0 km
Al_2O_3	634 kg	5 mg/m^3	0.920	0.00804	0.438	0.762	0.620	0.455
CO	475 kg	40 mg/m^3 (35 ppm)	0.689	0.00602	0.328	0.571	0.464	0.341
HCl	502 kg	1.5 mg/m^3 (1 ppm)	0.728	0.00637	0.347	0.603	0.491	0.360

Source: National Research Council, 1987; U.S. Department of Health and Human Services, 1994.

Similar screening of the mishap scenarios indicated potential for exceedance of the guidance level for hydrogen chloride beyond the LHA, but no potential for exceedances of other levels of concern for other pollutants at equivalent distances as shown in table 3.1.1-4. Therefore, in keeping with USEPA guidance, refined modeling was conducted to more accurately determine the potential for impacts if a mishap were to occur. No currently approved USEPA model is suitable for analyzing potential air quality impacts due to missile launches or mishaps. Therefore, the refined modeling was conducted using the Open Burn Open Detonation Dispersion Model (OBODM). This model is undergoing the approval process, but is not currently an USEPA-approved model. It was specifically designed to determine the potential impacts of burning fuels or munition detonations. This made it a suitable choice to model the specified scenarios.

The refined modeling determined there would be no potential for exceedances of the applicable health-based guidance (SPEGL) beyond the LHA. Further information on this model and the mishap modeling process can be found in section 3.1.9 (Safety) and in appendix K.

Air quality monitoring of an actual Hera launch was conducted in concert with OBODM modeling to demonstrate the relative conservative nature of the estimates produced by the OBODM. The launch occurred 20 November 1997 at Fort Wingate, New Mexico. Locations of measurement sites were determined in accordance with OBODM-modeled hydrogen chloride concentrations. The meteorological parameters used in this modeling reflected the predicted Fort Wingate weather conditions forecast 1 day prior to actual launch. This gave the monitoring team adequate time to set all monitoring devices

within the safety time limits. The results of the monitoring indicated that concentrations of pollutants beyond 1,981 meters (6,500 feet) were well below health-based guidance levels and standards. At distances that would be within the LHA, the only exceedance was of the health-based guidance level for hydrogen chloride at 50 meters (150 feet) from the launch pad.

The hydrogen chloride monitor closest to the launch pad during the New Mexico Hera launch was located at a distance of approximately 50 meters (150 feet) from the launch point. At this distance the hourly time-weighted-average concentration of hydrogen chloride was calculated to be a maximum of 7.7 mg/m^3. The Short-term Public Emergency Guidance Level (SPEGL) suggested by the National Research Council (NRC) is 1.5 mg/m^3. Therefore, the SPEGL was exceeded near the launch pad. However, the public would be excluded from all areas this close to the launch pad (well inside the LHA) and the 7.7 mg/m^3 exposure is lower than Emergency Exposure Guidance Level (EEGL) of 45.6 mg/m^3 suggested for workplace exposures by the NRC. All other operable monitors registered no measurable concentrations of hydrogen chloride. As such, the OBODM can be assumed to have over-predicted the potential concentrations for areas beyond the LHA and thus provided conservative estimates of hydrogen chloride concentrations.

Due to the differences in meteorology and location, the modeled and monitored results for this launch differ from those which would be anticipated for similar launches occurring at locations in Florida. However, rather than use meteorological data from any one day (which may have had a greater or lesser impact than that experienced during the New Mexico launch), the modeling used in the air quality analysis for this EIS incorporated the meteorological conditions that would result in the greatest potential impact. The logic behind this was that the worst possible combination of conditions would result in the greatest potential impact. All other (more realistic) scenarios would result in less impact. Therefore, the modeling performed for the air quality analysis estimates the greatest potential impact at any location. (Air Force Development Test Center, 1998)

These results strengthen the stated position that the OBODM is an appropriate tool to use in analyzing potential impacts to air quality due to missile launch operations. In light of the analysis presented above, missile exhaust due to normal operations and potential full-body combustion mishaps would be anticipated to have negligible impacts to ambient air quality beyond the LHA.

The analysis presented above addressed the primary concern of human safety due to exposure to hazardous levels of exhaust byproducts. A secondary concern of exhaust pollutants is that of settling out or raining out of particulates (which includes all non-gaseous exhaust products and byproducts) that could then cause environmental damage. The major components of the exhaust that are of environmental concern are aluminum oxide and hydrogen chloride, both of which are major exhaust components in solid-fuel missiles. The impacts the deposition of these pollutants may have on the environment are addressed in detail in sections 3.1.3 (Biological Resources), 3.1.5 (Geology and Soils), 3.1.7 (Land and Water Use), and 3.1.9 (Water Resources). Air quality analysis methods were used only to determine the maximum potential concentration which could be deposited (mass per area [g/m^2]). Aluminum oxide is a particulate that is generally nonreactive by the time it settles to the ground. In addition, aluminum deposition for

Space Shuttle launches has been estimated to be approximately 1 to 10 percent that of chloride deposition (National Aeronautics and Space Administration, 1986). As such, no direct environmental impacts would be anticipated due to aluminum oxide deposition.

Hydrogen chloride reacts with water to form hydrochloric acid (stomach acid), which may in turn form droplets of sufficient size to rain out of the exhaust cloud. Depending upon quantity and concentration, studies of the Space Shuttle launches have shown that this acid may have an adverse effect on plants, or on the alkalinity of soils and exposed surface water. Acidification of water generally results in higher solubility of minerals and lower oxygen levels until the acid is neutralized. These effects may lead to toxic impacts on aquatic life. Acidification of soils may lead to increased plant mortality or proliferation, depending upon a specific species' resistance to acidity.

The Hera missile is the proposed missile with the greatest mass of exhaust hydrogen chloride. Therefore, it was used as the representative missile in this analysis. The OBODM was used to determine maximum deposition weights for both normal and mishap scenarios. Representative trajectories indicated the Hera missile would exceed a mixing height of 1,500 meters (4,900 feet) within 24 seconds of launch. Exhaust emitted above this altitude would be dispersed over a large area before reentering lower altitudes. As such, only the exhaust which could be emitted below the mixing height is considered in this analysis. In addition, monitoring in support of the Space Shuttle launch program has indicated that under conditions of excess water (which would tend to promote the formation of hydrochloric acid), less than 20 percent of the hydrogen chloride reacts with the water to form hydrochloric acid. The excess water in Space Shuttle launches takes the form of more than 1,100,000 liters (300,000 gallons) of water used to generate sound-suppressing fog. Therefore, it is assumed in the air quality analysis of this EIS and in the modeling of hydrogen chloride deposition that 20 percent of the available hydrogen chloride will combine with water to form hydrochloric acid.

Since no sound-suppression fog generation will take place for any proposed TMD launches, and there is no excess atmospheric water available naturally in this magnitude; it is assumed this 20 percent is an extremely conservative measure. Multiple runs of the OBODM were conducted to determine the conditions with the greatest potential for acidic deposition. Using these conditions, OBODM indicated the maximum potential deposition would be approximately 1.64 g/m^2 hydrogen chloride out to approximately 60 meters (200 feet) from the launch site and would be less than $1 g/m^2$ beyond approximately 120 meters (400 feet). Table 3.1.1-5 compares hydrogen chloride generated and potentially converted to hydrochloric acid using these assumptions for both the Space Shuttle and the Hera missile.

Table 3.1.1-5: Comparison of Space Shuttle and Hera Hydrogen Chloride Emissions

Rocket	Total Hydrogen Chloride Emitted	Partial Hydrogen Chloride Emitted	20% Rainout of Hydrochloric Acid	Maximum Estimated Deposition
Space Shuttle Solid Rocket Motor	209,000 kg (460,000 lb)	17,000 kg (37,000 lb) in 10 seconds	3,400 kg (7,500 lb)	127 g/m^2
Hera (SR-19AJ-1)	1,399 kg (3,078 lb)	502 kg (1,100 lb) in 24 seconds	100 kg (221 lb)	1.64 g/m^2

Sources: White Sands Missile Range, Environmental Services Division, 1995); National Aeronautics and Space Administration, Office of Space Science, 1995.

As shown in the table above, the total hydrogen chloride gas emitted by a Hera missile below the 1,500-meter (4,900-foot) mixing height, attained in less than 24 seconds, would be 502 kilograms (1,100 pounds). The amount entrained in the ground cloud after the first ten seconds of the Space Shuttle launch, is nearly 35 times this amount. Assuming the maximum rainout of 20 percent, the resulting deposition of hydrochloric acid per launch would be 100 kilograms (221 pounds), again approximately 35 times less than that experienced during Space Shuttle launches. However, the maximum amount of acid deposited in any one location due to proposed missile launches would be anticipated to be approximately 1.3 percent of the maximum deposited during Space Shuttle launches.

Cumulative Impacts

Construction of the TMD test facilities at Santa Rosa Island would take place within Eglin AFB property that was originally developed in 1959 for BOMARC missile testing over the Gulf of Mexico. In the 1980s, the complex was upgraded to test an electromagnetic rail-run for the Strategic Defense Initiative Organization. Current instrumentation sites and activities will continue for the foreseeable future. The additional activity currently proposed for the island is the Open Air Hardware in the Loop project which would involve construction of three towers, three control buildings, and associated support facilities.

Air emissions from periodic events do not accumulate in the airshed as do the continuous emissions of a heating plant or generator.

Construction of TMD test facilities at Santa Rosa Island may cause a short-term increase in the particulate emissions in the immediate vicinity of the construction work. Construction would cause a short-term localized increase in carbon monoxide, PM-10, and VOC levels in the immediate vicinity of the construction site. These types of emissions are normal for construction sites. This effect would be localized and is not anticipated to cause exceedances of the NAAQS, the potential for concurrent Santa Rosa Island reconstitution project construction at other nearby locations is not expected to impact air quality cumulatively.

Air emissions from the proposed action would be periodic in nature rather than continuous. Each series of missile launches would be a discrete air emission event. Emissions generated during one launch (including associated support emissions) would dissipate prior to the next series taking place. Therefore, because each launch event will not cause an exceedance of the NAAQS, it is reasonable to assume the proposed action will not cause an exceedance of the NAAQS.

The Eglin AFB Title V air permit includes potential Eglin AFB activities within the foreseeable future, and would cover any stationary air emissions source associated with the proposed action. As such, there would be no cumulative impact with other foreseeable activities.

In addition, the majority of emissions that would result from the activities defined in the proposed action would be emitted from non-stationary sources. As such, there would also be no regulatory cumulative impact.

Mitigations Considered

Standard procedures implement emergency response plan (appendix J) prior to test activities which includes notification procedures and an onsite recovery team for response to spill recovery.

Possible mitigations would include:

- Ensure that dust suppression measures are implemented during construction.
- Conduct monitoring of surface wind conditions prior to launch.
- Conduct air quality monitoring in the vicinity of the launch pad before and after initial launch.

3.1.1.4.2 Cape San Blas

The proposed action would not cause an exceedance of the NAAQS, would not be subject to PSD review, and would not expose the public or operation personnel to hazardous levels of HAPs.

No-action Alternative

Under the no-action alternative, the proposed ground-based TMD test activities at Cape San Blas would not be implemented. Current activity levels at Cape San Blas would remain unchanged, as would air quality. Continuing Eglin AFB operations including monitoring of flight testing and training and periodic missile launches would have negligible effects on air quality, which is currently within all air quality standards.

Site Preparation Activities

Interceptor

If Site D-3A is selected as an interceptor launch site, no site modification or construction is anticipated due to the mobile nature of the proposed interceptor systems. Site preparation activities would consist only of the transport and set-up of the mobile launch system itself.

Target

Air quality impacts due to construction activities would be limited to transient fugitive dust emissions (PM-10), temporary exhaust emissions from construction equipment, and minimal VOC emissions from points, solvent, and cleansers. These impacts would be temporary and would be quickly dispersed by coastal winds. Potential site preparation requirements are listed in section 2.2.2.2. Potential air quality impacts would be similar to those described for Santa Rosa Island in section 3.1.1.4.1.

Flight Test Activities

Flight test activities would potentially include temporary storage of missile components, assembly of missiles, transport of missile to launch pad, actual launch operations, target tracking and telemetry operations, and site maintenance activities. The proposed TMD activities at Cape San Blas would not require air permits because the anticipated stationary air emission sources associated with the proposed TMD activities are considered trivial and are exempted under FDEP regulations.

Remote instrumentation site emissions and resulting impacts due to tracking activities would be similar to those discussed in section 3.1.1.4.1.

Pre-launch emissions and resulting impacts would be similar to those described in section 3.1.1.4.1.

The single source of emissions that would be likely to result due to the proposed action would be the exhaust of the missile during launch. However, the missiles are not considered stationary sources, and thus are not subject to the PSD review process. Target missile launch emissions and resulting impacts would be similar to those described in section 3.1.1.4.1.

Interceptor missile launch activities would result in air quality impacts of a nature similar to those described for the Hera target missile system. However, the level of impacts due to launch emissions would be greatly reduced due to the difference between the missiles' masses and resulting exhaust emissions. Launching two interceptors in rapid succession at one site would result in emissions equal to one fourth of a single Hera launch at that site (table 3.0-2).

Preliminary analysis of emissions monitoring of a 20 November 1997 Hera launch at Fort Wingate, New Mexico, indicates that concentrations of pollutants were well below any health-based limits at any distance from the launch site to which the public would have access.

Cumulative Impacts

Construction of the TMD test facilities at Cape San Blas would take place on a site owned by Eglin AFB that was originally developed in 1959 for monitoring missile testing over the Gulf of Mexico. Airspace monitoring from instrumentation on Cape San Blas has been operational since that time and will continue for the foreseeable future. No other major projects are currently planned. Residential and commercial development on St. Joe Peninsula has proceeded more slowly than for Gulf County as a whole.

Site preparation and flight test activities at Cape San Blas would have equivalent air quality impacts to the Santa Rosa Island proposal described in section 3.1.1.4.1.

Air emissions from the proposed action would be periodic in nature rather than continuous. Each series of missile launches would be a discrete air emission event. Emissions generated during one launch (including associated support emissions) would dissipate prior to the next series taking place. Therefore, because each launch event will

not cause an exceedance of the NAAQS, it is reasonable to assume the proposed action will not cause an exceedance of the NAAQS.

Current activities at Cape San Blas are minimal in nature (storage operations and recreational activities). The are no identified PSD sources and no future projects have been identified. As such, there are no foreseeable cumulative impacts to air quality at Cape San Blas.

Mitigation Measures

Standard procedures implement emergency response plan (appendix J) prior to test activities which includes notification procedures and an onsite recovery team for response to spill recovery.

Possible mitigations would include:

- Ensure that dust suppression measures are implemented during construction.
- Conduct monitoring of surface wind conditions prior to launch.
- Conduct air quality monitoring in the vicinity of the launch pad before and after initial launch.

3.1.2 AIRSPACE USE

Controlled and uncontrolled airspace would not be affected by TMD activities at either Santa Rosa Island or Cape San Blas.

3.1.2.1 Resource Description and Evaluative Methods

Airspace, or the space that lies above a nation and comes under its jurisdiction, is generally recognized to be a limited national resource. Airspace is defined vertically and horizontally, and by time, when describing its use for aviation purposes. The time dimension is a very important factor in airspace management and air traffic control.

Under the Federal Aviation Act of 1958 (Public Law 85-726), the FAA is charged with the safe and efficient use of the nation's airspace and has established certain criteria and limits to its use. The method used to provide this service is the National Airspace System (NAS). This system is ". . . a common network of U.S. airspace; air navigation facilities, equipment and services, airports or landing areas; aeronautical charts, information and services; rules, regulations and procedures, technical information and manpower and material" (Aviation Supplies and Academics, Inc., 1996).

3.1.2.2 Region of Influence

The ROI is defined as that airspace that would be potentially affected by the proposed action that would use portions of the NAS and/or international airspace. They include any class of airspace overlapped by the proposed LHA. Two separate ROIs are defined for the Eglin AFB locations. They include the airspace in the LHA from the surface to unlimited altitude surrounding the proposed TMD missile program test area in the vicinity of Santa Rosa Island and in the vicinity of Cape San Blas. These ROIs are shown in figures 3.1.2-1 and 3.1.2-2, respectively.

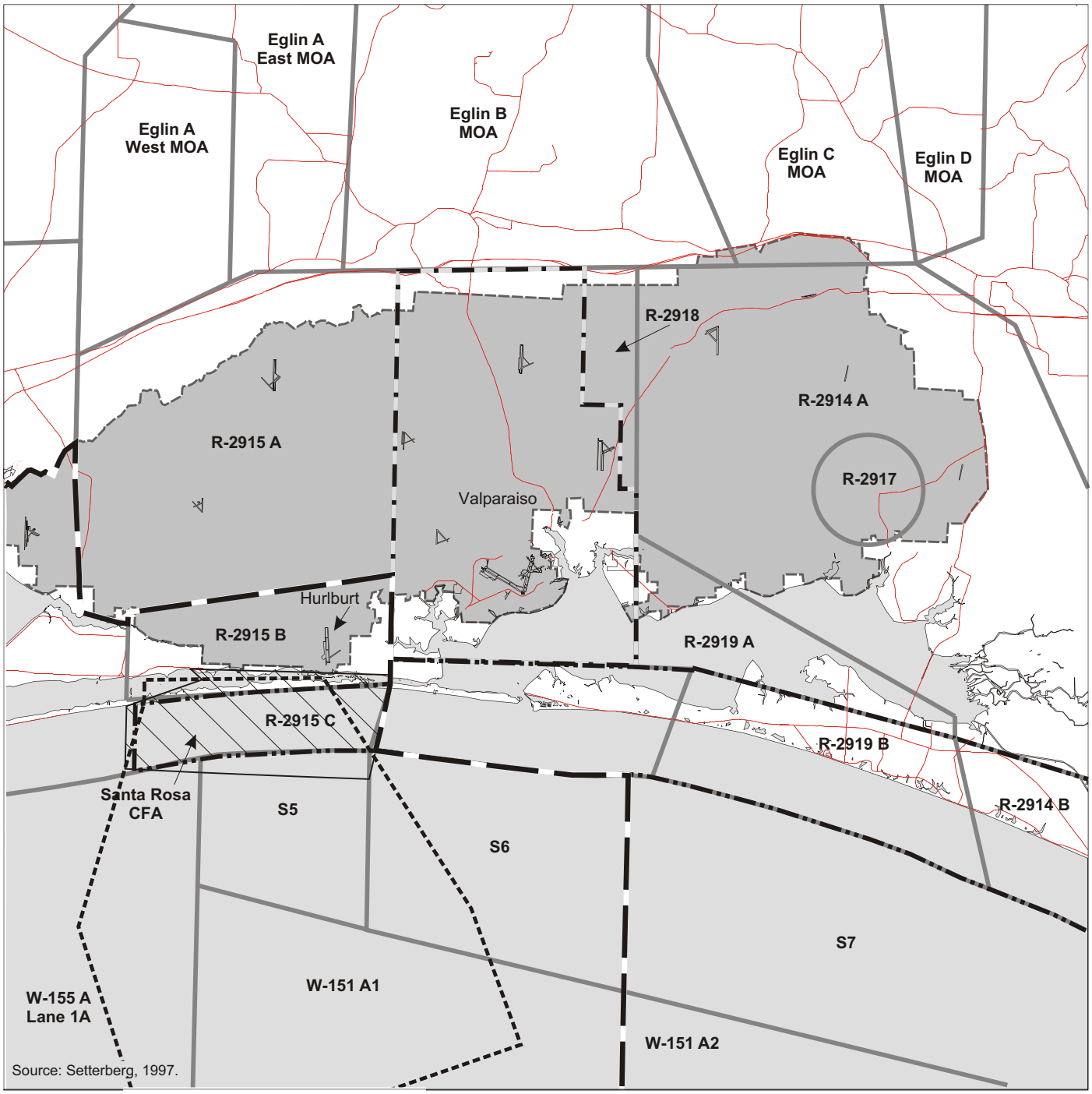
3.1.2.3 Affected Environment

The affected airspace use environment in the two Eglin AFB ROIs is described below in terms of its principal airspace attributes: controlled and uncontrolled airspace, special use airspace, military training routes, en route airways and jet routes, airports and airfields, and air traffic control. Although special use airspace is also considered controlled or uncontrolled airspace, depending on its location, it is discussed separately.

3.1.2.3.1 Santa Rosa Island

Controlled and Uncontrolled Airspace

Controlled and uncontrolled airspace referred to here is that airspace within the NAS that is managed by the FAA. Controlled and uncontrolled airspace has numerous designations from Class A to Class G depending upon the degree of airspace control required to maintain flight safety.



EXPLANATION

- Controlled Firing Area
- Eglin AFB
- Roads
- Airspace Boundaries
- Government Property
- Launch Hazard Area
- North-South Corridor (NSC)
- East West Corridor (EWC)
- Region of Influence

NOTES:
Eglin E MOA overlies all Restricted Areas (R).
East - West Corridor underlies: R-2915C, R-2919B, R-2914B, southern half of NSC, from the surface to 8,500 feet MSL.
That portion of Eglin E MOA above the North-South Corridor from FL 180 to FL 600, is an ATCAA.

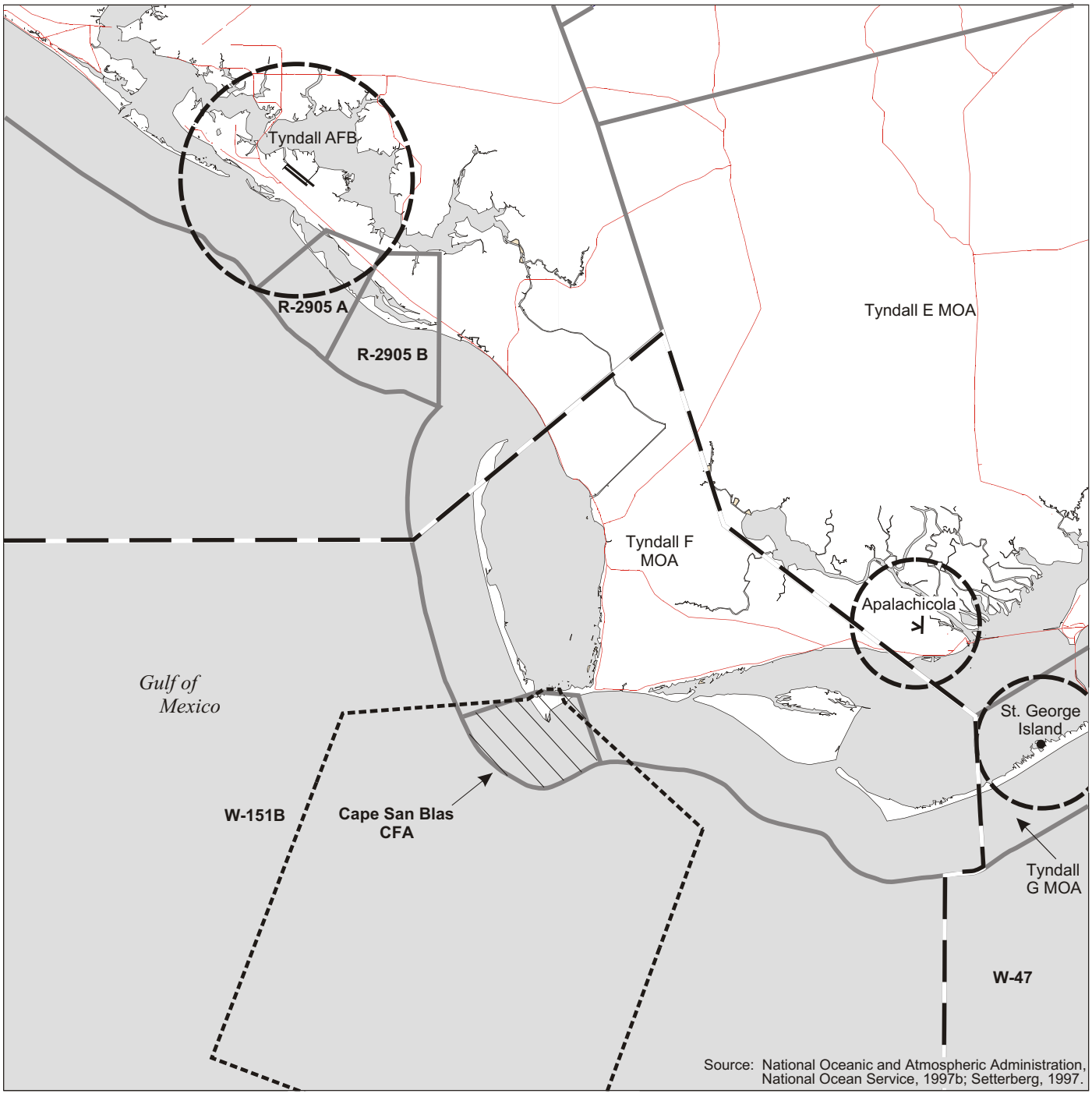
NORTH

0 4 8 Miles
0 6.5 13 Kilometers

Airspace Region of Influence

Santa Rosa Island, Florida

Figure 3.1.2-1



EXPLANATION

- Roads
- Airspace Boundaries
- Airport Airspace
- Launch Hazard Area
- Region of Influence
- Controlled Firing Area

Scale

NORTH

0 4 8 Miles

0 6.5 13 Kilometers

csb-500k-3as006

Airspace Region of Influence

Cape San Blas, Florida

Figure 3.1.2-2

Approximately 85 kilometers (53 miles) to the west and 107 kilometers (66 miles) to the east of the Santa Rosa Island launch site, is controlled airspace. This airspace is composed of Class A airspace from 5,486.4 meters (18,000 feet) mean sea level (MSL) up to and including Flight Level (FL) 600, including the airspace overlying the waters within 22.2 kilometers (12 nautical miles) of the coast, and Class E airspace below 5,486.4 meters (18,000 feet) MSL (figure 3.1.2-1). Class C and D airspace surrounds Pensacola and Pensacola Regional airports to the west of the special use airspace.

No Class B airspace, which usually surrounds the nation's busiest airports, or Class G (uncontrolled) airspace is found in the vicinity.

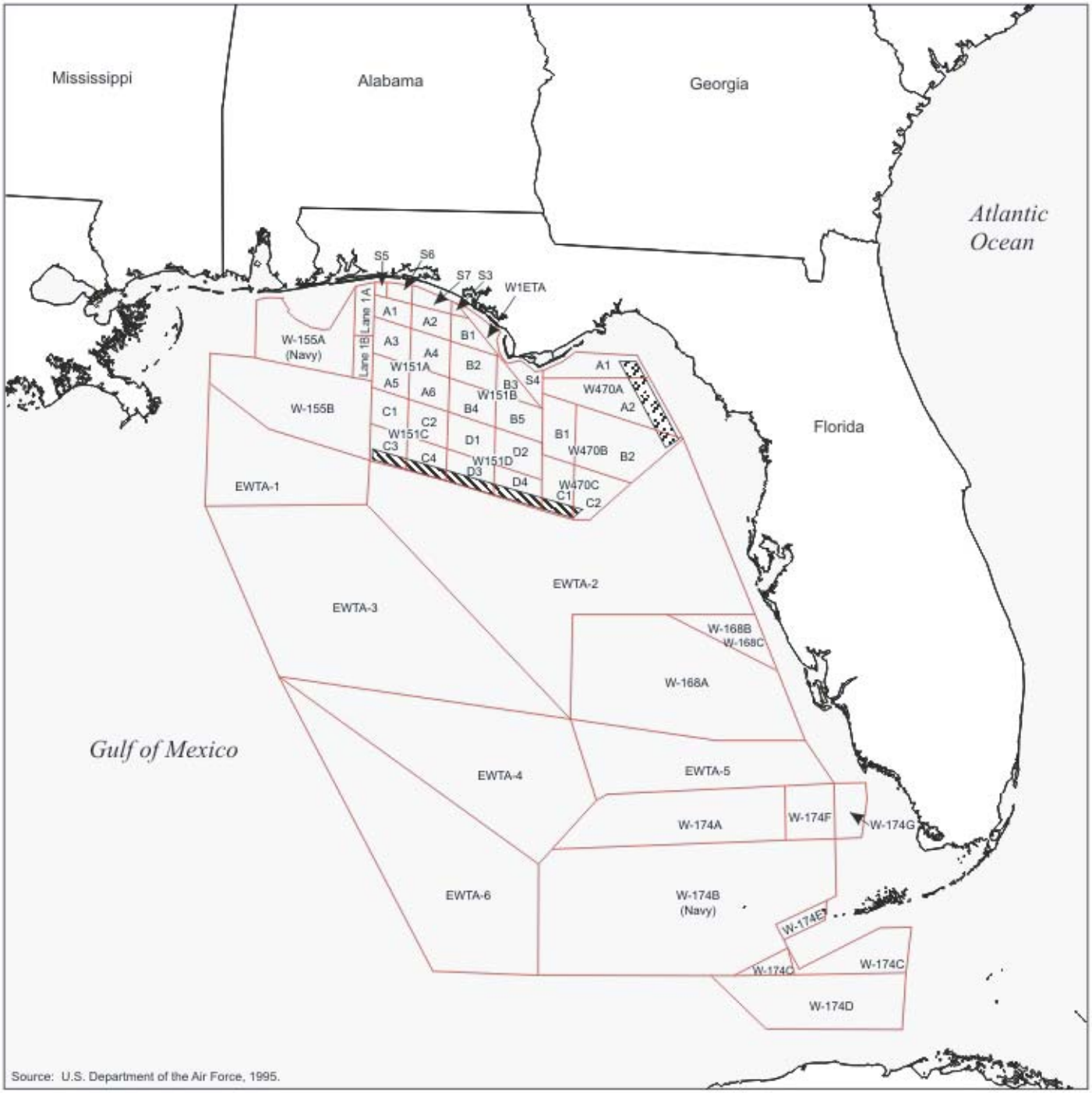
Special Use Airspace

The special use airspace in the Santa Rosa Island ROI consists of the following areas: R-2915C Restricted Area which lies immediately above Sites A-15 and A-10 on Santa Rosa Island; the western portion of the overlying Eglin E Military Operations Area (MOA); the Santa Rosa CFA; and the W-155A and W-151A Warning Areas offshore (figure 3.1.2-2). The R-2915A Restricted Area is part of the special use airspace complex over Eglin AFB, which includes several Restricted Areas, the Eglin E and Eglin F MOAs, and two Special Air Traffic Rule Corridors (figure 3.1.2-1).

Warning Area 151 (W-151) (figure 3.1.2-3) is a large volume of airspace extending south and east of Eglin AFB to Cape San Blas and approximately 190 kilometers (118 miles) over the Gulf of Mexico. The large Warning Area is divided into smaller units for airspace management purposes. The W-151 Test Area is scheduled for more than 27,000 hours per year and is used by approximately 15,000 sorties per year. Training accounts for 80 percent of the total hours scheduled for W-151. Test activities account for most of the rest, with exercises taking less than 1 percent. W-470 is adjacent to and east of W-151. The W-470 Test Area is scheduled for more than 13,000 hours per year and is used by approximately 20,000 sorties per year. W-155 Test Area is scheduled primarily by the Navy for more than 3,300 hours per year. The Navy conducts surface to air and surface to surface missile testing using Eglin Restricted Airspace, W-151, and the Eglin Water Test Areas (EWTAs) several times a year.

Restricted Areas R-2915 B and C lie directly over the proposed Santa Rosa Island launch location. R-2915 B is scheduled for 8,500 hours per year, and R-2915 C is scheduled for 700 hours per year.

An east-west corridor underlies the R-2915C Restricted Area over and just south of Santa Rosa Island. The purpose of the Special Air Traffic Rule Corridors is to alert aircraft that they must contact the appropriate air traffic control function prior to flight entry or operation in these terminal areas to obtaining routing and altitude clearance. The east-west corridor extends from the surface to 2,590.8 meters (8,500 feet) MSL, commencing at the eastern boundary of R-2914B, continuing between and below the northern and southern boundaries of R-2914B and R-2919B, and west below R-2915C (figure 3.1.2-1).



EXPLANATION

- Eglin Overwater Region of Influence
- EWTA — Eglin Water Test Area
- W — Warning Area
- Thunder Area
- Lightning Area

Notes: Lightning and Thunder Areas in W151 and W470 are deviation areas for Gulf Route 26 and J41-43, respectively, during severe weather.

Airspace is controlled by the FAA and scheduled and used by the Air Force and the Navy.

Scale 1:6,000,000

0 50 100 Miles

0 100 200 Kilometers

NORTH

Special Use Airspace in the Eastern Part of the Eglin Gulf Test Range Region of Influence

Figure 3.1.2-3

Unless otherwise authorized by the Eglin Radar Control Facility, aircraft cannot operate within the corridor without two-way radio communication with the Eglin Radar Control Facility or an appropriate FAA facility. The East–West Corridor allows non-participating aircraft access to airports in the Eglin AFB–Fort Walton Beach area. It is also used by low-altitude/low speed private and commercial aircraft (such as banner planes and ultra-lights).

Table 3.1.2-1 provides a listing of the affected Restricted Areas, MOAs, and Warning Areas and their effective altitudes, times used, and their manager or scheduler. There are no Prohibited or Alert special use airspace areas in the Santa Rosa Island ROI.

Table 3.1.2-1: Special Use Airspace in the Eglin AFB Airspace Use ROI

		Time of Use		
Number	**Altitude (Feet)**	**Days**	**Hours**	**Controlling Agency**
Santa Rosa Island				
R-2915B	To Unlimited	Cont[1]	Cont[1]	Jacksonville (ZIX) CNTR
R-2915C	8,500 to Unlimited	Cont[1]	Cont[1]	Jacksonville (ZIX) CNTR
W-151A	Unlimited	Inter[2]	Inter[2]	Jacksonville (ZIX) CNTR
W-155A	To FL 600	Inter[2]	Sunrise-0700	Jacksonville (ZIX) CNTR
Eglin E MOA	To but not including FL 180	Inter[2]	1200-0300	Jacksonville (ZIX) CNTR Eglin APP CON
Cape San Blas				
Tyndall E MOA	300 AGL to but not including FL 180	M-F[4]	Inter[2]	Tyndall RAPCON 4
Tyndall F MOA	300 AGL to but not including FL 180	M-F[4]	Inter[2]	Tyndall RAPCON 4
Tyndall G MOA	1,000 AGL to but not including FL 180	M-F[4]	Inter[2]	Tyndall RAPCON 4
W-151B	Unlimited	Inter[2]	Inter[2]	Jacksonville (ZIX) CNTR

[1] Cont = Continuous
[2] Inter = Intermittent
[3] Inter = Intermittent M-F, other times by NOTAM
[4] Other times by NOTAM

R = Restricted
W = Warning
MOA = Military Operations Area
APP CON = Approach Control
CNTR = Center
FL = Flight Level (FL 600 = 60,000 feet)
NOTAM = Notice to Airmen
RAPCON = Radar Approach Control (Military)

Source: National Oceanic and Atmospheric Administration, National Ocean Service, 1997e.

Military Training Routes

There are no Military Training Routes (MTRs) in the Santa Rosa Island ROI. MTRs, a joint venture by the FAA and the DOD, are mutually developed for use by the military for the purpose of conducting low altitude, high speed training.

En Route Airways and Jet Routes

There are no low-altitude airways or high altitude jet routes in the Santa Rosa Island ROI. The closest airways and jet routes traverse the area approximately 10 kilometers (6 miles) north of the Eglin AFB special use airspace complex, outside the ROI. Low altitude (up to but not including 5,486.4 meters (18,000 feet) MSL airways, and high altitude (above 5,486.4 meters [18,000 feet] MSL) jet routes are based on a center line that extends from one navigational aid or intersection to another navigational aid (or through several navigational aids and intersections) specified for that airway or jet route.

Airports and Airfields

The only airport or airfield in the ROI is Hurlburt Field at Eglin AFB (figure 3.1.2-1). Hurlburt Field is home to the 16th Special Operation Wing whose mission is to organize, train, and equip Air Force special operations forces for global deployment. As part of the Air Force Special Operations Command, the 16th Special Operations Wing manages a fleet of fixed-wing aircraft and helicopters. It lies under the R-2915B Restricted Area. It had a total of 68,824 operations in 1993. Hurlburt Field is not open to commercial air traffic.

Eglin AFB airfield and the Okaloosa County Air Terminal, both of which use Eglin AFB runways, are located outside, and east of, the Santa Rosa Island ROI.

Eglin AFB airfield, and Okaloosa County Air Terminal, which uses Eglin AFB runways, are located under the North-South Corridor outside, and east of, the Santa Rosa Island ROI.

Air Traffic Control

Air traffic control is provided by Jacksonville Center and Eglin AFB Approach Control.

3.1.2.3.2 Cape San Blas

Controlled and Uncontrolled Airspace

The airspace above and surrounding Cape San Blas is made up almost entirely of special use airspace. However, immediately to the north of Cape San Blas is controlled airspace. This airspace is composed of Class A airspace from 5,486.4 meters (18,000 feet) MSL up to and including FL 600, including the airspace overlying the waters of the Gulf of Mexico within 22.2 kilometers (12 nautical miles) of the coast, and Class E airspace below 5,486.4 meters (18,000 feet) MSL (figure 3.1.2-2). Circular areas surrounding Costin, Apalachicola, and St. George Island airfields denote that the airspace at and below 457.2 meters (1,500 feet) within the circles is excluded from the overlying Tyndall MOA (figure 3.1.2-2).

No Class B airspace, Class D airspace, or Class G (uncontrolled) airspace is found in the ROI.

Special Use Airspace

The special use airspace in the Cape San Blas ROI consists of the following areas: Tyndall F MOA; the Cape San Blas Controlled Firing Area; and portions of the W-151B Warning Area offshore. The R-2905 Restricted Area lies outside the ROI to the northwest of Tyndall F MOA, just south of Tyndall AFB (figure 3.1.2-2). Tyndall F MOA is active intermittently. The letter of agreement governing Tyndall I MOA operations includes an agreement to accommodate the CFA.

Table 3.1.2-1 provides a listing of the Restricted Areas, MOAs, and Warning Areas and their effective altitudes, times used, and their manager or scheduler. There are no Prohibited or Alert special use airspace areas in the Cape San Blas ROI.

Military Training Routes

There are no Military Training Routes in the Cape San Blas ROI.

En Route Airways and Jet Routes

There are no low-altitude airways or high altitude jet routes in the Cape San Blas ROI. The closest airways and jet routes traverse the area well to the north and east of the ROI.

Airports and Airfields

Three airports or airfields are located in the Cape San Blas ROI, including Costin airfield just south of Port St. Joe, Apalachicola Municipal airport to the east of Cape San Blas, and St. George Island airfield further to the east. None of the airfields or airports have control towers.

Air Traffic Control

Air traffic control is provided by Jacksonville Center and Tyndall AFB Radar Approach Control.

3.1.2.4 Environmental Impacts and Mitigations

3.1.2.4.1 Santa Rosa Island

CFA procedures would be utilized over the east-west corridor immediately adjacent to and south of the launch location. The CFA would not affect air traffic in the corridor.

No-action Alternative

Under the no-action alternative, the proposed ground-based TMD test activities on Santa Rosa Island would not be implemented. Current operations at Eglin AFB, including, Santa Rosa Island would continue at their current or planned levels.

Ongoing Eglin AFB mission activities, including: air-to-air, air-to-surface, and surface-to-air test and evaluation and training activities would continue to use the existing special use airspace. The continuing mission activities represent the kinds of activities for which the Eglin AFB special use airspace, was created; namely, to accommodate national security and necessary military activities, and to segregate activities considered to be hazardous to non-participating aircraft. The continuing mission activities do not conflict with any airspace use plans, policies and controls.

Ongoing mission activities would not require a change to: an existing or planned Instrument Flight Rules (IFR) minimum flight altitude, a published or special instrument procedure, or an IFR departure procedure; or, require a change to a Visual Flight Rules (VFR) operation from a regular flight course or altitude. Consequently, no impacts to the surrounding low altitude airways or high altitude jet routes would occur from the no-action alternative.

Ongoing Eglin AFB mission activities would not restrict access to or affect the use of the existing public use airfields and airports. Operations at the Okaloosa County Terminal, a joint use facility just outside the ROI which uses Eglin AFB runways and has a terminal area leased from DOD until January 2012 are limited to up to 60 operations per day by a Joint Use Agreement. Continuing mission activities would not change the terms of this agreement.

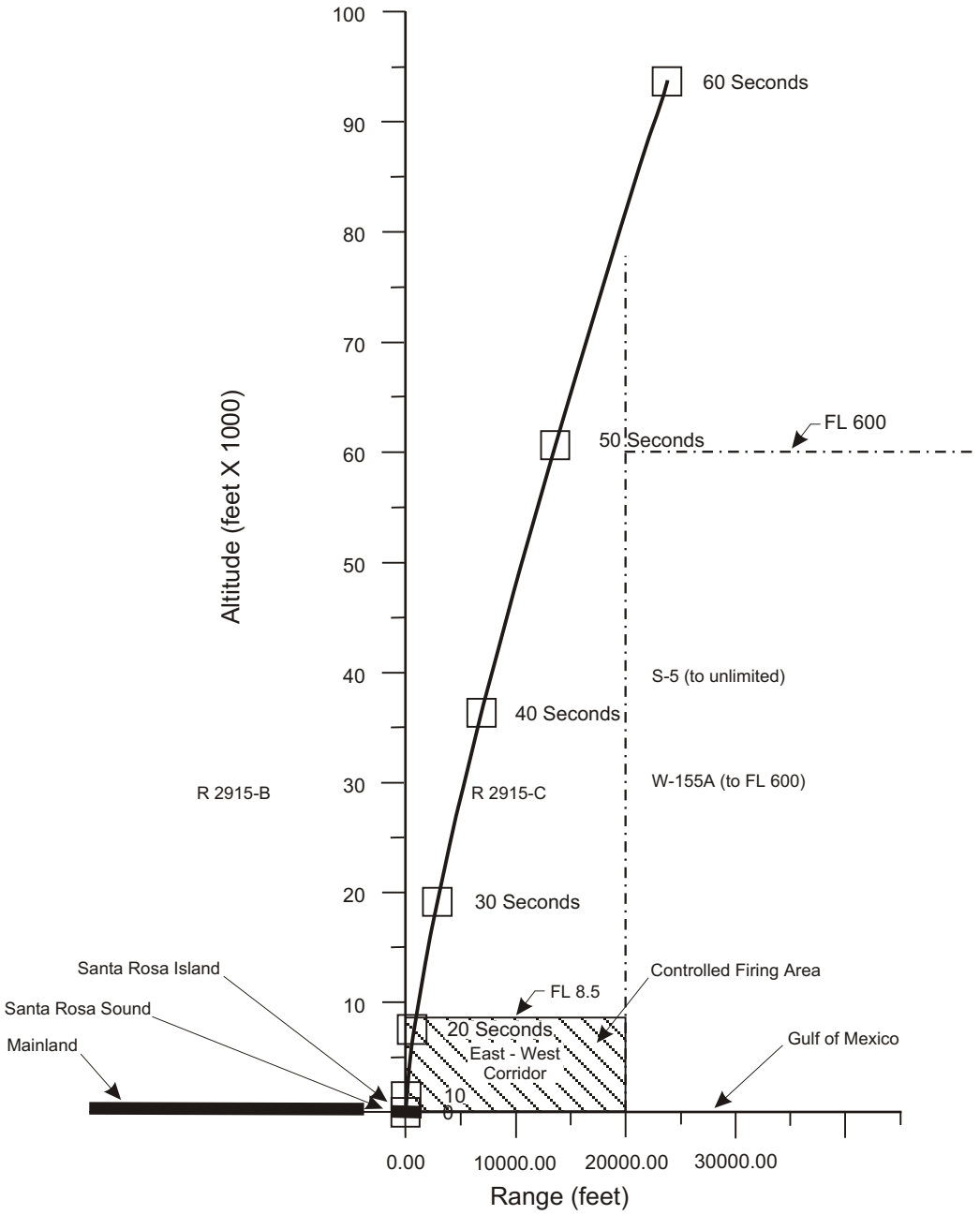
The existing airfield or airport arrival and departure traffic flows would not be affected by ongoing mission activities. Access to the Okaloosa County Terminal on Eglin AFB, the Destin-Fort Walton Beach and Navarre-Fort Walton Beach airports is ensured by the two Federal Aviation Regulation (FAR) Part 93 corridors, the North-South Corridor and the East-West-Corridor. With all arriving and departing aircraft, and all participating military aircraft, under the control of the Eglin Radar Control Facility, there would be no airfield or airport access conflicts in the area under the no-action alternative.

Site Preparation Activities

Site preparation activities for either interceptor or target missiles 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.

Flight Test Activities

The limited amount of controlled and uncontrolled airspace to the west and east of Eglin AFB Restricted Area complex would not be affected by the TMD program. Missile launches would take place within the existing special use airspace above and surrounding the Santa Rosa Island launch sites. A target missile would be above FL 600 (at 10,937 meters [35,884 feet] downrange) within 1 minute of launch (figure 3.1.2-4).



Source: Bledsoe, 1998; National Oceanic and Atmospheric Administration, National Ocean Service, 1997b.

Representative Trajectory in Relation to Eglin AFB Airspace

Figure 3.1.2-4

Interceptor or target missile launches from Site A-15 would occur within R-2915B, namely the Santa Rosa Island CFA and its overlying Restricted Area R-2915C (whose altitude of use is from 2,590.8 meters (8,500 feet) to unlimited), and Warning Areas W-155A and W-151 (figure 3.1.2-1) which lie to the south of R-2915C, and whose altitudes of use extend from the surface to FL 600 and unlimited. The CFA is established to cover activities which, if not conducted in a controlled environment, would be hazardous to non-participating aircraft. These activities include the firing of missiles, rockets, anti-aircraft artillery, and field artillery.

If 24 test events per year were conducted from either Eglin AFB site, each event affecting airspace for no more than 4 hours each, this would call for scheduling 96 hours of airspace per year for TMD testing or training activities. In a normal launch event, the airspace would be used for no more than 1 or 2 of the scheduled 4 hours.

The East-West Corridor, which extends from the surface to 2,590.8 meters (8,500 feet) MSL, allows aircraft access to airports in the Eglin AFB-Fort Walton Beach area, and is also used by low altitude or low speed private and commercial aircraft. Consequently, there would be no impacts to en route airways and jet routes in the Santa Rosa Island airspace ROI. This corridor is a Special Air Traffic Rule, FAR Part 93 (Subpart F-Valparaiso, Florida, Terminal Area) East-West Corridor underlying the R-2915C Restricted Area south of Santa Rosa Island.

The only airfield in the ROI, Hurlburt Field at Eglin AFB, lies within the R-2915B Restricted Area. Military aircraft using Hurlburt Field are under the control of Eglin Radar Control Facility and traffic would be coordinated to reduce any impact to Eglin AFB. Consequently, the TMD program would not restrict access to, or affect the use of, airfields and airports available for public use, and would not change airfield or airport arrival and departure traffic flows.

Access to the Okaloosa County Terminal at Eglin AFB, a joint use facility that uses Eglin AFB runways, the Destin-Fort Walton Beach, and Navarre-Fort Walton Beach airports, all of which lie outside the ROI, would not be affected by the TMD program. Access to these airports is ensured by the two FAR Part 93 corridors, the North-South Corridor, and the East-West Corridor. Whenever the Santa Rosa Island CFA is used, the R-2915B Restricted Area immediately to the north is also scheduled to ensure airspace would be available to IFR traffic flying along the coastline through the East-West Corridor. With all arriving and departing aircraft, and all participating military aircraft, under the control of the Eglin Radar Control Facility, there would be no airfield or airport conflicts in the ROI.

Cumulative Impacts

TMD testing would request clearance of various areas of airspace, and may cause rerouting or rescheduling of flights, for periods of as much as 4 hours, 24 times a year. This could result in as much as 96 hours of direct effect on air traffic access per year.

Santa Rosa Island is under restricted airspace that is part of the larger Eglin AFB complex of managed airspace. This airspace complex has been in existence for more than 50 years.

Conducting as many as approximately 24 1-hour test events each year from Santa Rosa Island for 10 years could result in as much as 24 hours of airspace effects per year. This would be well within the routine scheduled activity levels of restricted airspace at Eglin AFB. Calling up the CFA 24 times a year would not affect the East-West Corridor, because calling up a CFA has no effect on airspace use or access, and therefore no airspace access effects would accumulate.

Mitigations Considered

TMD flight test activities are within the current airspace use; therefore, no mitigations are proposed.

3.1.2.4.2 Cape San Blas

CFA procedures would be utilized immediately adjacent to and south of the launch location. The CFA would not affect air traffic in the area.

No-action Alternative

Under the no-action alternative, the proposed ground-based TMD test activities on Cape San Blas would not be implemented. Current operations at Eglin AFB, including Cape San Blas, would continue at their current or planned levels.

Ongoing Air Force mission activities would continue to use the existing special use airspace as discussed in section 3.1.2.4.1.

Ongoing mission activities would continue to use the existing special use airspace, and would not require either: 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 VFR operation to change from a regular flight course or altitude. Consequently, no impacts to the surrounding low altitude airways or high altitude jet routes would occur from the no-action alternative.

Ongoing mission activities would continue to use the existing special use airspace and would not restrict access to, or affect the use of, the existing public use airfields and airports.

Site Preparation Activities

Site preparation activities for either interceptor or target missiles 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.

Flight Test Activities

The limited amount of controlled or uncontrolled airspace to the west and east of the Cape San Blas launch site would not be affected by the TMD program. All activities would take place within the existing special use airspace above and surrounding the Cape

San Blas launch site, and would occur at sufficient distance and altitude that the target missile launches would hardly be noticed. Consequently, no impact to the controlled or uncontrolled airspace in the ROI is anticipated.

Interceptor or target missile launches from the D-3A site would occur within the Cape San Blas CFA. These activities are conduced under conditions controlled to eliminate hazards to non-participating aircraft and the W-151B Warning Area to the south (figure 3.1.2-2) and whose altitudes of use extend from the surface to unlimited.

There are no en route low altitude airways or high altitude jet routes in the Cape San Blas airspace ROI. Consequently, there would be no impact to en route airways and jet routes.

None of three airfields or airports in the ROI would be affected by the TMD program. The program would not restrict access to, or affect the use of any of the three airfields or airports, or affect airfield arrival and departure traffic flows. Tyndall AFB ATC would routinely accommodate the 96 hours per year of scheduled TMD launch activities into routine air traffic control procedures. Consequently, no impacts to the airports and airfields in the ROI would result.

Cumulative Impacts

Conducting as many as approximately 24 1-hour test events each year from Cape San Blas would result in as much as 24 hours of airspace effects per year. This would be well within the routine scheduled activity levels of restricted airspace at Tyndall AFB. Calling up the CFA 24 times a year would have no effect, because calling up a CFA has no effect on airspace use or access; therefore, no airspace access effects would accumulate.

Mitigations Considered

TMD flight test activities are within the current airspace use; therefore, no mitigations are proposed.

3.1.3 BIOLOGICAL RESOURCES

TMD activities at Santa Rosa Island could affect sea turtles and snowy plover habitats; wetlands would not be affected. TMD activities at Cape San Blas would adversely affect sea turtles, bald eagles, and wetlands habitats.

3.1.3.1 Resource Description and Evaluative Methods

Native or naturalized vegetation, wildlife, and the habitats in which they occur are collectively referred to as biological resources. Existing information on plant and animal species and habitat types in the vicinity of proposed sites was reviewed with special emphasis on the presence of any species listed as rare, threatened, or endangered by Federal, state, or local agencies to assess their sensitivity to the effects of the proposed action. Biological studies consisted of literature review, field reconnaissance, agency consultation, and map documentation. Several site visits to the project areas were conducted.

The analytical approach for biological resources involved quantifying and evaluating the degree to which the proposed TMD activities could impact the vegetation, wildlife, threatened or endangered species, and sensitive habitat within the various ROIs. Impacts that could result from proposed construction activities include vegetation disturbance and disturbance or displacement of wildlife from the accompanying noise and presence of personnel. Impacts could also result from launch-related activities such as launch noise, launch emissions, sonic booms, dispersion of chemical simulants, and debris impacts.

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

Environmental consequences of the preferred alternative are also analyzed in the Biological Assessment being prepared concurrently with the SEIS. Since the potential exists for impacts to listed species as a result of the proposed action, consultation has been initiated with the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS), Florida Department of Community Affairs (DCA), Florida Game and Freshwater Fish Commission (FGFWFC), and Florida Department of Environmental Protection (FDEP) in accordance with the Endangered Species Act, the Marine Mammal Protection Act, and other applicable guidelines of Federal, state, and local agencies.

3.1.3.2 Region of Influence

The ROI for biological resources, including wildlife, vegetation, and habitat, is roughly equivalent to the LHA for launches from Site A-15 on Santa Rosa Island. This

area includes portions of Santa Rosa Island, the marine habitat south within the LHA in the Gulf of Mexico, and the marine habitat north of the sites in Santa Rosa Sound.

The ROI for Cape San Blas includes the land area inside the LHA at Cape San Blas, and the immediate marine habitat in St. Joseph Bay and the Gulf of Mexico surrounding the southern tip of Cape San Blas that falls within the LHA.

3.1.3.3 Affected Environment

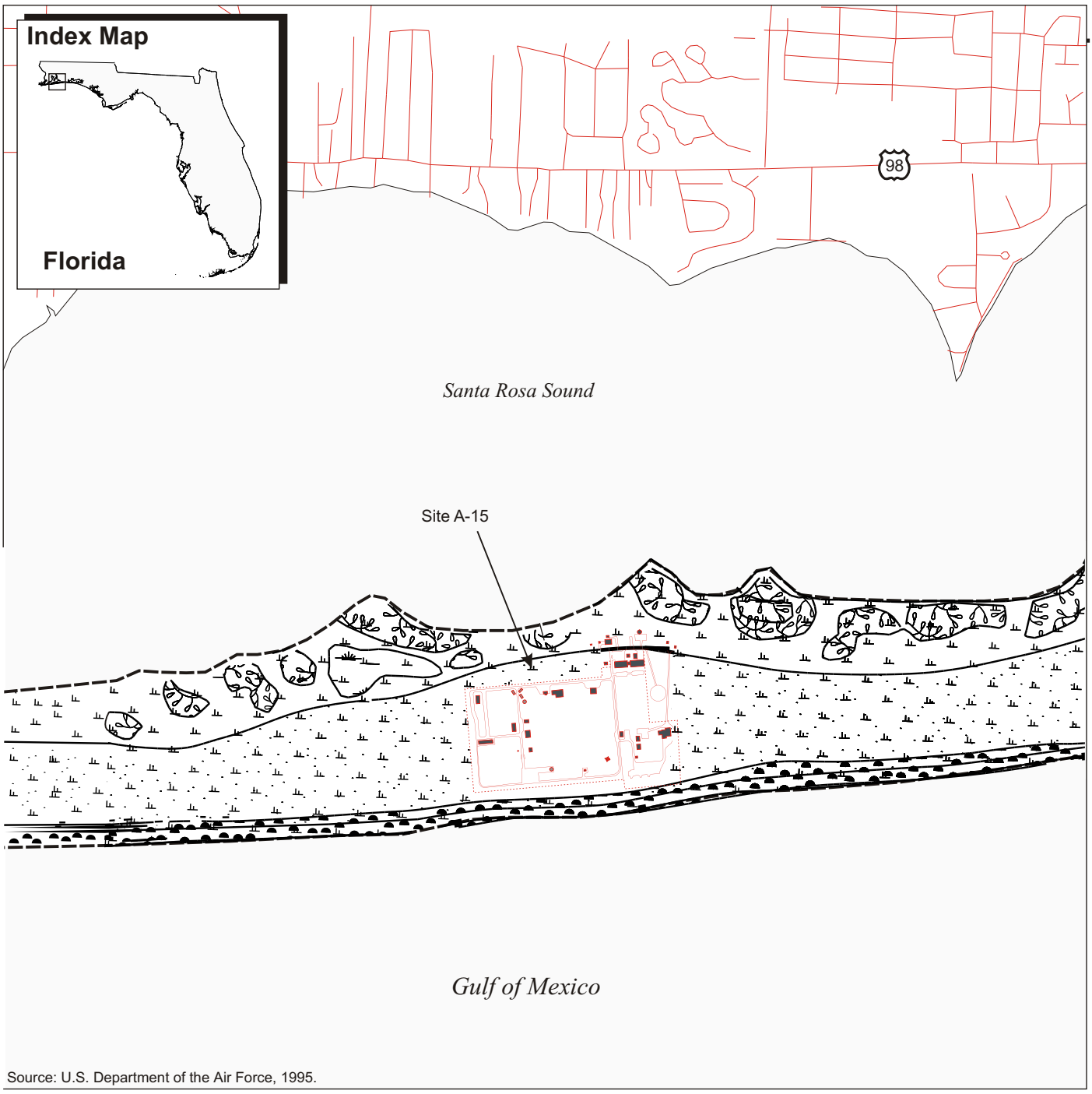
3.1.3.3.1 Santa Rosa Island

Vegetation

Santa Rosa Island supports barrier island vegetation (figure 3.1.3-1) such as coastal grassland scrub, open dunes, scrub, and flatwoods adapted to wind-driven sand, high salinity from salt spray deposition, and high winds (Myers and Ewel, 1992; Barrett Daffin and Carlan, Inc., 1982). Vegetation is sparse and includes sea oats (*Uniola paniculata*) along the southern beaches and dunes and slash pine (*Pinus elliottii*), sand pine (*Pinus clausa*), magnolia (*Magnolia grandiflora*), and sand live oak (*Quercus geminata*) on the uplands (U.S. Readiness Command, 1984). Old stable scrub, such as rosemary (*Ceratiola ericoides*) and British soldier lichen (*Cladonia leporina*), is located on the ridges. Swales (hollows, depressions, or low areas of land) in the central portion of the island have sparse to dense stands of slash pine, gallberry (*Ilex glabra*), and yaupon (*Ilex vomitoria*). (U.S. Department of the Air Force, 1995)

Tracy's beakrush (*Rhynchospora tracyi*), common pipewort (*Eriocaulon decangulare*), club moss (*Lycopodium appressum*), and bog buttons (*Lachnocaulon engleri*) are found between coastal swales. Panic grass (*Dicanthelium aciculare*) and nutgrass (*Cyperus lecontei*) are located in transition zones. Coastal grasslands are composed of gulf bluestem (*Schizachyrium maritinum*) and two species of golden aster described below. Tidal marshes occur along the north shore of Santa Rosa Island, but very little marsh habitat exists in the vicinity of Site A-15 (U.S. Department of the Air Force, 1992a).

During 1995, Santa Rosa Island's natural communities suffered extensive damage by Hurricanes Opal and Erin. The storm surge and wave action associated with Hurricane Opal in 1995 severely damaged vegetation on Santa Rosa Island. The immediate post-hurricane survey indicated that the beach dune, interdunal swale, and scrub communities were severely damaged. Flatwoods, although damaged, appeared relatively intact. Mortality of trees, shrubs, and herbaceous plants is evident over portions of the island. Wind and wave action eroded some substrate to the point where plants were uprooted and washed away or covered by sand. Some plant communities, however, are recovering as dune systems are re-established. The long term effects of salt spray and exposure of roots on the survival of plants remaining on the island will only be known with time. This disturbance should be considered a natural part of barrier island ecology. (Florida Natural Areas Inventory, 1997; U.S. Department of the Air Force, 1997)



Source: U.S. Department of the Air Force, 1995.

EXPLANATION

- Beach Dune
- Coastal Grassland
- Grassland Scrub
- Open Dune
- Mesic Flatwood/Oaks
- Government Property
- Scrub

Scale 1:24,000

0 1,000 2,000 Feet

0 250 500 Meters

Vegetation

Santa Rosa Island, Florida

Figure 3.1.3-1

104d-sri

Mortality of pine trees as a result of Hurricane Opal has provided temporary additional nesting sites for wading birds. Changes in the shoreline of Santa Rosa Island have occurred from Hurricane Opal's high wind and wave action. No substantial changes in marine resources are expected since submerged habitats did not undergo significant changes during the hurricane. (U.S. Department of the Air Force, 1997)

Cruise's golden aster (*Chrysopsis gossypina* ssp. *cruiseana*) (state-listed as endangered) has been identified on Santa Rosa Island. The USFWS is seeking more information on this species and encourages Federal agencies to consider it when planning actions (U.S. Department of the Interior, 1997). Most golden asters in the vicinity of Site A-15 appear to be Godfrey's golden aster, and are considered locally abundant (U.S. Department of the Air Force, 1995). One of the most dense populations occurs in a disturbed area with substantial amounts of gravel and debris in the sand, indicating that these annual golden aster species may be capable of rather rapid recovery after a disturbance (U.S. Department of the Air Force, 1992b).

The Gulf Coast lupine (*Lupinus westianus*), a state threatened species, is known to occur in dunes of Santa Rosa Island. Seven occurrences of the Florida perforate cladonia (*Cladonia perforata*), a Federally listed endangered lichen, have been documented on Santa Rosa Island. This species is found on old, stable dunes, in association with rosemary balds on the leeward sides of the dunes. The state-endangered Cruise's golden aster grows on crests and leeward sides of sand dunes on the north side of Santa Rosa Island. It has been documented at 31 sites on Eglin AFB. Populations of these species were severely impacted by storm-related effects resulting from Hurricane Opal. The closest known location of the Florida perforate cladonia to the site is approximately 12.8 kilometers (7.9 miles) east of Site A-15. Table 3.1.3-1 provides a list of plants with Federal or state status potentially occurring on Santa Rosa Island.

Wildlife

Although a cooperative agreement between Eglin AFB, the USFWS, and the Florida Game and Fresh Water Fish Commission (FGFWFC) has been established (1992) to provide public access to Eglin AFB property for recreation, including hunting, Santa Rosa Island is not open to the public.

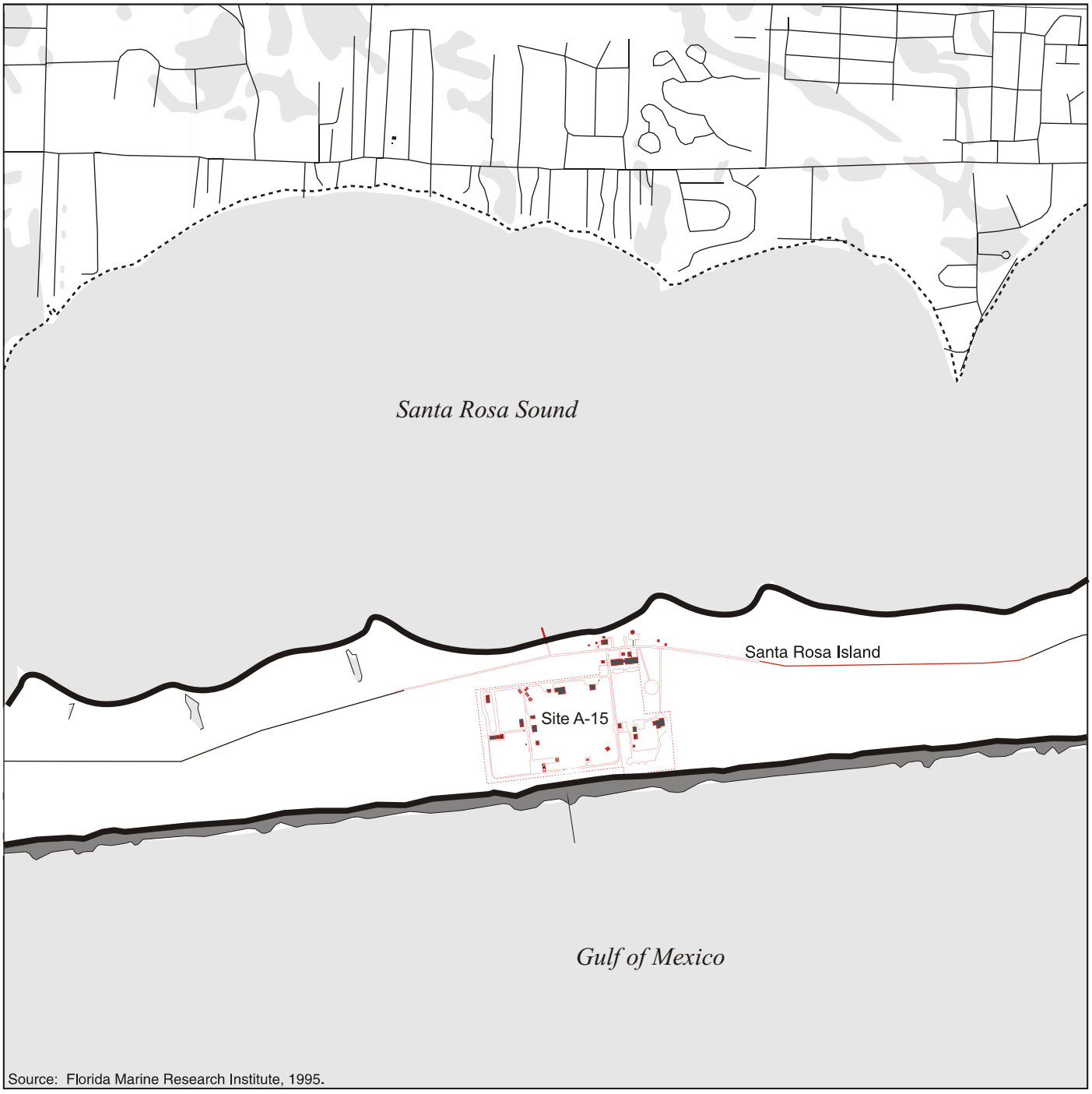
Wildlife is limited at Site A-15 due to the open nature of the vegetation, lack of potable water, and high ground surface temperatures. Shorebirds and wading birds are the primary wildlife at the site, occurring along the beach, dune line, and the swales and grasslands. The eastern end of Santa Rosa Island, approximately 17 kilometers (10.5 miles) east of Site A-15, is important shorebird wintering and nesting habitats. Several ospreys (*Pandion haliaetus*) were recently observed flying north over the site and along the shoreline. Bald eagles have also been observed flying over Santa Rosa Island and perched in nearby trees. Use of this area of Santa Rosa Island by transient wildlife is relatively low due to the poor surf- and beach-dwelling food sources. Figure 3.1.3-2 illustrates the sensitive habitat for threatened or endangered species at Santa Rosa Island (U.S. Department of the Air Force, 1992a). Mammals present on Santa Rosa Island include white-tailed deer (*Odocoileus virginianus*), coyote (*Canis latrans*), gray fox (*Urocyon cinereoargenteus*), and raccoon (*Procyon lotor*).

Table 3.1.3-1: Sensitive Species with Federal or State Status Potentially Occurring at Santa Rosa Island and Cape San Blas

		Status	
Scientific Name	**Common Name**	**State**	**Federal**
Plants			
Chrysopsis gossypina vaccruiseana	Cruise's golden aster	E	I
Cladonia perforata	Florida perforate cladonia (SRI)	–	E
Euphorbia telephioides	Telephus spurge (CSB)	E	T
Lupinus westianus	Gulf coast lupine	T	I
Mammals			
Peromyscus polionotus leucocephalus	Santa Rosa beach mouse (SRI)	–	I
Peromyscus polionotus peninsularis	St. Andrew beach mouse (CSB)	E	PE
Birds			
Charadrius alexandrinus tenuirostris	Southeastern snowy plover	T	I
Charadrius melodus	Piping plover	T	T
Falco peregrinus tundrius	Arctic peregrine falcon (CSB)	E	T(S/A)
Falco sparverius paulus	Southeastern American kestrel	T	I
Haliaeetus leucocephalus	Bald eagle	T	T
Sterna albifrons antillarum	Least tern	T	–
Pandion haliaetus	Osprey	SSC	–
Fish			
Acipenser oxyrinchus desotoi	Gulf sturgeon	SSC	T
Reptiles and Amphibians			
Alligator mississippiensis	American alligator	SSC	T(S/A)
Caretta caretta	Atlantic loggerhead	T	T
Chelonia mydas	Atlantic green turtle	E	E
Dermochelys coriacea	Atlantic leatherback	E	E
Drymarchon corais couperi	Eastern indigo snake	T	T
Gopherus polyphemus	Gopher tortoise	SSC	–

– = Not listed
CSB = Cape San Blas
E = Endangered
I = Information needed about the status of the species. Although not protected under the ESA, the USFWS encourages Federal agencies and the public to consider these species in environmental planning
PE = Proposed endangered
SRI = Santa Rosa Island
SSC = Species of Special Concern
T = Threatened
T(S/A) = Threatened due to similarity of appearance with a Federally listed species

Source: U.S. Department of the Interior, U.S. Fish and Wildlife Service, 1997; Florida Spaceport Authority, undated; Atencio, 1997.



Source: Florida Marine Research Institute, 1995.

EXPLANATION

- Roads
- Shoreline
- Santa Rosa Beach Mouse
- Sea Turtles and Snowy Plover Nesting

Scale 1:24,000

0 1,000 2,000 Feet

0 250 500 Meters

Sensitive Habitat Locations

Santa Rosa Island, Florida

Figure 3.1.3-2

Santa Rosa Island is heavily used by numerous species of migratory birds as they move north in the spring. The Gulf Coast is the first land that birds can rest on after crossing the Gulf of Mexico and is therefore very important for successful migration. Figure 3.1.3-3 displays the periods of sensitivity for the various species.

Transient listed species in the area surrounding Santa Rosa Island are the peregrine falcon (*Falco peregrinus*), bald eagle (*Haliaeetus leucocephalus*), and brown pelican (*Pelecanus occidentalis*) (U.S. Department of Energy, 1991). Eglin AFB and Santa Rosa Island lie within a migratory bird route.

The Santa Rosa beach mouse (*Peromyscus polionotus leucocephalus*) is under consideration for Federal listing as threatened or endangered. This small, light-colored mouse is restricted to coastal sand dune ecosystems where it burrows and excavates nests. Its diet consists of plant seeds and insects. It prefers sand-covered slopes with patches of sea oats, beach and other grasses, and herbs. This subspecies occurs only on Santa Rosa Island. (U.S. Fish and Wildlife Service, no date)

The once continuous range of the Santa Rosa beach mouse has been fragmented and reduced by habitat loss and other factors. Coastal development, intense vehicle and pedestrian use, natural erosion, hurricanes, and tropical storms have damaged or destroyed sand dunes in the area. Predation by cats, competition from other rodents, and decreased genetic fitness as a result of population fragmentation have also contributed to the mouse's overall decline. (U.S. Fish and Wildlife Service, no date)

The Southeastern snowy plover (*Charadrius alexandrinus tenuirostris*) (listed in Florida as threatened) nests along the gulf coast of Florida and Alabama. Nearly half of Florida's snowy plover population nests on Santa Rosa Island (U.S. Department of the Air Force, 1996). Approximately two nest sites per mile occur along Santa Rosa Island, making these dunes the most abundant nesting location in Florida. The solitary nests are built between late March and early September. Snowy plovers were seen nesting directly on the graveled launch pad in 1993. Snowy plovers are very sensitive to disturbance during the nesting season. (U.S. Department of the Air Force, 1992b)

In addition to use by listed species, Santa Rosa Island is an important foraging area for shorebirds, especially during the winter. Large concentrations of shorebirds forage on the beaches and dunes that surround Sites A-15 and A-10.

Atlantic Green Turtle. The green sea turtle (*Chelonia mydas*) is Federally classified as a threatened species, except for breeding populations in Florida, which are listed as endangered. The State of Florida also classifies the green sea turtle as an endangered species (Wood, 1996). The Atlantic green turtle is known to occur in the Panhandle and Gulf of Mexico portions of the project area. Between 200 to 1,100 females nest on U.S. beaches (National Marine Fisheries Service, 1996). The FDEP estimates that between 130 and 717 female green sea turtles nest in Florida annually and that the population seems to be increasing, although annual estimates fluctuate greatly and some researchers question the reported population growth (Meylan et al., 1995, National Marine Fisheries Service, 1997). Nesting sites are predominately along the southeast Florida coast, with minor nesting occurring in the southwest and Panhandle regions.

Nesting and Breeding Periods-Santa Rosa Island and Cape San Blas

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Snowy plover			■	■	■	■	■	■				
Bald eagle	■	■	■	■	■					■	■	■
Least tern			■	■	■	■	■	■	■			
Green sea turtle			■	■	■	■	■	■	■			
Loggerhead turtle			■	■	■	■	■	■	■			

Source: Kale and Maehr, 1990.

Nesting/Breeding Periods

Figure 3.1.3-3

Within the vicinity of the project, one green sea turtle nest was found at Cape San Blas in 1994; it was not, however, located on Air Force property (Florida Department of Environmental Protection, undated, 1996). Prior to that year, the only nesting on the Gulf coast was recorded from Eglin AFB, on Santa Rosa Island (Meylan, Schroeder, and Mosier, 1995). A comprehensive survey of sea turtle nesting since 1987, including 1997, states that 52 green turtle nests and 35 false crawls have been documented on Eglin AFB property with remigration occurring approximately every 2 years (U.S. Department of the Air Force, 1998).

Of 22 green sea turtles observed during NMFS aerial surveys conducted in the Gulf of Mexico (Gulf) between 1987 and 1994, a large percentage were in the vicinity of the lower Keys (National Marine Fisheries Service unpublished data, Pascagoula, Mississippi). There were no observations in the northern Gulf or along the proposed flight test area, except in the area immediately to the north of the Keys. However, since these turtles nest on Eglin AFB beaches, the potential exists for them to occur in northern Gulf of Mexico waters.

Atlantic Loggerhead Turtle. The loggerhead sea turtle (*Caretta caretta*) is Federally and state listed as a threatened species (Wood, 1996). The FDEP estimates that between 9,000 and 16,700 female loggerhead sea turtles nest an average of 4.1 times per nesting season in Florida (Meylan, Schroeder, and Mosier, 1995). Okaloosa and Gulf counties each support less than 0.1 percent of all Florida loggerhead nests (Meylan, Schroeder, and Mosier, 1995). In the northwest region, which contains Santa Rosa Island and Cape San Blas, nesting has been reported between 27 April and 24 September (Meylan, Schroeder, and Mosier, 1995).

Along the Florida Panhandle, loggerhead sea turtles nest both on Santa Rosa Island and Cape San Blas. A total of 259 loggerhead nests and 291 false crawls have been documented on Eglin AFB at Santa Rosa Island between 1987 and 1997. A total of 192 nests and 296 false crawls have been documented on Federal property at Cape San Blas since surveys began in 1994. Along the eastern Gulf, most nesting occurs from Sarasota through Collier counties (Meylan, Schroeder, and Mosier, 1995).

Aerial surveys conducted between 1987 and 1994 by NMFS indicated that loggerhead sea turtles are the most common species in the Gulf, extending out to the slope of the OCS. Of the 1,051 turtles that were observed, most in the northern Gulf were to the west of Santa Rosa Island and to the east of Cape San Blas as opposed to immediately offshore from either proposed launch site (National Marine Fisheries Service, undated, Pascagoula, Mississippi). During a helicopter survey of a marine target area off of Santa Rosa Island, approximately three turtles/square kilometer (seven turtles/square mile) were observed during June (Eglin Air Force Base, 1996). The proposed flight test area encompasses scattered loggerhead turtle observations along the entire path.

Hawksbill Turtle. The hawksbill turtle (*Eretmochelys imbricata*) is Federally and state-listed as an endangered species. Nesting by hawksbill turtles in Florida is rare; only 11 nests were documented between 1979 and 1992, primarily in Dade County (Meylan, Schroeder, and Mosier, 1995). Since this species is a solitary nester, estimating population size is difficult. Post-hatchling hawksbills occupy the pelagic environment and reenter coastal

waters after they reach a 20- to 25-centimeter (8- to 10-inch) carapace length (National Marine Fisheries Service, 1997). Breeding only occurs after at least 31 years following recruitment into the reef ecosystem.

All of the 141 hawksbill turtles observed during NMFS aerial surveys between 1987 and 1994 were in the vicinity of the lower Keys (National Marine Fisheries Service, undated). There were no observations in the northern Gulf or along the proposed flight test area.

Kemp's Ridley Turtle. The Kemp's Ridley turtle (*Lepidochelys kempii*), one of the smallest of the sea turtle species, was Federally listed as an endangered species in 1970. An estimated 500 females nest worldwide (National Marine Fisheries, 1997). Only one Kemp's Ridley turtle nested in Florida between 1979 and 1992 (Meylan et al., 1995). This nest was in Pinellas County in 1989. The distribution of this species is restricted to the Gulf of Mexico (Air Force Development Test Center, Environmental Management Directorate, 1997).

Of 31 Kemp's Ridley turtles observed during NMFS aerial surveys between 1987 and 1994, there were several observations well to the east of Cape San Blas, but none in the immediate area of the launch sites. No other observations were recorded along the proposed flight test area. (National Marine Fisheries Service, undated)

Leatherback Turtle. The leatherback turtle (*Dermochelys coriacea*) was Federally listed as an endangered species in 1970 and is the largest of the sea turtle species. In Florida, the leatherback turtle nests almost exclusively along the eastern coast, primarily in Martin and Palm Beach counties (Florida Department of Environmental Protection, undated; Meylan, Schroeder, and Mosier, 1995). The FDEP estimates that between 16 and 31 females nest annually from late February through early September in Florida, with each female potentially nesting 5 to 7 times each year (Meylan, Schroeder, and Mosier, 1995). There are no records of leatherback nesting on Santa Rosa Island (National Oceanic and Atmospheric Administration, 1995). One nest was documented at St. Joseph State Park, near Cape San Blas, in 1993 (Florida Department of Environmental Protection unpublished data, 1996). Estimating the size of the population is difficult because females often change beaches used for nesting (National Marine Fisheries Service Internet Homepage). This species is more pelagic than other species of sea turtles, is highly migratory, and feeds primarily on jellyfish (National Marine Fisheries Service,1997).

Most of the 181 leatherback turtles observed during NMFS aerial surveys of the central and western Gulf conducted between 1987 and 1994 were concentrated offshore from Louisiana and Mississippi (National Marine Fisheries Service unpublished data, Pascagoula, Mississippi). However, at least nine observations were offshore from Santa Rosa Island, and several were near the shore to the east of Cape San Blas. Strandings have been reported to FDEP from Santa Rosa Island.

Sensitive Habitat

A critical shorebird wintering and nesting area has been identified on the eastern end of Santa Rosa Island, although the island's entire shoreline is often used by nesting shorebirds (figure 3.1.3-2). There are several areas of wetland in the general vicinity of

Sites A-15 and A-10 (figure 3.1.3-4). Although sparse seagrass beds occur in the shallow waters of Santa Rosa Sound and offshore, no major beds occur near Site A-15 (figure 3.1.3-4) (U.S. Department of the Air Force, 1995; U.S. Department of the Interior, 1997).

3.1.3.3.2 Cape San Blas

Existing information on plant and animal species and habitat types in the vicinity of the launch site at Cape San Blas was reviewed, with special emphasis on the presence of any species listed by Federal, state, or local agencies as rare, threatened, or endangered. Biological studies consisted of literature review, field reconnaissance, and map documentation. Site visits to the project area were conducted. The following sections describe the vegetation and wildlife resources associated with the Cape San Blas site.

Vegetation

Cape San Blas is surrounded by Saint Joseph Bay to the north and the Gulf of Mexico to the east, south, and west. Biological resources at Cape San Blas are constantly affected by the dynamics and characteristics of these waterbodies (figure 3.1.3-5). Vegetation north of the launch pad is maintained by mowing and consists of grasses and other groundcover (figure 3.1.3-6).

Plant communities of Cape San Blas are typical of Atlantic or Gulf barrier island vegetation associations. Salt tolerance is an important factor in the tidal communities along the beaches. Fresh or brackish water communities are found behind the primary dune system, and are either scrubby or forested marshes and swamps (figure 3.1.3-7). Cape San Blas also has upland habitat, including flatwoods, shrubs, xeric (dry, desert-like conditions) and old scrub dunes, and a variety of disturbed areas in various stages of recovery (figure 3.1.3-8). A very dense slash pine forest is located on the bayshore. The rest of the cape consists of a series of swales and ridges. Vegetation on the swales consists of slash pines, gallberry, willow (*Salix* sp.), white-topped sedge (*Dichromena colorata*), and sawgrass (*Cladium jamaicense*). Old stable scrub, such as rosemary and British soldier lichen, is located on the ridges.

A large area of coastal grassland borders the gulf beach south of the Coast Guard station and grades westward into an upper tidal marsh grassland at the point. Species located here include saltmeadow cordgrass (*Spartina patens*), hairgrass *(Muhlenbergia capillaris*), marsh elder (*Iva frutescens*), and saltbush (*Baccharis halimifolia*). The narrow beach dune vegetation is composed mainly of sea oats and saltmeadow cordgrass. Species found in the upper beach zone include beach morning glory (*Ipomoea stolonifera*) and seashore paspalum (*Paspalum distichum*).

Telephus spurge (*Euphorbia telephioides*), a Federal threatened and state endangered plant, could potentially be located on Cape San Blas. However, the only rare plant documented on Cape San Blas is the Gulf coast lupine (*Lupinus westianus*) which is listed as threatened by the state. This lupine species is uniquely adapted to unstable and changing habitat and occurs on exposed and active sand dunes. Table 3.1.3-1 provides a list of plants with Federal or state status potentially occurring on Cape San Blas.

EXPLANATION

- Roads
- Fence
- Government Property
- Saltmarsh
- Patchy Seagrass

Scale 1:24,000

0 1,000 2,000 Feet

0 250 500 Meters

North

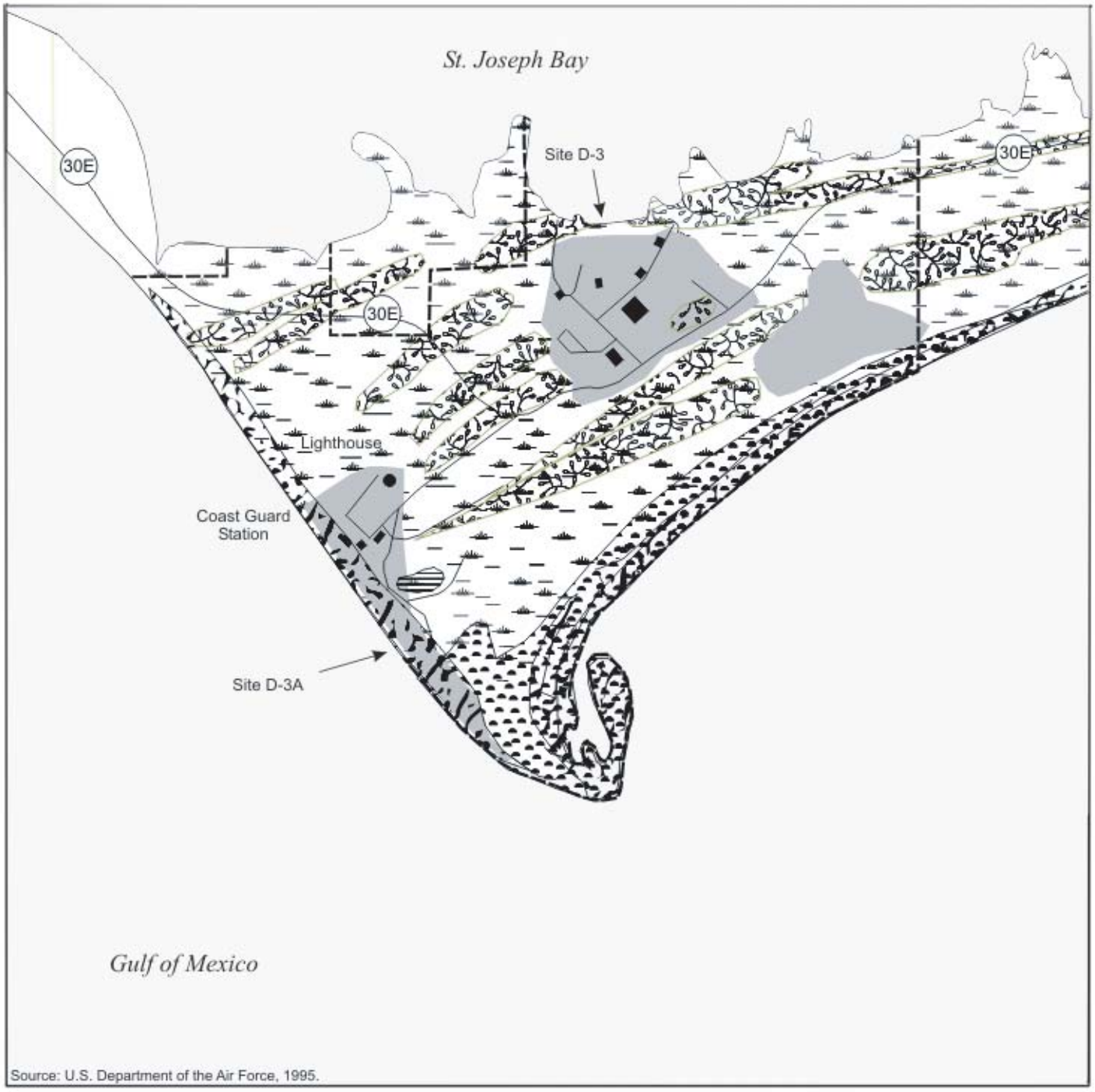
019srbe

Wetlands

Santa Rosa Island, Florida

Figure 3.1.3-4

Figure 3.1.3-5: Shoreline of Cape San Blas - West Side



Source: U.S. Department of the Air Force, 1995.

EXPLANATION

- Beach Dune
- Disturbed Area
- Grassland Scrub
- Mesic Flatwood/Oaks
- Coastal Grassland
- Open Dune
- Scrub
- Open Water
- Government Property

Scale 1:24,000

0 1,000 2,000 Feet

0 250 500 Meters

104d-csb

Vegetation

Cape San Blas, Florida

Figure 3.1.3-6

Figure 3.1.3-7: Cape San Blas Marsh Habitat

Figure 3.1.3-8: Cape San Blas Upland Habitat

Wildlife

Cape San Blas is within a migratory bird route and is heavily used by a wide variety of migratory shorebirds throughout the year. Cape San Blas is also a known shorebird wintering and nesting area (U.S. Department of the Interior, 1997). An active bald eagle nest occurs on U.S. Air Force property within approximately 914 meters (3,000 feet) of the proposed launch site (figure 3.1.3-9). This pair began nesting at the site several years ago and produced young for the first time during the 1996–1997 nesting season (U.S. Department of the Interior, 1997). The state threatened snowy plover is a year-round resident and has been known to nest on the property; the site is a wintering ground for the piping plover (*Charadrius melodus*).

Also of special concern are sea turtles, which nest along the Cape San Blas shoreline, particularly the Atlantic loggerhead. Since 1994, 192 loggerhead turtle nests and 296 false crawls have been identified at Cape San Blas (Atencio, 1997; U.S. Department of the Air Force, 1995). Cape San Blas has the highest sea turtle nesting density in northwest Florida—approximately 10 nests per kilometer (15 nests per mile).

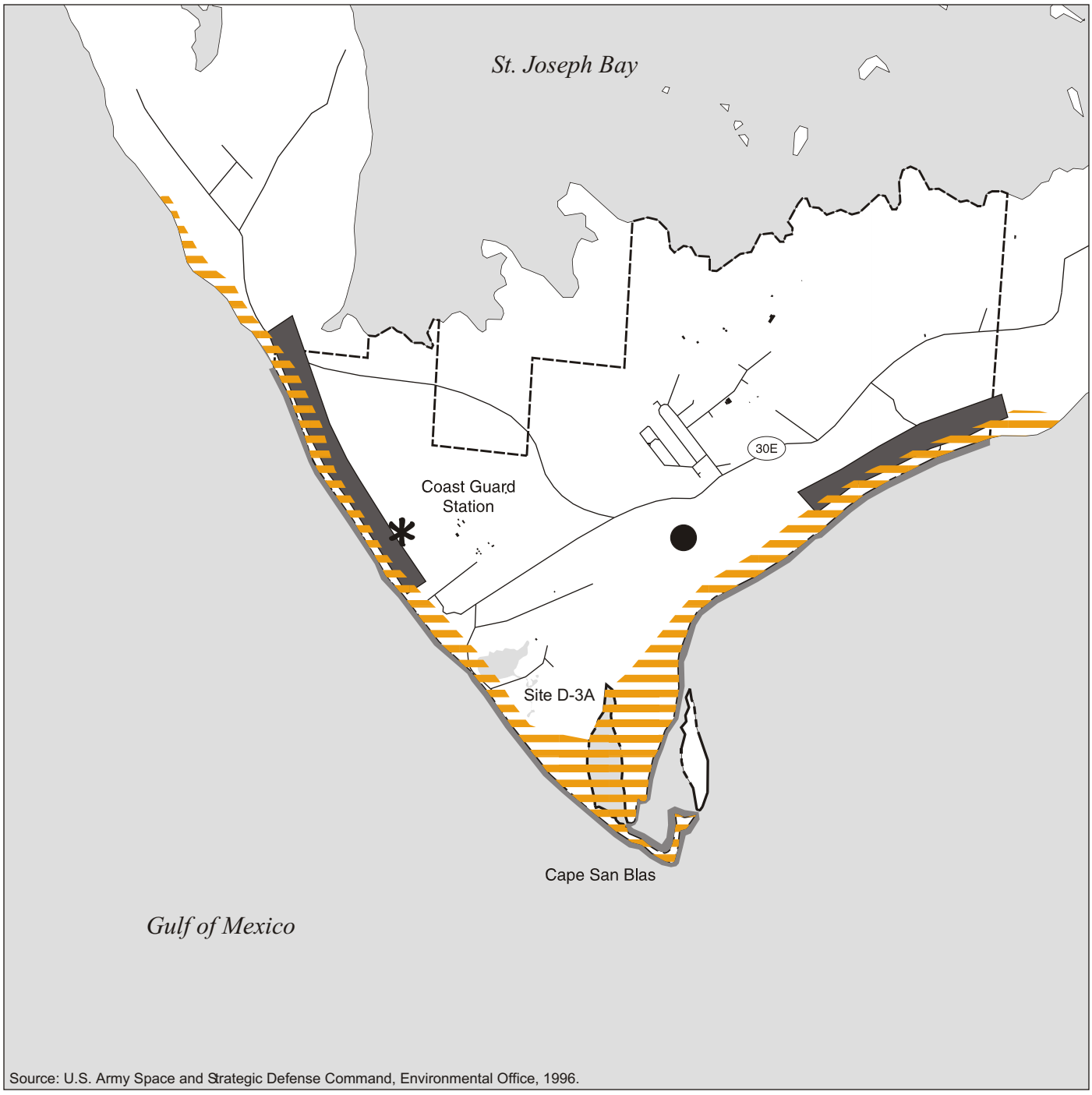
The beaches provide potential habitat for a proposed Federal endangered and state endangered species of beach mouse (*Peromyscus polionotus peninsularis*). Table 3.1.3-1 provides a list of wildlife species with Federal or state status potentially occurring on Cape San Blas (U.S. Department of the Interior, 1984a).

The flatwoods provide potential habitat for gopher tortoises (*Gopherus polyphemus*), although no evidence of this species was observed during the site visits.

Sensitive Habitat

The Saint Vincent National Wildlife Refuge is located approximately 19 kilometers (12 miles) east of Cape San Blas on Saint Vincent Island. An additional portion of the refuge lies 5 kilometers (3 miles) north of Cape San Blas on Pig Island and includes the southern region of Saint Joseph Bay. Saint Joseph Peninsula State Park is located 11 kilometers (7 miles) northwest of Cape San Blas and north of Pig Island (U.S. Department of the Interior, 1984b). Leatherback sea turtle (*Dermochelys coriacea*) nesting has been documented at the park (U.S. Department of the Air Force, 1995). The Pig Island Unit and Saint Vincent Island refuges are known to include areas of nesting bird colonies and endangered wildlife habitats (U.S. Department of the Interior, 1984b). Figure 3.1.3-10 illustrates sensitive habitat for threatened or endangered species at Cape San Blas. Figures 3.1.3-11 and 3.1.3-12 depict sensitive marsh and seagrass habitat on Cape San Blas and surrounding areas.

Figure 3.1.3-9: Eagle Nest, Cape San Blas



Source: U.S. Army Space and Strategic Defense Command, Environmental Office, 1996.

EXPLANATION

- Government Property
- Roads
- Shorebird Nesting Areas
- Sea Turtle Nesting Areas
- Historical Occurrence of Beach Mice
- Gulf Coast Lupine
- Bald Eagle Nest

Scale 1:24,000

0 1000 2000 Feet

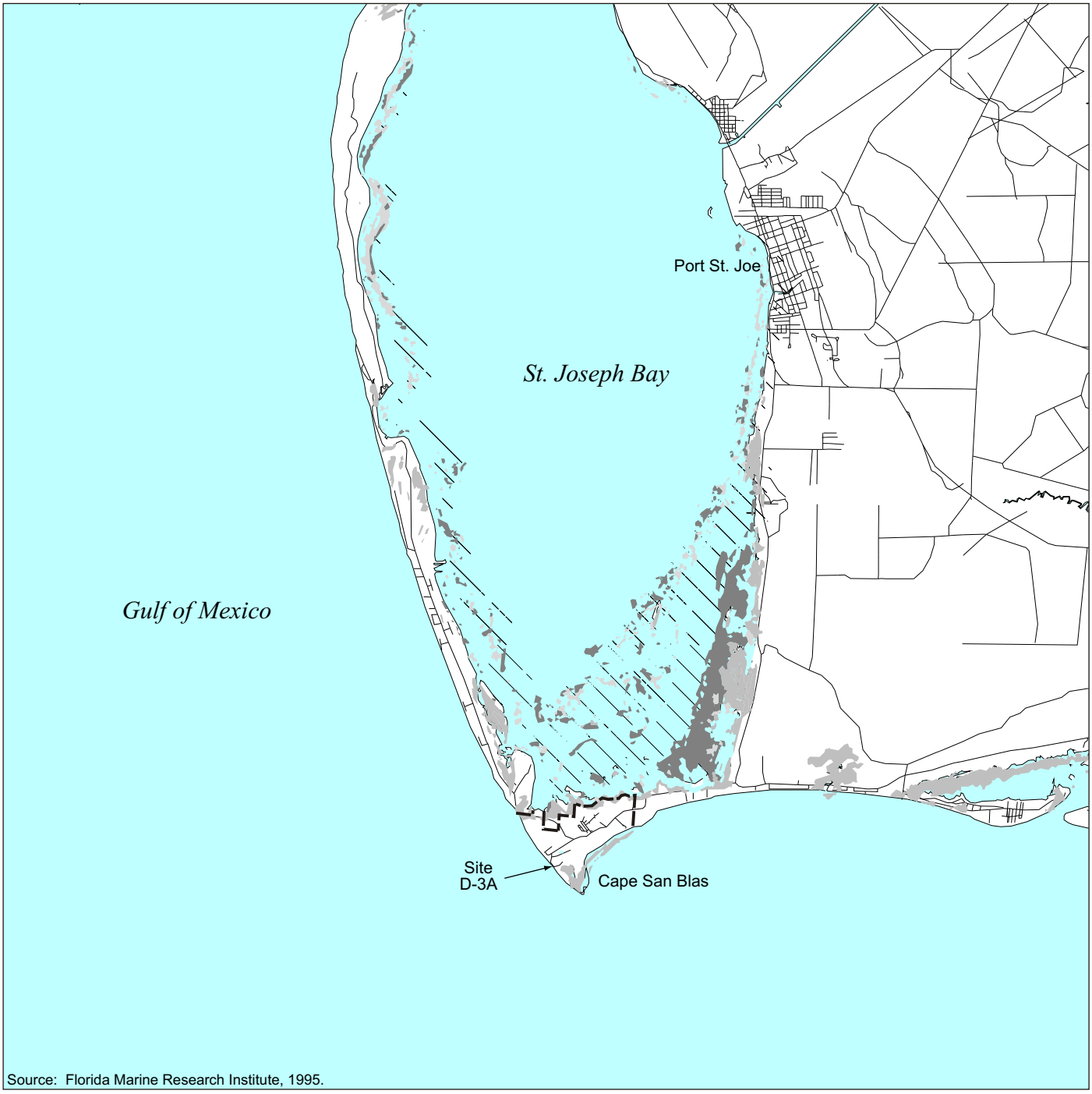
0 250 500 Meters

Sensitive Habitat Locations

Cape San Blas, Florida

Figure 3.1.3-10

csb-24k-3bio005



Source: Florida Marine Research Institute, 1995.

EXPLANATION

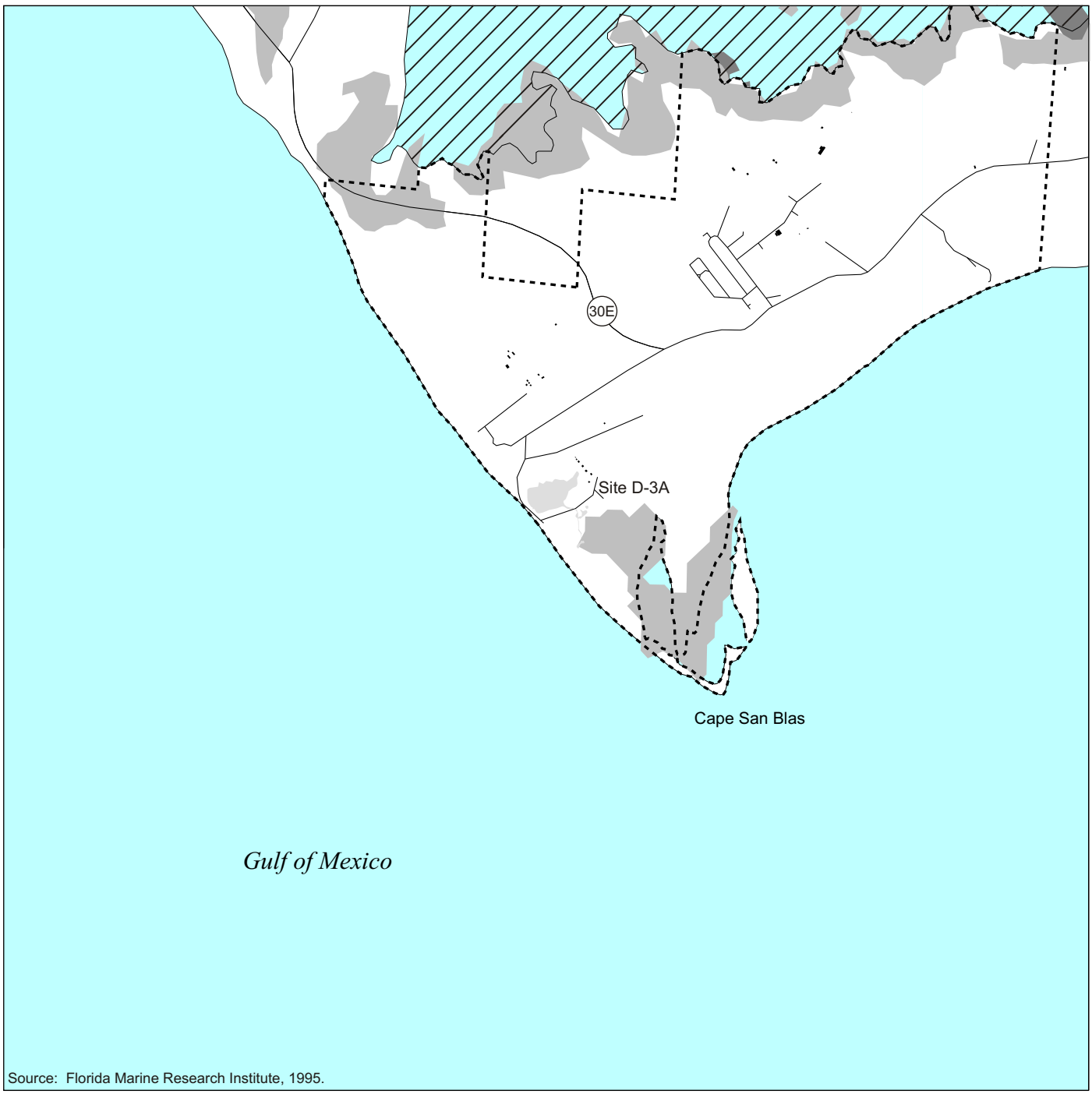
- Government Property
- Roads
- Unconsolidated Sandy Bottom
- Dense Seagrass
- Patchy Seagrass
- Sparse Seagrass
- Saltmarsh

Scale 1:150,000
0 1 2 Miles
0 1.5 3 Kilometers
NORTH

Marsh and Seagrass Habitat

Cape San Blas, Florida

Figure 3.1.3-11



Source: Florida Marine Research Institute, 1995.

EXPLANATION

- Roads
- Government Property
- Saltmarsh
- Patchy Seagrass
- Dense Seagrass

Scale 1:24,000

0 1,000 2,000 Feet

NORTH

0 250 500 Meters

Marsh and Seagrass Habitat, Site D-3A

Cape San Blas, Florida

Figure 3.1.3-12

017cape

3.1.3.4 Environmental Impact and Mitigations

3.1.3.4.1 Santa Rosa Island

Site preparation activities at Santa Rosa Island would disturb 0.04 hectare (0.1 acre) of previously undisturbed open dune land that could have potential as nesting habitat. This represents a small percentage of the available nesting habitat. No wetlands would be disturbed by this proposal. Snowy plover nesting may be displaced by the increased human activity in the area. TMD activities will take place near the beach, but would not encroach directly on the sea turtle nesting habitat. Lighting may affect sea turtle behavior. Increased human presence and traffic during site operations may result in accidental take of the Santa Rosa beach mouse and disturbance of other species on the island.

Flight test activities would take place primarily on previously disturbed land; therefore, wildlife or vegetation should be minimally affected. Launch noise may injure wildlife in the immediate vicinity of the launch, but pre-launch human activity should cause wildlife to avoid the site. Nesting birds in the vicinity of the launch may flush because of the noise, but in the absence of other perceived threats would resettle. Launch emissions containing elevated concentrations of hydrogen chloride would persist only minutes at the launch site. Combined with moisture at the site this may cause some spotting of vegetation. There would be no vegetation close enough to the launch site to be burned.

No-action Alternative

Under the no-action alternative, the proposed ground-based TMD test activities on Santa Rosa Island would not be implemented. Current operations at Eglin AFB, including PATRIOT missile launches and the use of Site A-10 as an instrumentation site on Santa Rosa Island, would continue. Continuing Eglin AFB use of Sites A-10 and A-15 for instrumentation operations would have negligible effects on local vegetation, wildlife or habitats. Threatened and endangered species would continue to be protected by Eglin AFB natural resource management practices.

Site Preparation Activities

Interceptor

If Site A-15 is selected as an interceptor missile launch site, no site preparation is anticipated. The interceptors under consideration are mobile, self-contained launch systems. As such, the proposed scenarios assume no site preparation setup for a launch would be required. Therefore, no biological impacts would be anticipated.

Target

If Site A-15 is selected as a target missile launch site, site preparation activities would be undertaken to upgrade the site to the required operational state. Potential construction projects are described in section 2.2.1.2.2.

There would be little if any site preparation of potential support sites for the Site A-15 launch options. Remote instrumentation sites would require no clearing, leveling, or construction. All other support facilities for this option are currently operational on Eglin AFB. As such, no impacts due to support site preparation would be anticipated for the site preparation portion of the Santa Rosa Island launch option.

The use of Site A-10 as an optical and radar tracking site would not require any clearing or construction activities and would not result in any habitat loss.

The modifications to existing roads and concrete pads at Site A-15 on Santa Rosa Island would result in the permanent loss of 0.04 hectare (0.10 acre) of previously disturbed land as potential nesting habitat for the state threatened southeastern snowy plover and least tern (figure 3.1.3-13). One pair of snowy plovers was documented nesting directly on the graveled concrete pad at Site A-15 during 1993. Although nesting on the pad has only been documented once, construction during the spring and summer would potentially preclude use by snowy plovers. The permanently altered habitat would also be unavailable for wintering migratory shorebirds.

The habitat that would be removed during site preparation activities is not regularly used for foraging by bald eagles or osprey. The closest known populations of Florida perforate cladonia are 12.8 kilometers (7.9 miles) east of Site A-15 outside of the ROI, and they would not be affected by construction activities on Santa Rosa Island.

Noise at Santa Rosa Island originates from military operations, including aircraft; noise produced by the community such as private vehicle traffic, lawn care equipment, and boats; and ambient noise from waves, tree movement, mammals, and similar sources. The average day/night background levels for all current activities on Santa Rosa Island, excluding aircraft noise, range from 41 to 60 A-weighted decibels (dBA). Unweighted decibel (dB) levels are expected to be within the same range. (U.S. Department of the Air Force, 1997)

Construction noise of up to 65 dB may disturb Federally or state listed wildlife near Site A-15 during the 8-month construction period. Most of the noise and human activity would be caused by truck traffic to and from the mainland and heavy machinery at the launch pad. The level of impact to listed species would be dependent on the time of year the work is completed. If the activities take place during the months of February through October, the construction may disturb nesting or hatchling turtles, least terns, or snowy plovers. If all construction takes place during daylight hours, the effect on adult turtles attempting to come on shore would be minimal.

Since most sea turtles are nocturnal nesters, artificial lighting in nesting areas may disrupt visual cues. Artificial lighting may also disrupt the seaward orientation of hatchlings. A study on mercury vapor and low-pressure sodium vapor lighting showed

Source: Florida Marine Research Institute, 1995.

EXPLANATION

- Existing Building/Structure
- Proposed Building/ Concrete Pad
- Proposed New Construction Disturbance (NCD)
- Existing Berm
- Interceptor Areas
- Government Property
- Fence
- Warning Buoys (Proposed)
- Sea Turtles & Snowy Plover Nesting
- Santa Rosa Beach Mouse

Note: ESQD = Explosive Safety Quantity Distance

NORTH

Scale 1:9,600

0 800 1,600 Feet

0 250 500 Meters

Proposed Facilities in Relation to Wildlife Habitat

Santa Rosa Island, Florida

Figure 3.1.3-13

that low-pressure sodium lighting does not appear to have a significant effect on the numbers of green and loggerhead turtles emerging and nesting (Witherington, 1992).

Sea turtle hatchlings are easily misdirected to artificial light sources. Hatchlings move in circular paths when confronted by several light sources. Mortality associated with hatchling disorientation due to artificial lighting is increasing. A study of the effects of artificial lighting showed that yellow-tinted incandescent (bug) lamps and low pressure sodium lighting resulted in the highest proportion of hatchlings oriented seaward. Low-pressure sodium lighting placed further from the water will have the least adverse effect on orientation. (Witherington and Bjorndal, 1991)

If construction takes place during the turtle nesting season, noise and vibration could cause turtle embryos or hatchlings to move within nearby nests. The extent of this effect would be dependent on the specific locations of turtle nests; however, the number of nests potentially affected would likely be quite small. Seismic test blasts were conducted in 1996 during the sea turtle hatching season at Clam Bay Collier County, Florida, to attempt to determine blast effects on hatching sea turtles. One seismograph was set up at a loggerhead turtle nest. A second seismograph was located at a house approximately 116 meters (380 feet) from the nest. Three-3-kilogram (6-pound) charges were placed in two holes, and 1-kilogram (2-pound) charges were placed in four holes. Detonating the 3-kilogram (6-pound) charges resulted in a measurement of 0.13 peak particle velocity (ppv) at the dwelling and 0.11 ppv at the nest. Detonation of the 1-kilogram (2-pound) charges resulted in measurements of 0.10 ppv at the dwelling and the nest.

A one-foot stomp approximately 0.3 meter (1 foot) away from the seismograph registered at 1.16 ppv, and a two-foot stomp 1.5 meters (5.0 feet) away registered 0.05 ppv. To put registered levels in perspective, a thunder or lightning event registered at 0.05 ppv. The loggerhead nest closest to the seismograph had a hatching success rate of 92 percent. Average hatching success for adjacent beach segments in 1994 was 76 and 85 percent. No other scientific studies on the effects of vibration on incubating and hatching of sea turtle eggs have been identified. Turtle nests will likely be several hundred feet from the proposed construction. Sand acts as a dampening material for vibration as the particles shift and absorb motion without materially changing the composition. No adverse effects on turtle embryos or hatching success are anticipated as a result of construction.

If construction occurs during the winter months, wintering shorebirds may be disturbed. The increased noise may cause many of the birds within approximately 0.8 kilometer (0.5 mile) to leave. However, sufficient foraging habitat occurs elsewhere along Santa Rosa Island. The initial flushing would slightly increase the energy expenditure of the birds.

The effects of construction would be minimal to the Federally threatened bald eagle and the osprey, a state species of special concern. The nearest eagle nest is 39.7 kilometers (24.7 miles) away on Rocky Bayou, and is well outside the ROI of the proposed construction site. The nearest osprey nest is located on Santa Rosa Island at Pirate's Cove 5.6 kilometers (9 miles) from the construction site, and would not be subjected to

the noise of construction. Construction activities may temporarily cause foraging bald eagles and osprey to avoid the area within approximately 0.8 kilometer (0.5 mile) of the site over the 8 months of construction.

The use of gasoline and diesel machinery during construction of the launch pad, MAB, and other facilities at Site A-15 has the potential to cause small-scale hydrocarbon spills that, if uncontrolled, could enter the sand dune, beach, and marine habitats. Such spills could affect the Federally or state listed species that occur in the area, including nesting turtles and shorebirds. However, proper preventive and contingency plans should avert any hydrocarbon spills that could substantially affect any of the protected species.

Flight Test Activities

Interceptor and Target

Flight test activities would potentially include missile storage at Eglin AFB facilities, transportation to the launch pad, establishment of temporary remote instrumentation sites, assembly and preparation of the missile for launch, actual launch of the missile, post-launch clean-up, and general site maintenance.

Sensor systems are necessary to detect and track the missiles during live fire tests ands assess whether a near-hit has been made. The mobile PATRIOT radar, as an example, is a multi-functional phased-array device that operates in the C-band of the electromagnetic spectrum. Average power is several kilowatts, with a peak power of several hundred kilowatts. Power densities of 38 to 61 mW/cm^2 (243 to 390 mW/in^2) have been determined necessary to affect other birds weighing up to 3.5 kilograms (7.7 pounds). The radar will be positioned to the north of the launch site, oriented toward the south, and pointed skyward at an angle of 22.5 degrees above ground level.

Electromagnetic radiation (EMR) fields generated by phased-array radars vary depending on power generated by the antennae and distance from the antenna. To minimize hazards associated with potential EMR exposure, the safety zone for the PATRIOT radar extends 120 meters (394 feet) along the radar boresight and 2 meters (6.5 feet) to either side of the radar. Specific siting and orientation of the radar results in a cone shaped EMR zone being projected skyward yet within site boundaries. These factors, combined with a site elevation of 1.5 to 3 meters (5 to 10 feet), should ensure that the frontal dune zone, beach, surf-to-shore transition zone, and all species associated with these zones are not exposed to high levels of EMR. The probability of birds being impacted by the EMR zone while in flight is considered low, due both to specific siting/orientation and limited operational time. In terms of the potential for EMR impacts on wildlife, the *Ground Based Radar (GBR) Family of Radars Environmental Assessment* (EA) (U.S. Army Space and Strategic Defense Command, 1993) analyzed potential impacts on wildlife from EMR. The GBR 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 4 degrees above horizontal, which limits the probability of energy absorption by ground-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. EMR power devices would not exceed 5 milliwatts (mW) per square centimeter (cm^2) (32 mW per square inch[in^2]) on the ground anywhere within the safety zone.

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 beam of the TMD 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 (269 mW/in^2) to affect the falcon. Power densities of 38 to 61 mW/cm^2 (243 to 390 mW/in^2) have been determined necessary to affect other birds weighing up to 3.5 kilograms (7.7 pounds). The analysis was based on the conservative assumption that the energy absorption rate of a bird's body was equal to its resting metabolic rate and that this 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. The analysis assumed a thermal loading of only 10 percent of the in-flight metabolic rate may pose a hazard. Since birds are not likely to remain continuously within the radar beam and the power density is not expected to exceed 5 mW/cm^2 (32 mW/in^2), the likelihood of harmful exposure is not great.

The increased activity at Sites A-15 and A-10 may result in a temporary disturbance to wildlife in the area, particularly those species that potentially use the beach and dune habitat in the immediate vicinity of the launch site, such as turtles and shorebirds. Fourteen days of continuous human activity could cause shorebirds to abandon the area of ongoing nesting activities.

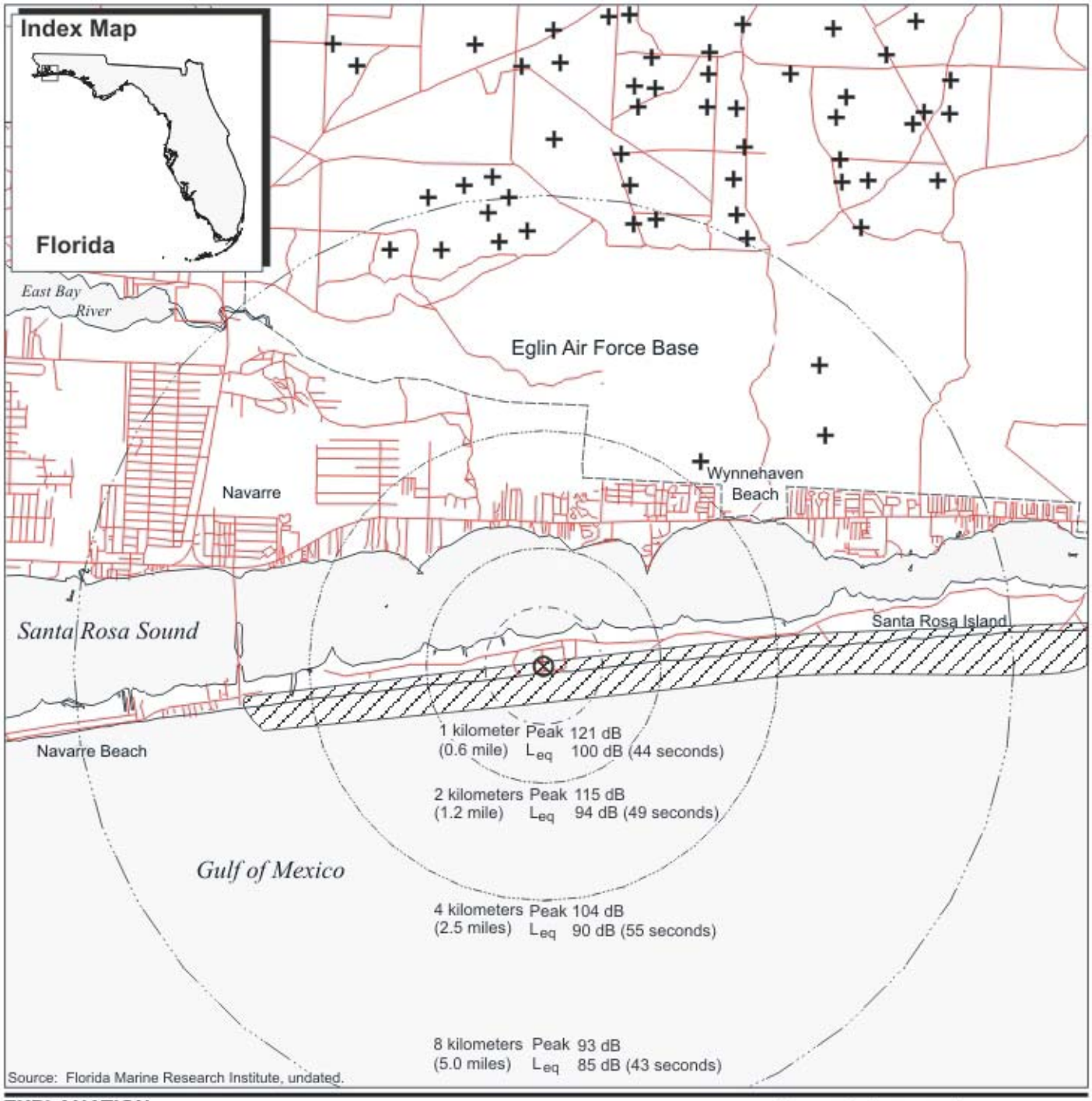
Launch Activities

Interceptor and Target

During the flight test portion of the proposed action, activities at Sites A-10 and A-18 would be limited to monitoring missile launches and flight tracking. Each instrumentation site may require the use of a generator with up to a 60-kW capacity. These generators would be operating for up to 8 hours per launch.

Both target and interceptor launches have the potential to affect listed species (figure 3.1.3-14). The activities, emissions, and noise associated with a single normal launch of interceptor and target missiles are described in detail in sections 2.2 (Proposed Action), 3.1.1 (Air Quality), and 3.1.8 (Noise), respectively.

Flight test activities at Site A-15 would consist of missile launches and the attendant support activities. There would be little likelihood of singeing vegetation as the site is virtually clear of vegetation. For each missile launch, there would be a slight chance of mortality of protected bird species that are present within approximately 15.2 meters (50 feet) of the pad during launches.



EXPLANATION

- Roads
- Eglin Air Force Base Boundary
- Sea Turtle Nesting Beaches, Snowy Plover, Piping Plover, and Least Tern Nesting and/or Wintering Areas
- 1 kilometer (0.6 mile)
- 2 kilometers (1.2 mile)
- 4 kilometers (2.5 miles)
- 8 kilometers (5.0 miles)
- \+ Red Cockaded Woodpecker Cluster Sites

Scale 1:100,000
0 1 2 Miles
0 1.5 3 Kilometers
NORTH

Target Launch Noise Levels

Santa Rosa Island, Florida

Figure 3.1.3-14

Sri-100k-3noise004

Noise effects on wildlife vary from serious to minor in different species and situations. Hearing damage is potentially greater from exposure to close blast noises than from long-lasting exposure to continuous noise such as small arms fire. Behavioral effects that may decrease survival and reproduction include fleeing from favorable habitat near noise sources and less time spent feeding resulting in energy depletion. (Larkin, 1996)

Disturbance is generally described in terms of behavioral responses. Regular intervals between noises should have less effect on wildlife than haphazard and varied sounds. Cues appearing just prior to loud sounds, such as the increased human presence and associated noise prior to a launch, may permit wildlife to learn to vacate an area or reduce the potential for a stressful effect. (Larkin, 1996) Snowy plovers were sighted nesting directly on the concrete pad at Site A-15 during 1993 and thus may be the most likely species to be affected by launches during the breeding season. However, the increased human activity near the pad during prelaunch activities would most likely minimize direct threats to plovers and other species of birds.

The bald eagle nest located 39.7 kilometers (24.7 miles) from the launch pad in Rocky Bayou would not be affected by launch noise. In the rare instance when eagles could forage near Site A-15 at the time of launch, they may flee the area.

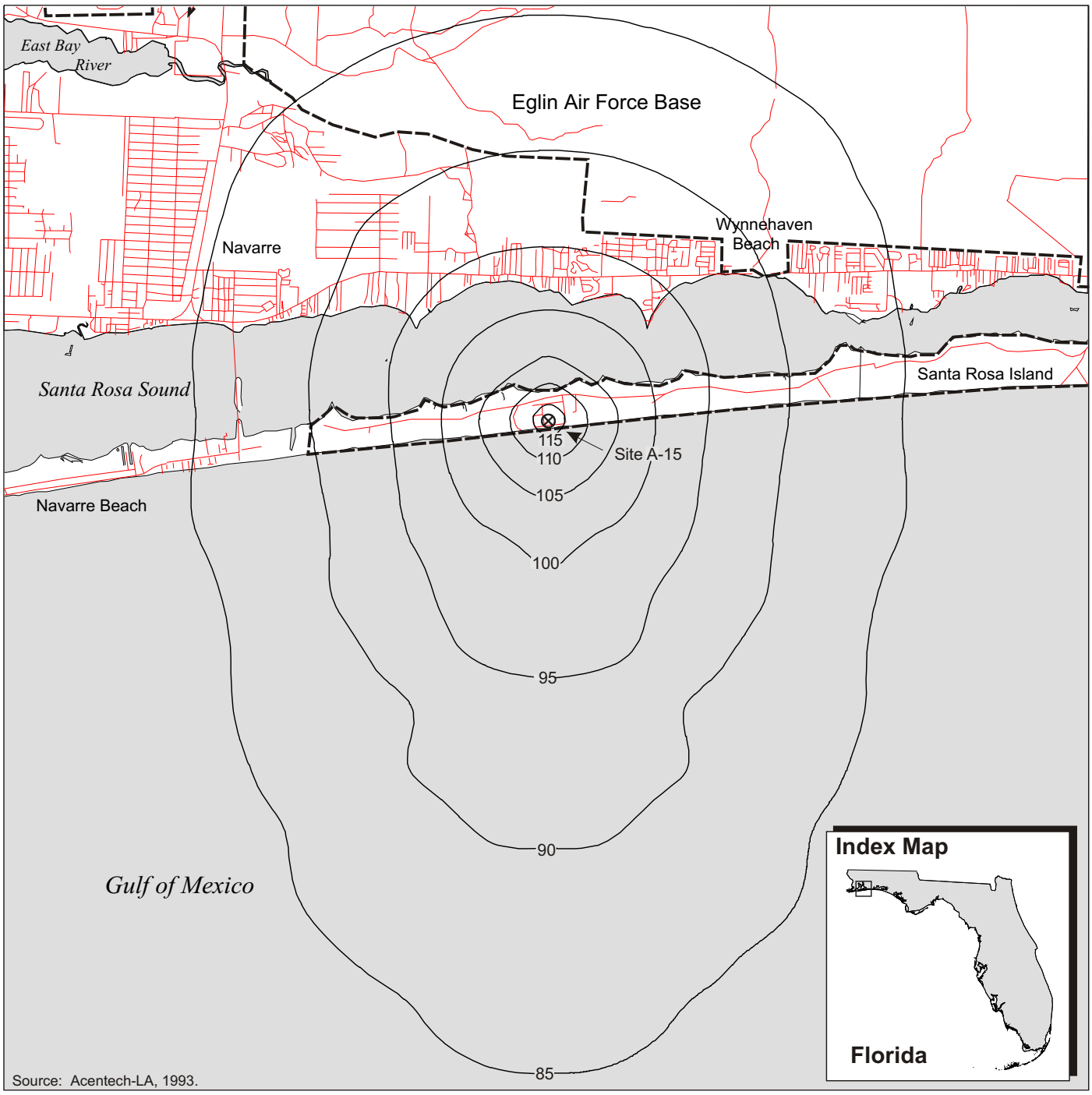
Launch preparation activities could occur at any time of the day or night. Night lighting could disorient turtle hatchlings on their way to the water and increase mortality.

Multiple missile launches could result in a slightly larger affected area and longer duration of disturbance to nesting or wintering shorebirds, bald eagles, and osprey. No red cockaded woodpecker clusters are shown within the 104 dB peak contour. Ten clusters are located within the 93 dB peak contour.

The peak noise level of the representative Hera target missile would be approximately 124 dB within approximately 0.5 kilometer (0.3 mile) of the launch pad and would drop to a level of 93 dB at 8 kilometers (5 miles) from the launch pad (figure 3.1.3-14). The noise level would return to near ambient levels within 60 seconds. During the spring and summer breeding season, snowy plovers, osprey, and other migratory bird species nesting within 8 kilometers (5 miles) of the launch site may be affected.

The peak noise level of the representative interceptor missile would be approximately 115 dB (figure 3.1.3-15).

Many studies have addressed noise and disturbance to various species of birds, including several Federally threatened or endangered species. The following is a summary of these studies. The USFWS and the Florida Department of Natural Resources (1992) describe the potential effects of human disturbance on avifauna and stress that there is great variation, both among and within species. The Institute for Raptor Studies (1981) found potential negative effects of disturbance on nesting raptors include temporary nest abandonment, allowing exposure of eggs or young to excess heating or cooling, reduced reproductive performance, aerie abandonment, accidental death of young due to premature fledging, and other short-term behavior responses. Female hawks left nests when they experienced shock waves, but returned to the nest within 10 minutes.



EXPLANATION

- Roads
- Proposed Launch Site
- Peak Noise Levels (Contours in dBC)

Scale 1:100,000

0 1 2 Miles

0 1.5 3 Kilometers

C-Weighted Peak Noise Levels for a Single Launch of a Defensive Missile

Santa Rosa Island, Florida

Figure 3.1.3-15

sri-100k-3bio004

Anderson et al. (1986) reported that red-tailed hawks shift their activity center away from areas of high human activity, but return after the human activity ceases. Red-tailed hawks seem to become habituated to regular low-altitude aircraft overflights (Anderson and Rongstad, 1989). Hawks that are not accustomed to regular aircraft disturbance do tend to exhibit stronger responses than hawks that nest in areas with frequent overflights. However, nesting success does not appear to be influenced by overflights. Nesting peregrine falcons and seven other raptor species occasionally flew from perches or aeries, but usually showed minimal response to low-level (within 500 meters [1,640 feet]) jet aircraft and sonic booms; there was no reproductive failure caused by the overflights (Ellis et al., 1991). Adults seemed to be more disturbed when the aircraft was within 300 meters (984 feet). The missiles proposed for launches would be over open waters of the Gulf within seconds of liftoff and would not provide a visual disturbance like low-flying aircraft.

At KSC, a rookery used by wood storks and other species of wading birds is located approximately 750 meters (2,461 feet) from a Space Shuttle launch pad. This rookery continues to be utilized successfully, even though it has received peak noise levels of up to approximately 138 dB. (American Institute of Aeronautics and Astronautics, 1993) Monitoring studies of birds during the breeding season indicate that adults respond to Space Shuttle launch noise by flying away from the nest, but they return within 2 to 4 minutes. Ten minutes after the launches, adults and juveniles appeared to resume normal activities. No young were injured or pushed out of the nest. Also, birds within 250 meters (820 feet) of Titan launch complexes at CCAS have shown no mortality or reduction in habitat use. This author also reported that scrub jays subjected to noise levels of up to 145-160 dB were not affected. However, at CCAS, Titan launches may have caused a temporary hearing or behavioral change in scrub jays within the 95 dB contour (U.S. Department of the Air Force, 1990). (U.S. Department of Transportation, 1996)

Due to the short duration of the launch noise (approximately 60 seconds) and the fact that the missiles would be over open waters of the Gulf within seconds of liftoff, the only individuals likely to be affected are those within the peak 93 dB and greater noise contours. Individuals having a direct line of sight to the launch pad area and birds that are early in the nest initiation/egg laying and fledgling stages would have the greatest chance of being affected. While adults are away from the nest, eggs and young could potentially be exposed to increased predation and effects of weather. Previous studies of jet aircraft noise have indicated that as long as noise levels drop to ambient levels and no other disturbance occurs, most birds would return to nests within only a few minutes (U.S. Department of Transportation, 1996). The nearest rookery for colonial nesting birds is located outside this 93 dB contour and would not be significantly affected.

During the winter, foraging shorebirds would be subjected to increased energy demands if they were flushed by the noise, but this should be a short-term, minimal effect. Bald eagles that occasionally forage near Site A-15 may avoid the area at the time of launch. The number of launches would be minimized, if possible, during spring and summer months when protected shorebirds and sea turtles are nesting on the island within the affected area.

Sea turtles coming on shore to nest or hatchlings leaving the nest could potentially be affected by lighting required for night time pre-launch activities. At this time it is not known what, if any, lighting would be required for support of the proposed launch activities. If lighting is determined to be a necessity, it will be kept to the absolute minimum required and will consist of low pressure sodium lights directed and/or shielded so as not to be visible from the beach. All construction plans, or subsequent requests for lighting will be reviewed and coordinated through Eglin's Natural Resources Branch, to ensure potential impacts to sea turtles are minimized to the maximum extent possible.

Launch-related noise for Space Shuttle and Titan launches has not had a substantial effect on wildlife on or near the launch complexes (U.S. Department of Transportation, 1996).

The level of noise impact resulting from interceptor launches is related to the following factors:

- Shorebirds, transient eagles, and other raptors that regularly use habitats along the shores of Eglin AFB already experience regular loud jet aircraft noise flying nearby and may not react strongly to a short-term launch event.
- Human activity before the launch would likely cause birds to leave the area before the launch, reducing the number of individuals that would be exposed to the loudest noise levels or that would potentially be affected by launch activity.
- The noise level near the launch pad would return to near ambient levels within 60 seconds.

Due to the short duration of the launch noise (approximately 60 seconds) and the fact that the missiles would be over open waters of the Gulf within seconds of liftoff, the only wildlife that would likely be affected are those within the 90 dB and greater contours shown in figure 3.1.3-14. During the summer, wildlife that have a direct line of sight to the launch pad area and nesting birds that are in the early nest initiation or egg laying and early fledgling stages would have the greatest chance of being affected. While away from the nest, eggs and young could be exposed to increased predation and effects of weather. Previous studies of jet aircraft noise have indicated that as long as noise levels drop to ambient levels and no other disturbance occurs, most birds return to their nests within only a few minutes. There are no colonial nesting bird rookeries within 10 kilometers (6.2 miles) of Site A-15. Therefore, it is unlikely that target or interceptor launches would result in impacts other than temporary disturbance to nesting wading birds.

Some of the wildlife species would habituate to the increased visual and auditory stimuli resulting from missile launches. This has occurred with eagles and wading birds nesting near Space Shuttle and Titan/Delta rocket launch pads at Kennedy Space Center (KSC) and CCAS. However, other species may not become accustomed to the periodic noise levels. Turtle nests will likely be several hundred feet from the launch pads. Sand acts as a dampening material for vibration as the particles shift and absorb motion, without materially changing the composition. No adverse impacts to turtle embryos or hatching success are anticipated as a result of ground vibrations generated during launch activities.

Launch operations represent the largest source of uncontrolled emissions into the atmosphere. Normal launch activities during dry (non-rainy) 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. The USEPA has determined that nonfibrous aluminum oxide, as found in solid rocket motor exhaust, is nontoxic (National Aeronautics and Space Administration, 1990).

Approximately 1.64 grams per square meter (0.005 ounces per square foot) of hydrogen chloride would be deposited within 60 meters (200 feet) of the launch pad during missile launches from Site A-15. This amount decreases to less than a gram per square meter (0.003 ounce per square foot) at a distance of 117 meters (384 feet). The deposition may cause some acid spotting of plant leaves within 15 meters (50 feet) of the launch pad during launches. Although hydrogen chloride is very soluble in water, it does not deposit readily onto dry surfaces when the relative humidity is below 100 percent. Because the atmosphere would have a relative humidity lower than 100 percent, under launch conditions when there is no rain for 2 hours after the event, direct dry deposition of hydrogen chloride gas onto the ground and vegetation would not be significant.

Rain within 2 hours of launch could cause hydrogen chloride to be deposited in small quantities. This chemical is known to injure plant leaves and affect wildlife in quantities emitted during solid propellant missile launches for very large flight vehicles (such as the Space Shuttle). Far-field effects are produced after the ground cloud rises and moves with the prevailing winds. No plant mortality or community changes have occurred from far-field deposition following Space Shuttle launches. The Space Shuttle ground cloud is formed as a result of the solid rocket motors and main engines ignition combined with the dumping of thousands of kiloliters of sound suppression and cooling water on the launch pad. Approximately 3,000 kilograms (6,614 pounds) of chlorides and 7,000 kilograms (15,432 pounds) of particulates (aluminum oxide) are deposited in the near-field environment (area within a 2-kilometer [1-mile] radius of the launch pad), resulting in plant loss and community changes. The proposed missile launches in the EGTR do not use coolant water, thus reducing the major source of acid deposition on plants, and only produce a very small amount of hydrogen chloride and aluminum oxide compared to the Space Shuttle. Rapid acceleration of the smaller launch vehicles proposed in the EGTR program further reduce the effect of rocket exhaust products on the near-field environment when compared to the slower, heavier Space Shuttle and Titan rocket. (National Aeronautics and Space Administration, 1985; 1986)

Results of a February 1993 environmental monitoring program following a Strategic Target System launch in Hawaii indicated little effect upon vegetation or wildlife due to the resulting low-level, short-term hydrogen chloride emissions. The program included marine surveys of representative birds and mammals for both prelaunch and postlaunch conditions, concluding that any impacts resulting from the booster launch would be negligible. As the amount of hydrogen chloride produced by the largest proposed TMD booster is much smaller than that produced by the boosters monitored during this program, the potential impact on vegetation and wildlife from the proposed launches is expected to be slight. (U.S. Army Space and Strategic Defense Command, 1993)

Air quality monitoring for hydrogen chloride during the 20 November 1997 Hera launch at Fort Wingate, New Mexico, was not able to detect measurable amounts of hydrogen chloride beyond the immediate vicinity of the launch pad. Thus, no impacts to surface water and very little effect to vegetation are anticipated for normal launches during dry weather. Since no Federally or state-listed plant species occur within this range, there would be no direct effect to protected plants.

Rabbits used for laboratory tests involving hydrogen chloride were found to have lung damage when exposed to 49 milligrams per cubic meter (mg/m^3) of hydrogen chloride gas for 10 minutes. After 18 days, guinea pigs were found to have no lung damage after exposure to 15 mg/m^3 of hydrogen chloride gas for 2 hours per day, 5 days per week. From these studies, a threshold air concentration for injury to small animals breathing hydrogen chloride is estimated between 15 mg/m^3 and 49 mg/m^3. The air quality modeling results for the proposed target launches indicate the maximum predicted hydrogen chloride concentration would be 0.728 mg/m^3, well below the injury threshold range for hydrogen chloride. Therefore, no adverse effects on small animals are expected due to hydrogen chloride inhalation. (National Aeronautics and Space Administration, 1990)

There are no documented cases of exposure to acid rain that produced any significant injury to nonaquatic animals, such as wild mammals, and birds. Only with extremely high laboratory doses of hydrogen chloride (73 milligrams per liter [mg/L]), not found under no-rain conditions, has any injury to animals been documented. (National Aeronautics and Space Administration, 1990)

In laboratory studies using aluminum oxide dust, rats and mice experienced eye and nose irritations at a concentration of 478 mg/m^3 for 60 minutes. Air quality modeling results predict a maximum instantaneous concentration of aluminum oxide of approximately 0.9 mg/m^3, or 500 times less than the irritation concentrations reported for rats and mice. Deposition of aluminum oxide onto skin, fur, or feathers of animals will not cause injury because it is inert and is not absorbed into the skin. (National Aeronautics and Space Administration, 1990)

Under expected conditions without rain, Hera launches are expected to have no impacts on wildlife. Air concentrations of hydrogen chloride produced by the Hera missile are predicted to be 50 to 100 times below the injury threshold observed for small animals. Aluminum oxide predicted concentrations are 500 times less than irritation levels for small animals (rats and mice) and when deposited directly onto the skin, fur, or feathers of animals is not expected to cause injury. Thus, no adverse impacts on wildlife are expected as a result of the deposition of hydrogen chloride and aluminum oxide from target launches. (National Aeronautics and Space Administration, 1990)

If it were to rain shortly after a TMD missile launch the hydrogen chloride present in the exhaust plume would be dissolved in the rain droplets, which would result in a temporary reduction in rainfall pH. Depending on the buffering capacity of the receiving water, rainfall may result in an increase in surface water acidity. Surface water acidity ranging from approximately pH 4.0 to 6.0 is generally believed to result in stress to marine life and possibly death (National Aeronautics and Space Administration, 1990). The

degree and duration of any increased acidity in surface waters would depend on several variables, including surface water volume and alkalinity, as well as the amount and pH level of rainfall.

The pH of shallow marine waters near Santa Rosa Island is approximately 8.0. Marine waters in the vicinity of Santa Rosa Island range from a low of 7.2 in eastern Pensacola Bay to a high of 8.2 in central Pensacola Bay. Average alkalinity measurements range from a low of 93 mg/L calcium carbonate in the central Pensacola Bay to a high of 97 mg/L calcium carbonate near the mouth of Pensacola Bay (Florida Department of Environmental Protection, 1994).

Project-related changes in pH of shallow marine waters near Santa Rosa Island were estimated for the purposes of impact analysis. Calculations were conservative in that 100 percent of the hydrogen chloride present in the exhaust plume was assumed to be dissolved in rain droplets (as opposed to approximately 20 percent under normal conditions). Existing surface water pH and alkalinity levels were assumed to be 7.2 and 93 mg/L calcium carbonate, respectively. Under these circumstances, rainwater falling on nearby surface waters would result in a slight decrease in pH from 7.2 to approximately 7.1 within the upper 15 centimeters (6 inches) of the water surface. This effect would quickly dissipate with additional rainfall and mixing of the surface waters, thus ameliorating the slight potential for impact within a short period of time.

Acid spotting may affect vegetative communities that protected shorebirds and other migratory birds rely on. However, the deposition rate would be below the level that would cause plant mortality, unless launches occurred during or within 2 hours following a precipitation event.

Birds flying through the exhaust plume may be exposed to concentrations of hydrogen chloride that could irritate eye and respiratory tract membranes. Maximum concentrations of 0.5 parts per million (ppm) of hydrogen chloride 1.9 kilometers (1.2 miles) from the launch site have been modeled. This level is well below the maximum permissible exposure of 10 ppm used by the U.S. Air Force to safeguard personnel involved in missile launches. Since most birds would be temporarily frightened away by the noise of the launch and because of these small concentrations, it is not likely that any would come into immediate contact with the exhaust plume. Physiological impacts to birds are not expected. (U.S. Department of Transportation, 1996)

Liquid fueled Lance missiles would emit 0.32 kilogram (0.71 pound) of lead and 0.04 kilogram (0.09 pound) of nitrogen oxide. Combustion products generated by Lance would dissipate quickly based on their relatively small amounts, prevailing winds, and rapid decrease in ambient air temperature from ground level to their respective altitudes (Cortez III Environmental, no date). The limited emissions of exhaust products will minimize any potential impacts. These quantities in widely dispersed emissions would not result in concentrations toxic to wildlife or plants.

Overall, emissions from either type of target missile launch would not affect any listed plant species and would not likely jeopardize the continued existence of any wildlife species protected by Federal or state law.

Post Launch

The post-launch activities at Santa Rosa Island would involve personnel removing the mobile instrumentation from the site and securing equipment. These activities would result in continued human activity and noise in the immediate area for a period of up to 5 days.

The human activity at Santa Rosa Island following each launch may result in a temporary disturbance to wildlife in the area. The physical presence of humans may preclude use of the beach habitat within approximately 0.5 kilometers (0.3 miles) of the launch pad and instrumentation sites during daylight hours.

Currently, there is no plan to collect the boosters or debris following launches. During a normal launch there should be no debris falling on or near the beaches at the launch site, although there is a small chance of debris washing onshore after launches. Such debris could interfere with turtle movement, entangle wildlife, or harm wildlife that ingest it.

Cumulative Impacts

Construction of facilities in support of TMD testing would disturb 0.8 hectare (1.98 acres) of land at Santa Rosa Island.

Over time, assuming multiple launches per year, the continuous level of human presence would cause wildlife to avoid the immediate vicinity. Missile exhaust emissions and deposition would diminish biodiversity in the immediate vicinity of the launch pad. Plants that are tolerant of decreased pH levels would survive or thrive at the expense of plants more sensitive to decreased pH levels.

Dawn launches would require pre-dawn or all night launch preparation activities. These activities and the associated lighting could have a negative effect on sea turtles emerging to nest during the summer and sea turtle hatchlings crawling to the surf during the late summer and early fall.

The Navarre, Ft. Walton Beach, and Destin sea shore is undergoing rapid and extensive residential and tourist development. Habitat is being converted to subdivisions or beach front hotels at an increasing rate. DOD land and state parks are the only extensive areas not being subjected to these development pressures.

The Air Force has a plan for the reconstitution of the instrumentation facilities on Santa Rosa Island. This Santa Rosa Island Reconstitution Plan calls for the consolidation of radars and other instrumentation damaged during the hurricanes of 1995 into three compounds. There is also consideration of building a large tower. This proposal may bring more military activity to Santa Rosa Island, but it would likely be concentrated at the three sites, leaving the remainder unaffected. Depending upon the site selected for the proposed tower and the timing of the construction, there could be two concurrent construction projects ongoing.

Mitigations Considered

In compliance with Section 7 of the Endangered Species Act, AFDTC would continue to consult with the USFWS and NMFS to insure that program actions are not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of lands determined by the USFWS to be critical habitat. AFDTC would also, in coordination with the USFWS and NMFS, establish and implement measures to mitigate impacts to any listed species. Consultation and coordination with the other appropriate Federal, state, and local agencies would also be continued to determine mitigations to minimize impacts to sensitive species. Site personnel involved in construction activities would receive an environmental awareness orientation to make the personnel aware of their responsibilities with regard to threatened and endangered species, cultural resources, allowable activities on sensitive and protected lands, erosion control, and hazardous materials management.

Possible mitigations would include:

- Minimize nighttime activities and lighting and use low pressure sodium where lighting is required.
- Reduce the effect of nighttime activities on sea turtle nesting and hatchling by aiming low pressure sodium lighting away from the beach, placing the light source as close to the ground as possible, and utilizing shields around the lights.
- To the extent possible, schedule test activity to avoid spring breeding seasons to reduce potential adverse impacts on migratory bird species.
- Include construction contract provisions to ensure compliance with environmental protection measures and minimize habitat destruction.
- Continue endangered species population surveys within the LHA.
- Continue to survey plants adjacent to the launch pad to assess effects of launch.
- Construct sound barriers surrounding the launch pad to reduce launch noise.
- A qualified biologist would monitor debris recovery activities following early flight termination or launch failure to reduce impacts on sensitive species or resources.
- Ensure siting layout design minimizes site disturbance.

3.1.3.4.2 Cape San Blas

Site preparation activities at Cape San Blas would have an adverse effect by disturbing 1.87 hectares (4.63 acres) of previously undisturbed land composed of flatwoods, coastal grasslands, and scrub and eliminating 0.66 hectare (1.62 acres) of fresh water wetland habitat used by foraging birds. There would be a Bald eagle nest within approximately 914 meters (3,000 feet) of the proposed launch site and within 23 meters (75 feet) of the proposed RDAS line-of-sight corridor. TMD activities will take place near the beach, but would not encroach directly on the sea turtle nesting habitat. Lighting may affect sea turtle behavior.

Flight test activities would take place primarily on disturbed land, so minimal additional wildlife or vegetation should be directly affected. Launch noise may have an adverse effect on wildlife in the immediate vicinity of the launch, but pre-launch human activity should cause wildlife to avoid the site. Nesting birds in the vicinity of the launch may flush because of the noise, but in the absence of other threat stimuli would resettle. Launch emissions containing elevated concentrations of hydrogen chloride would persist only minutes at the launch site. Combined with moisture at the site, this hydrogen chloride may cause some periodic, temporary spotting of vegetation.

No-action Alternative

Under the no-action alternative, the proposed TMD test activities on Cape San Blas would not be implemented. Current operations, including PATRIOT missile launches, would continue.

Cape San Blas is an Air Force radar tracking site occupied by approximately 20 people during the day. Currently, the proposed launch site is adjacent to another interceptor launch pad approximately 15.2 meters (50 feet) from the shoreline. The existing launch pad is used approximately once a year for a period of 2 to 3 weeks by a crew of 30 to 50 people. The Coast Guard Station immediately north of the launch pad on the beach is not occupied. The road leading to the site is open and used for beach access and parking during daylight hours. Continuing Eglin AFB operations including monitoring of flight testing and training and periodic missile launches would have negligible effects on local vegetation, wildlife or habitats. Threatened and endangered species would continue to be protected by Eglin AFB natural resource management practices.

Site Preparation Activities

Interceptor

If Site D-3A is selected as an interceptor missile launch site, no site preparation is anticipated. The interceptors under consideration are mobile, self-contained launch systems. As such, the proposed scenarios assume no site preparation setup for a launch would be required.

Target

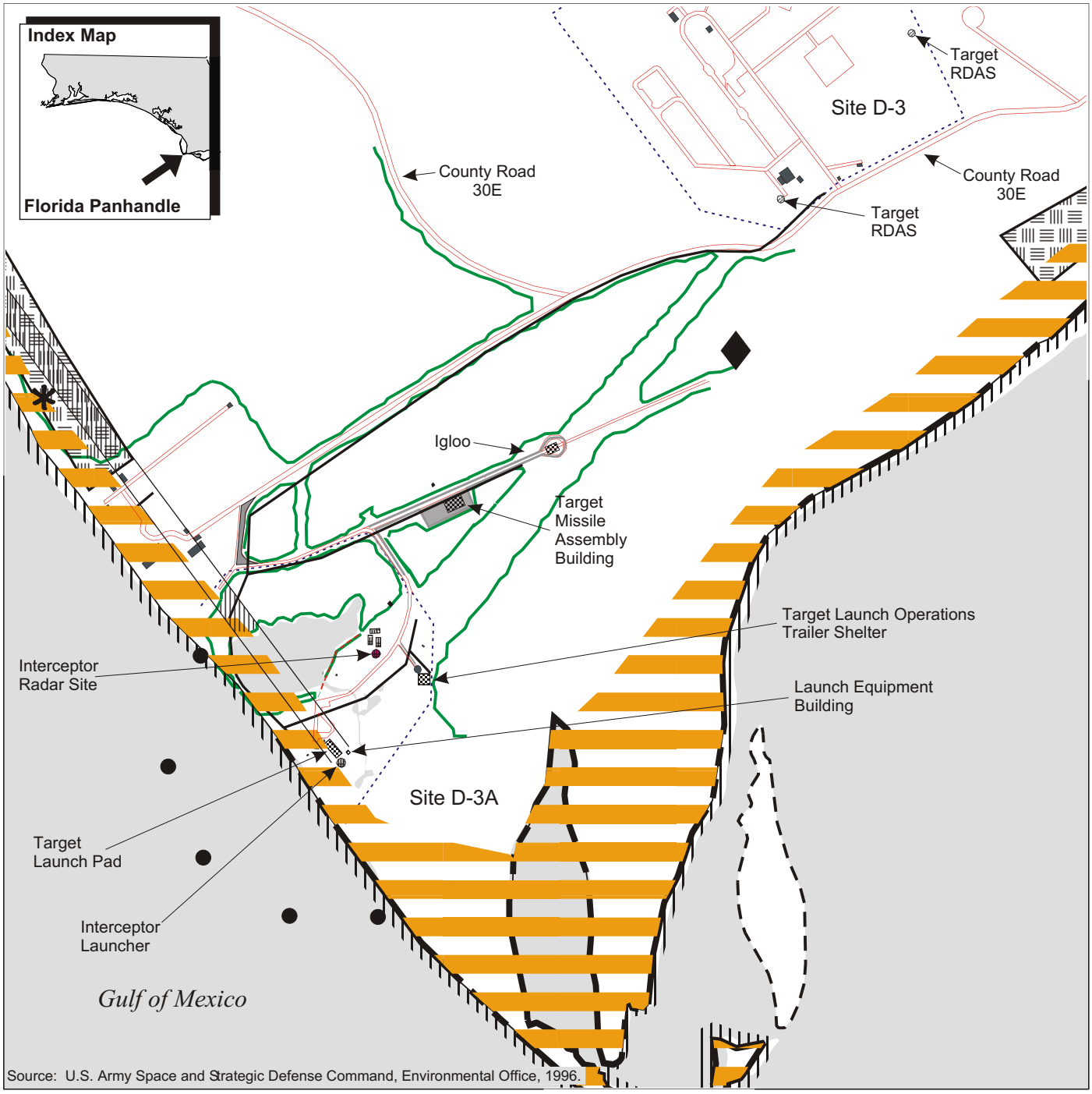
If Site D-3A is selected as a target missile launch site, site preparation activities would be undertaken to upgrade the site to the required operational state. Potential construction projects are described in section 2.2.2.2.2.

The bald eagle nest site that occurs at Cape San Blas would not be removed or altered; however, a line-of-sight corridor 1,676 meters (5,500 feet) long and 12 meters (40 feet) wide from the launch pad northwest to an RDAS could be necessary. The outer edge of this swath would be approximately 23 meters (75 feet) from the bald eagle nest. Topping or cutting down trees along this line-of-sight path would have an adverse effect on habitat the eagles use for roosting. Activities along this corridor during the months of December through May would have the potential to disturb nesting behavior of the eagles, which could cause them to abandon this nesting site.

This corridor is well within the 229- to 457-meter (750- to 1,500-foot) primary zone recommended by the USFWS to minimize the effects of human activities on breeding bald eagles in Florida. A 229-meter to 1.6-kilometer (750-foot to 1.0-mile) secondary zone would accommodate most reactions to vehicle, noise, and aircraft disturbance. Buffer zones of 450 meters (1,476 feet) and 1,600 meters (5,249 feet) have also been used in the southeast (U.S. Forest Service, 1991). Alternative types of RDAS are being considered that would eliminate the corridor requirement. However, these have not been developed enough to be proposed as alternatives to the proposed action.

The modifications to existing roads and concrete pads on Cape San Blas would result in the permanent loss of 1.87 hectares (4.63 acres) of previously undisturbed land (figure 3.1.3-16). Construction activities would eliminate 0.66 hectare (1.62 acres) of freshwater wetland habitat that is used by foraging bald eagles, terns, plovers, rails, wading birds, and migratory birds (figure 3.1.3-16). The eagle nest site at Cape San Blas would not be removed or altered.

Background noise levels at Cape San Blas range from less than 25 dB to 45 dB and are produced by traffic on local roads and highways; occasional rocket and missile launches; military aircraft; and ambient noise from wind, waves, and tree movements. Alteration of existing buildings and possible expansion of the concrete pads would increase the noise level to 65 dB within the immediate area surrounding Site D-3A for approximately 8 months. Most of the noise and human activity would be caused by truck traffic and heavy machinery at the proposed launch pad. If the activities take place during the months of December through May, the construction may disturb the pair of bald eagles that nest within 914.4 meters (3,000 feet) of the proposed launch pad. Because the eagles would most likely see the construction activities from their nest site, they may be more prone to disturbance. Continued disturbance during the nesting season could cause the eagles to abandon the nest site. If the construction activities take place during the months of February through October, the construction could disturb least terns, piping plovers, or snowy plovers using the nearby beaches for nesting, foraging, and loafing.



EXPLANATION

- Existing Building/Structure
- Wooded Area
- Proposed Clearing Area
- Paved Area
- Interceptor Areas
- Sea Turtle Nesting Areas
- Historical Occurance of Beach Mice
- Shorebird Nesting Areas
- Bald Eagle Nest
- Gulf Coast Lupine
- Fence
- Warning Buoys (Proposed)

NORTH

Scale 1:9600

0 400 800 Feet

0 125 250 Meters

Note: ESQD = Explosive Safety Quantity Distance
RDAS = Real-time Data Acquisition System

Proposed Facilities in Relation to Wildlife Habitat

Cape San Blas, Florida

Figure 3.1.3-16

csb-9600-4bio005

Since construction would take place during daylight hours, the effect to adult turtles, primarily loggerhead sea turtles, attempting to come on shore at night to nest would be minimal. Increased lighting along the beach would also have the potential to adversely affect hatchling turtles moving from the nest to the ocean.

Flight Test Activities

Interceptor and Target

The increased activity at Cape San Blas may result in a temporary disturbance to wildlife in the area, particularly those species that potentially use the beach and dune habitat in the immediate vicinity of the launch site, such as turtles and shorebirds. The use of trucks and other equipment to prepare the missile and the instrumentation sites would result in slight increases in ambient noise levels and human presence that could temporarily disturb wildlife. The use of aircraft to patrol nearby waters could cause dolphins and other protected marine species in the area to flee from the noise; the effect would be short-term.

Launch Activities

Interceptor and Target

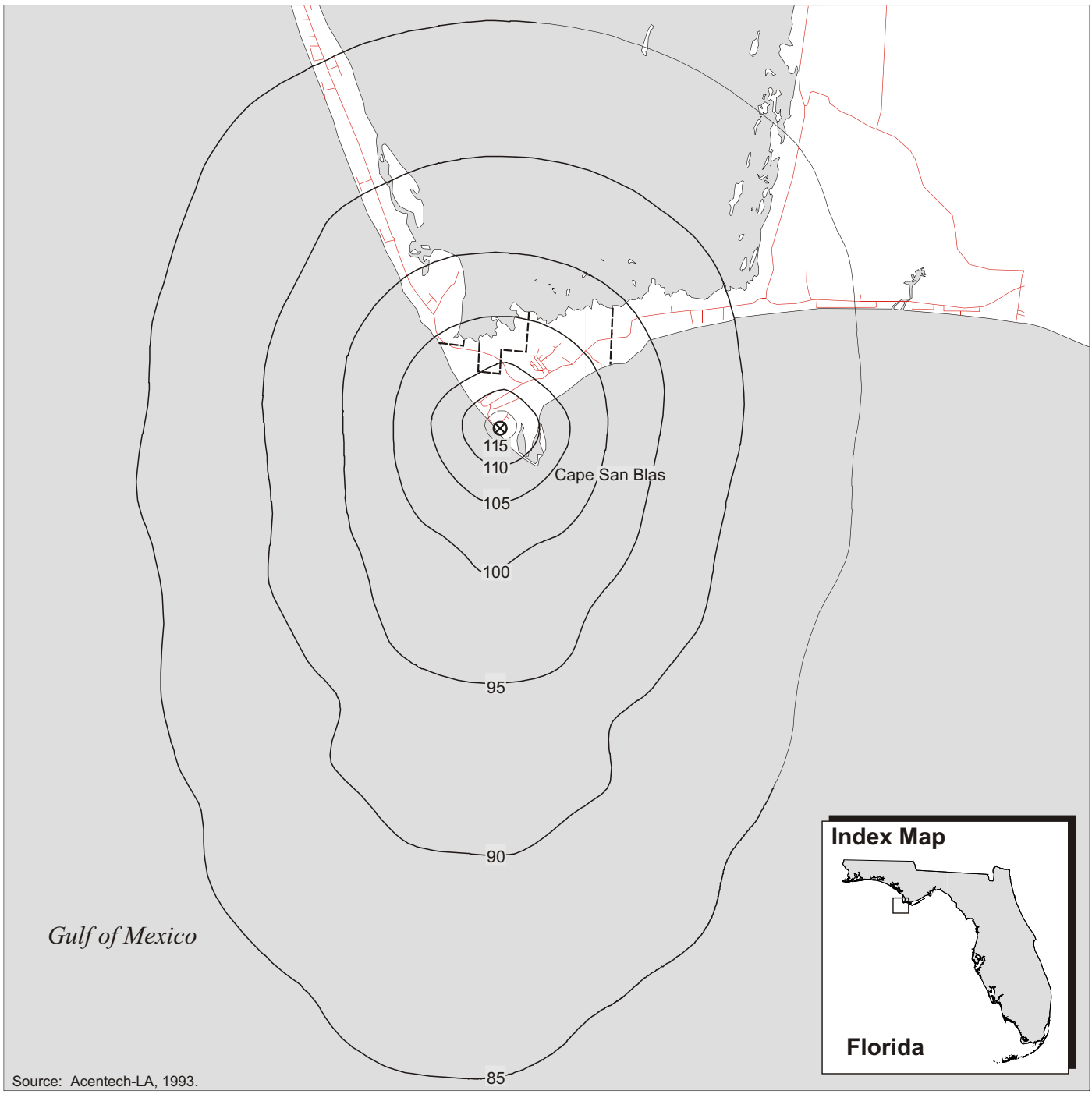
The activities, emissions, and noise associated with a single normal launch of an interceptor or target missile are described in additional detail in sections 2.2, 3.1.1, and 3.1.8, respectively.

For each missile launch at Site D-3A, there may be a slight chance of mortality of protected bird species that are present within approximately 15 meters (50 feet) of the pad during a launch. Increased human activity and noise during the pre-launch time period would reduce the potential for harm to shorebirds, rails, and wading birds, including listed species.

Assuming launches are scheduled throughout the year, multiple launches could occur during the turtle nesting season, during the shorebird and migratory bird nesting period, during the bald eagle nesting period, and during the shorebird wintering period.

The singeing of vegetation in the vicinity of Site D-3A may cause a minor loss of habitat for shorebirds and other migratory birds. Vegetation within 10 meters (32.8 feet) of the pad may be singed. Most of this vegetation would survive and quickly return to pre-launch conditions. The cumulative effect of multiple launches per year may permanently remove or degrade the vegetation within close proximity of the launch pad; vegetation singed outside of this range would likely suffer only short-term non-lethal effects. No listed plant species or bald eagle nesting or foraging habitat would be affected during nominal launches.

Some test activity may involve two interceptor missiles being launched within minutes of each other. This noise level may cause nesting and foraging birds to either become alert or temporarily leave nesting or foraging areas (figure 3.1.3-17).



EXPLANATION

- Roads
- Proposed Launch Site
- Peak Noise Levels (Contours in dBC)

Scale 1:100,000

0 1 2 Miles

0 1.5 3 Kilometers

C-Weighted Peak Noise Levels for a Single Launch of a Defensive Missile

Cape San Blas, Florida

Figure 3.1.3-17

csb-100k-3bio005

Due to the short noise duration of the missile launch (approximately 60 seconds), the only wildlife that would likely be affected are those that are within the 90 dB and greater contours (figure 3.1.3-18). Wildlife that have a direct line of sight to the launch pad area and nesting birds that are in the early nest initiation, egg laying, and early fledgling stages would have the greatest chance of being affected. While away from the nest, eggs and young could be exposed to increased predation and effects of weather. The effects of weather would be minimized by not conducting launches during the mid-day heat. Previous studies of jet aircraft noise have indicated that as long as noise levels drop to ambient levels and no other disturbance occurs, most birds will return to nests within only a few minutes after being flushed. The nearest rookery for colonial nesting birds is located approximately 8.5 kilometers (5.3 miles) east of Site D-3A and would experience noise levels of less than 85 dB from an interceptor launch. During the winter, foraging shorebirds would be subjected to increased energy demands if they are flushed by the noise.

Sensitive bird species located on the tip of Cape San Blas would experience peak noise levels of 121 dB from a launch. These noise levels would be discrete events lasting approximately 60 seconds. Any protected species within this noise contour could be startled or temporarily flushed from nests, but this should be a short-term impact that would not jeopardize the continued existence of the species.

During winter and spring launches, the nesting bald eagles would experience peak noise levels of 121 dB during launch events conducted during the breeding season. The increased human activity and noise during the pre-launch time period should ensure species' avoidance of the immediate launch area, thus the likelihood of a listed species being directly harmed by the launch should be remote. Each launch may cause a short-term alert or flee reaction. If adults leave the nest, eggs and young could be more susceptible to predation, weather, or dislodgment from the nest. The response of bald eagles to human activity during the nesting period appears to be variable. At KSC and Merritt Island National Wildlife Refuge, there is an active bald eagle nest within approximately 6 kilometers (4 miles) of a Space Shuttle launch pad. Although this nest is located at a much greater distance from the launch pad than the nest at Cape San Blas, the nest has been active since 1968, and the pair has habituated to the increased noise levels of periodic launches (102 dB for approximately 2 minutes) without noticeable effects (Whaley, 1997). In Washington, pile driving in Puget Sound caused minimal disturbance to perched eagles, although the construction activity may have caused eagles to avoid the 0.8-kilometer (0.5-mile) radius area around the site (Botteroff et al., 1987). Human activities that are within sight of eagles tend to cause greater disturbances than those that are not in sight; thus, all activities at Cape San Blas are likely to affect the bald eagles to some degree and could lead to a temporary or permanent abandonment of the nest.

As test preparation would be done primarily during night-time hours, sea turtles coming on shore to nest at night could be adversely affected.

The level of noise impact resulting from launches is related to the following factors:

EXPLANATION

- Roads
- Proposed Launch Site
- Shorebird Nesting Areas
- Sea Turtle Nesting Area
- Historical Occurrence of Beach Mice
- Bald Eagle Nest
- Gulf Coast Lupine
- 1 kilometer (0.6 miles)
- 2 kilometers (1.2 miles)
- 4 kilometers (2.5 miles)
- 8 kilometers (5.0 miles)
- 9 kilometers (5.6 miles)

Scale 1:100,000

0 1 2 Miles

0 1.5 3 Kilometers

NORTH

Target Launch Noise Levels

Cape San Blas, Florida

Figure 3.1.3-18

- Human activity prior to the launch would likely cause wildlife to leave the area prior to the launch, reducing the number of individuals that would be exposed to the loudest noise levels.
- The noise level would return to near ambient levels within 60 seconds.

Noise from interceptor missile launches would result in a smaller area of disturbance to listed wildlife species than for target missiles. During the breeding season, snowy plovers, bald eagles, osprey, and other migratory bird species may nest within 0.5 kilometer (0.3 mile) of the launch site and would be subjected to peak noise levels of 112.4 dB. The noise level would return to near ambient levels within 60 seconds.

Emission

Emission effects for launches from Cape San Blas would be the same as those discussed in section 3.1.3.4.1 for Santa Rosa Island launches.

Post Launch

The post-launch activities at Cape San Blas would result in human activity and noise in the immediate area for a period of up to 5 days and are the same as discussed in section 3.1.3.4.1.

Cumulative Impacts

Construction and site preparation would disturb 3.53 hectares (8.72 acres) of habitat but would not intrude onto the beach area. The construction would impact 0.66 hectare (1.62 acres) of the 67.2 hectares (166 acres) of wetlands, or 1 percent of the wetlands at Site D-3. This disturbance would require a Section 404 permit.

Sensitive species in the vicinity of Site D-3 include the bald eagle and sea turtles, both of which use the area for nesting. Cape San Blas is one of the premier sea turtle nesting areas on the entire Gulf Coast of Florida. Human presence, lighting, and traffic during the 8 months of construction and subsequent site preparation activities could adversely affect nesting or breeding of either the eagles or sea turtles.

Multiple launches could result in a periodic human presence that could cause wildlife to avoid the immediate vicinity.

The heat and noise of launch events may cause mortality to those small animals in the immediate vicinity of the launch pad that were not frightened away by the increased human activity. Deposition of hydrogen chloride and aluminum oxide emissions may cause some temporary spotting and browning of plants within 61 meters (200 feet) of the launch pad. Missile exhaust emissions and deposition would diminish biodiversity in the immediate vicinity of the launch pad. Plants that are tolerant of decreased pH levels would survive or thrive at the expense of those plants more sensitive to decreased pH levels.

Dawn launches would require pre-dawn or all night launch preparation activities. These activities and the associated lighting could have a negative effect on sea turtle hatchlings crawling to the surf during the late summer and early fall.

There are very few other activities planned for Cape San Blas that would contribute to cumulative biological impacts at this location.

Mitigations Considered

In compliance with Section 7 of the Endangered Species Act, AFDTC would consult with the USFWS and NMFS to insure that program actions are not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of lands determined by the USFWS to be critical habitat. AFDTC would also, in coordination with the USFWS and NMFS, establish and implement measures to mitigate impacts to any listed species. Consultation and coordination with the other appropriate Federal, state, and local agencies would also be conducted to determine mitigations to minimize impacts to sensitive species. Site personnel involved in construction activities would receive an environmental awareness orientation to make the personnel aware of their responsibilities with regard to threatened and endangered species, cultural resources, allowable activities on sensitive and protected lands, erosion control, and hazardous materials management.

Possible mitigations would include:

- Minimize nighttime activities and lighting and use low pressure sodium where lighting is required.
- Reduce the effect of nighttime activities on sea turtle nesting and hatchling by aiming low pressure sodium lighting away from the beach, placing the light source as close to the ground as possible, utilizing shields around the lights.
- Design and implement alternative RDAS line-of-sight that would eliminate or minimize impacts associated with the removal for the line-of-sight corridor.
- Ensure siting layout design minimizes wetlands fill and site disturbance.
- Design wetland and habitat enhancement measures which occur onsite and in-kind.
- Include construction contract provisions to ensure compliance with environmental protection measures and minimize habitat destruction.
- Relocate raptor roosts offsite to avoid impacts from construction activities.
- Continue endangered species population surveys within the LHA.
- Continue to survey plants adjacent to the launch pad to assess effects of launch.
- Construct sound barriers surrounding the launch pad to reduce launch noise.
- A qualified biologist would monitor early flight termination or launch failure debris recovery activities to reduce impacts on nesting shorebirds and rare plant populations.
- To the extent possible, schedule test activity to avoid spring breeding seasons to reduce potential adverse impacts on migratory bird species.

3.1.4 CULTURAL RESOURCES

The Santa Rosa Island Site A-15 is potentially eligible for listing on the NRHP because of the BOMARC launches which occurred there from 1959 to 1985. Site preparation activities would have an effect on the character of the property's setting. The Cape San Blas lighthouse, two keeper's quarters, two cisterns, and a fuel storage building are eligible for listing on the NRHP. Launch noise may adversely affect these historic structures. Site preparation activities would not change the historical setting of the lighthouse and keeper's quarters.

3.1.4.1 Resource Description and Evaluative Methods

Cultural resources consist of prehistoric and historic districts, sites, structures, artifacts, and any other physical evidence of human activity considered important to a culture or community for scientific, traditional, religious, or other reasons. Cultural resources are divided into two categories: prehistoric archaeological resources, and historic resources.

Prehistoric archaeological resources are defined as physical remnants of human activity that predate the advent of written records in a particular culture and geographic region. They include archaeological sites, structures, artifacts, and other evidence of prehistoric human behavior.

Historic resources consist of physical properties or locations postdating the advent of written records in a particular culture or geographic region, such as archaeological sites, structures, artifacts, documents, and other evidence of human occupation. Historic resources also include submerged cultural resources such as shipwrecks and locations associated with events that have made a significant contribution to history or that are associated with the lives of historically significant persons.

The analytical approach for cultural resources first involved defining the ROI which, for the purposes of analysis, will be synonymous with the term "area of potential effect" used in cultural resources legislation. The number of cultural resources present within the ROI were quantified through field reconnaissance and research of existing literature. Refer to sections 3.1.4.3.1, 3.1.4.3.2, 3.2.4.3, and 3.3.4.3.1 for specific references. This research included coverage of all archaeological surveys and architectural inventories previously conducted within the project area as well as a review of the Florida Master Site File for information regarding cultural resources which are located within the ROI. Resources included in this research were:

- All prehistoric archaeological resources potentially eligible, eligible, or listed on the NRHP
- All historic resources or structures potentially eligible, eligible, or listed on the NRHP
- Paleontological resources

Impacts to the cultural resources located within the ROI that could occur as a result of the proposed action were then identified. The following major issues were considered during analysis of potential impacts to cultural resources:

- Noise—impact to historic properties due to launch noise, sonic booms, or launch mishap
- Construction activities—impact to historic properties due to siting of program-related facilities or construction activities, including modification of facilities potentially eligible, eligible, or listed on the NRHP

Coordination with the State Historic Preservation Officer (SHPO) was initiated at the beginning of the environmental analysis phase.

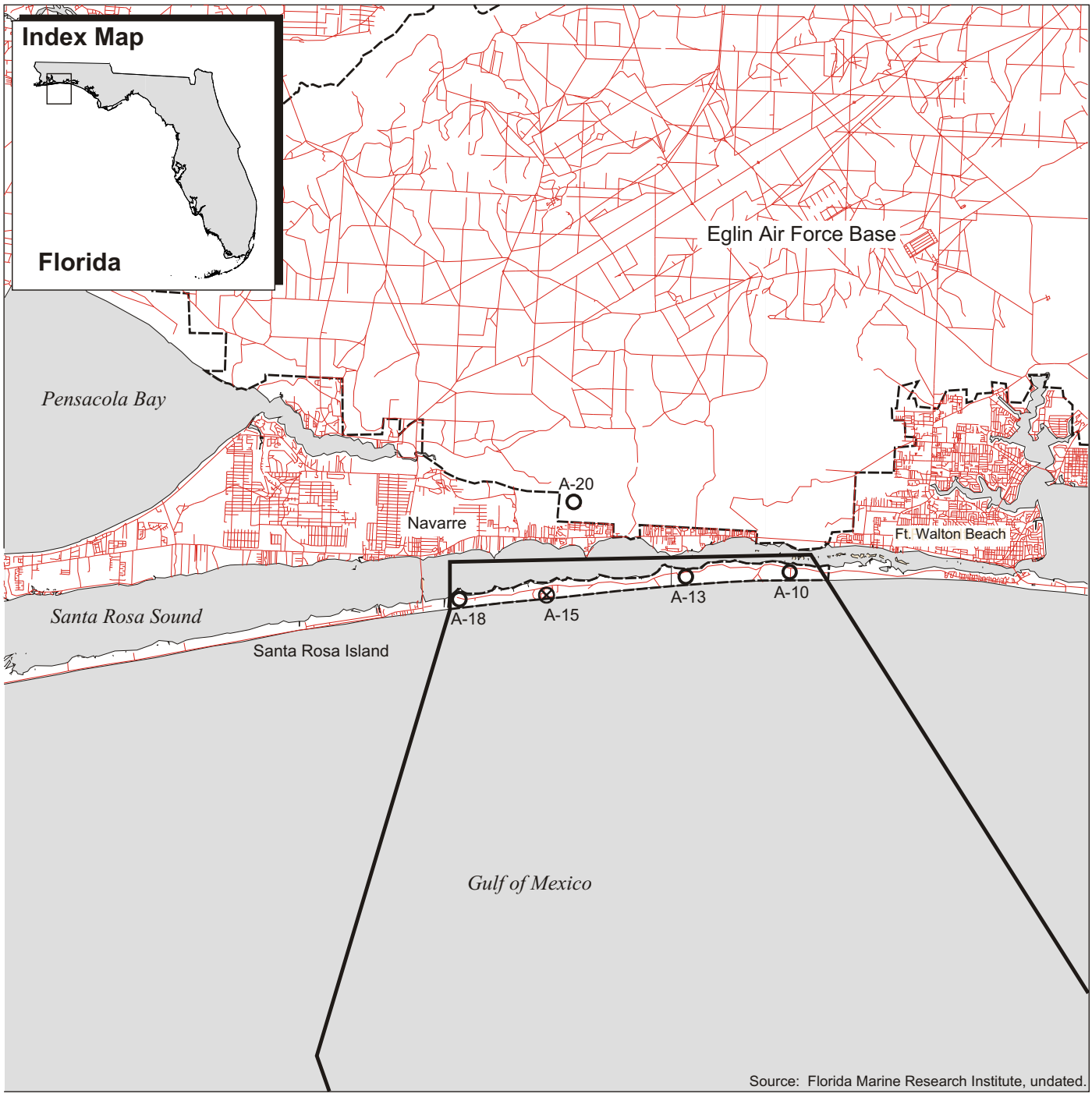
3.1.4.2 Region of Influence

The cultural resources ROI is defined as the area which is encompassed by the launch hazard area (figure 3.1.4-1), the areas affected by launch noise, the areas affected by ground disturbance due to construction activities, and the area in the immediate vicinity of the proposed instrumentation sites.

3.1.4.3 Affected Environment

Excerpts from the Eglin AFB Cultural Resources Management Plan (1997) are presented here to provide a context for the types of cultural resources known to exist that have the potential to occur within the ROI.

> Between 10,000 and 8000 B.C., the Paleoindians, Eglin's earliest inhabitants, arrived, probably by way of an eastward migration from the Great Plains to northwest Florida. These early groups were successful hunters who brought down their prey with efficient skill.
>
> The subsequent Archaic populations who appeared sometime between about 8000 and 6000 B.C. manufactured many different types of spear points. They hunted, fished and gathered in the forests and waters of the region and occupied camps along the creek, rivers and bay shores until some circa 2000 B.C.
>
> At that time, the Elliotts Point Complex developed in the Eglin area, distinguished by an involvement in long distance trade, production of delicate stone tools, the acquisition of innovative ideas from distant neighbors, a system of redistribution of goods and the first appearance of pottery.
>
> The Deptford culture that followed Elliotts Point persisted from around 600 B.C. to A.D. 150-200. These people were probably the descendants of the Elliotts Point populations. For about 400 years, the Deptford society was rather static, exhibiting little change. The Deptford people practiced an efficient subsistence strategy, hunting an array of animals, gathering wild plants and collecting oysters and other shellfish.



EXPLANATION

- Roads
- Region of Influence (Instrumentation Sites)
- Eglin Air Force Base
- Region of Influence (Launch Hazard Area)

Scale 1:250,000

0 2 4 Miles

0 6 Kilometers

NORTH

Sri-250k-3cult001

Region of Influence for Cultural Resources

Santa Rosa Island, Florida

Figure 3.1.4-1

Around 50 B.C., the local Deptford population began to be influenced by cultures to the west in Louisiana and to the northeast in Georgia that inspired innovation in pottery manufacture. The influences from the west included bird motifs on ceramics and other types of iconography that may have had ritual meaning. From the east, the innovations included scalloped rims on pots and stamped decorations with complicated abstract designs and bull's eye patterns. These ceramic traditions culminated around A.D. 150 to 200 with the fluorescing Santa Rosa/Swift Creek culture.

The Santa Rosa/Swift Creek people preferred to live along the bay rather than the sound and ate clams instead of oysters, the latter probably a necessity because of changes in the bay's salinity levels. Other changes were seen in the appearance of bone tools used as pins or punched, drilled teeth (probably used as pendants) and shell implements. Some exotic items suggest that trade with other regions was active again. Examples of these items include quartzite, clear quartz, quartz crystals, mica and copper. Sources for these are as far away as the Great Lakes, the Appalachians and the Atlantic Coastal Plain.

By A.D. 700-perhaps earlier-the area was occupied by Weeden Island culture, populations of whom displayed changes in settlement from earlier groups. These Weeden Island folk inhabited more diverse environmental settings, living along the coastal areas, as well as in the interior uplands that were not settled by their predecessors. Another difference between Weeden Island and earlier groups is that the Weeden Island people put greater emphasis on ritual burial and erected some 15 mounds in the region-two on Eglin. The mounds were used for burying the dead and for observing religious ceremonies. Villages were clustered around the mounds, indicating order and hierarchy in the society.

Some researchers have hypothesized that an invasion may have occurred around A.D. 1000, resulting in the establishment of Fort Walton/Pensacola culture. Others have argued that the change came largely from within, although influenced by outside developments. Both theories have been hotly debated. Regardless of the reasons why, the Eglin area, like much of the northern Gulf Coast, witnessed a replacement of Weeden Island culture by the Fort Walton and Pensacola cultures no later than A.D. 1200 and probably somewhat earlier. In this culture, the highest status is believed to have been afforded the local chiefs who wielded considerable power over the populations.

Fort Walton/Pensacola groups resumed the tradition of living along the water, rarely venturing into the interior areas except, perhaps, for hunting. Major villages were probably occupied year-round by at least some of the population, while smaller camps were used periodically for special purposes. In addition to the exploitation of natural resources, these people are presumed to be the first local inhabitants to practice agriculture-remains of corn have been found in Fort Walton/Pensacola sites, including one on Eglin proper. The Fort Walton/Pensacola people are believed to have been in the area when the first Spaniards arrived in the 1500s.

Throughout the Exploration and Colonial period, the Spanish, French and British all focused their activities on Pensacola rather than the Eglin area.

In the pioneer period of the early nineteenth century, settlement in the area was sparse because of the lack of good roads and easily exploitable resources. Those settlers that did come were initially interested in farming, but the soils over much of the region were not suitable for large-scale agricultural production. An exception were the rich soils in the bottomlands along the Alaqua and Yellow River that were used for the cultivation of vegetables.

During the Civil War, the Walton Guard, a Confederate militia company, was established. Their first assignment was to create a post on the Narrows of Santa Rosa Sound to prevent enemy access, through the East Pass and the Sound, to Pensacola. Although no major battles took place in the Eglin area, there were skirmishes between the Confederate and Union soldiers.

In the aftermath of the Civil War, with late 1800s reconstruction and rural industrial expansion in the early twentieth century, the area experienced a serious need for improved transportation, a need which was partially answered by the coming of the railroad. Improved transportation helped meet the demands of the timber and naval stores industries as well as to support general population growth.

In 1906, much of the land was included in the newly established Choctawhatchee National Forest. The United States Forest Service headquarters was located on Garnier Bayou at Camp Pinchot presently on Eglin.

The military began to utilize the Eglin area as early as 1931, and through the decade their presence increased. During World War II, Eglin played a primary role in training and the testing of new weapons and tactics. Priorities in the first year of the war involved suitability testing of aircraft, the first concern of which was to produce aircraft that could compete with the agile Japanese Zero. Another priority was climatic testing of equipment. Toward this end, Eglin established the Arctic, Desert and Tropic Information Center (Building 6) and the High Altitude Chamber (Building 408). These forays into climatic research set the groundwork for subsequent establishment of the McKinley Climatic Laboratory, which was operational by 1947. In 1987, the American Society of Mechanical Engineers designated the McKinley Climatic Laboratory as a National Historic Mechanical Engineering Landmark; the Air Force is currently considering the structure for National Register of Historic Places (NRHP) nomination.

In 1943, Eglin was chosen for the development of tactics to surmount the beach defenses of the "Atlantic Wall" for the invasion of Europe. A model of beach bastions was constructed for the purpose and attacked with several types of ordnance delivered from aircraft and underwater demolition teams to determine the most expedient means of breaching these defenses. These tests resulted in tactical changes which were successfully executed in the assault on Normandy's beaches the next year.

Eglin was also the scene of Operation Crossbow, a far-reaching, top priority project of the Allied forces. Eglin was tasked with quickly and secretively building a full-scale model of a German V-1 launching complex to determine the best means of destroying the complex. About the same time as Crossbow was being tested, Eglin developed and tested the US version of the V-1, the JB-2. Eglin built three launch ramps along the northwest Florida coast and, after much trial and error, developed successful launch tactics. Two of the launch sites are on Okaloosa Island and are currently listed on the National Register of Historic Places.

In the ensuing years, Eglin remained at the forefront of weapons test and development. Work at Eglin in conjunction with radio-controlled missile testing foreshadowed development of the GBU-15 laser-guided "smart" bomb, which was developed much later at Eglin. In the last half of the twentieth century, a new generation of advanced technology, weapons systems and tactics has evolved, many of which, like the B-1B Bomber and F-117 stealth fighter, have been tested at Eglin.

> The base has provided humanitarian aid in the form of temporary housing for Vietnamese refugees in 1975 and Cuban refugees in 1980. Eglin has also played an important role in international military events, including the aborted Iranian hostage rescue attempt in 1980, the Panamanian campaign in 1989, Desert Shield in 1990 and Desert Storm in 1991.
>
> (Eglin Air Force Base, 1997)

3.1.4.3.1 Santa Rosa Island

Prehistoric Archaeological Resources

The 16.1 kilometer (10-mile) portion of Santa Rosa Island which comprises the cultural resources ROI was surveyed during the preparation of the Eglin Historic Preservation Plan (figure 3.1.4-1). A total of 18 prehistoric archaeological sites have been identified on Santa Rosa Island. Thirteen of these sites have been determined to be either eligible or potentially eligible for listing on the NRHP. The remaining five prehistoric archaeological sites are ineligible for listing on the NRHP. (Wright, 1998)

Historic Resources and Structures

The Cultural Resources Management Office at Eglin AFB has identified a total of 16 historic archaeological sites within the cultural resources ROI for Santa Rosa Island. Two of these are listed on the NRHP. They are the remains of the launch sites for the JB-2 missile. The JB-2 "Jet Bomb," which was the U.S. version of the German V-1 rocket, was tested at the two Santa Rosa Island sites from 1944 until the end of WWII (Thomas and Campbell, 1993). A colonial period historic site, which is eligible for listing on the NRHP, and a potentially eligible sunken iron vessel located just offshore of Santa Rosa Island are also located within the ROI. The remaining 12 historic archaeological sites on Santa Rosa Island are ineligible for listing on the NRHP.

Building 12555 at Site A-15 was constructed in 1990 for use as an electricity research engineering facility. Since that time all of the research equipment has been removed and the structure abandoned.

Site A-15 contains a complex of objects and structures associated with the testing of BOMARC missiles. The BOMARC was a surface-to-air missile produced by Boeing and the Michigan Aeronautical Research Center (Dorr and Donald, 1990).

BOMARC testing began at Site A-15 in 1959 after the testing program was moved to the Eglin Proving Grounds from Cape Canaveral (Jones, V. 1997). Eglin AFB completed BOMARC testing in 1963, but continued launching versions of the BOMARC as targets until 1985. Of all BOMARC structures, 38 have since been demolished (Brown, A., 1997). Some original structures at the site have been used for other mission-related activities. The remaining 20 structures associated with BOMARC testing, as well as the entire complex of Site A-15 as a whole, are considered potentially eligible for listing on the NRHP as Cold War-era resources. (Wright, 1997) The BOMARC facility as a whole is also considered potentially eligible for listing on the NRHP as part of the complex of facilities associated with BOMARC testing including Site D-3 at Cape San Blas and Site D-8 at Cudjoe Key.

The review of existing literature as described in 3.1.4.1 indicates that no other historic resources or structures have been identified within the ROI for Santa Rosa Island. (Eglin Air Force Base, 1992; Mikell, 1992; Thomas and Campbell, 1993; Meyer and Hemphill, 1995; Thomas and Meyer, 1995)

3.1.4.3.2 Cape San Blas

The ROI for Site D-3A is illustrated in figure 3.1.4-2.

Prehistoric Archaeological Resources

In 1993, the Air Force property at Cape San Blas was surveyed for the presence of archaeological resources. No sites were located (Johnson, 1994).

Historic Resources and Structures

Site D-3 at Cape San Blas, as well as Site D-8 on Cudjoe Key, was part of the downrange radar tracking system for the BOMARC launches that originated at Site A-15 on Santa Rosa Island. Each of these facilities is part of a complex representing the same historic context. The entire complex of facilities including Sites D-3, D-8, and A-15 is considered potentially eligible for listing on the NRHP.

A historic lighthouse, two domestic dwellings, two cisterns, and a fuel storage building are located on the Air Force property at Cape San Blas (Johnson, 1994) (figures 3.1.4-3 and 3.1.4-4). The lighthouse structure is a metal frame tower anchored to the ground by large metal screws, which are attached to iron footings at the base of the tower. This screw pile construction was first employed by the British in 1839 off the east coast of England to avoid the destruction that masonry lighthouses built on sandy soils had undergone due to storms and coastal erosion. The screw pile lighthouse at Cape San Blas was completed in 1885 after three previous masonry structures in the area were destroyed by the dynamic shoreline. In 1919, this structure was moved 0.4 kilometer (0.25 mile) north to its present location to avoid the adverse effects of coastal erosion (figure 3.1.4-5). The two keeper's dwellings currently located near the lighthouse replaced earlier structures built in 1870 (figures 3.1.4-3 and 3.1.4-4). (U.S. Department of the Interior, 1978)

Studies by the University of West Florida indicate an average erosion rate of 1 meter (3 feet) per year along most of the southern end of the Gulf of Mexico side of the Saint Joseph Peninsula between 1957 and 1981 (U.S. Army Space and Strategic Defense Command, 1994a). Bathymetric surveys indicate that the shoreline at Cape San Blas eroded slightly less than 0.8 kilometer (0.5 mile) between 1875 and 1942, an average rate of about 11 meters (36 feet) per year (U.S. Army Space and Strategic Defense Command, 1997a). However, this is an average rate; generally, erosion occurs during major storm events or cycles. From July to mid-November 1993, the shore at Cape San Blas eroded 6 to 9 meters (20 to 30 feet) on the west side and generally accreted on the southern side.

Source: Gulf County, 1990.

EXPLANATION

- Roads
- Government Property
- ROI (Launch Hazard Area)

Region of Influence for Cultural Resources

Cape San Blas, Florida

Figure 3.1.4-2

NORTH

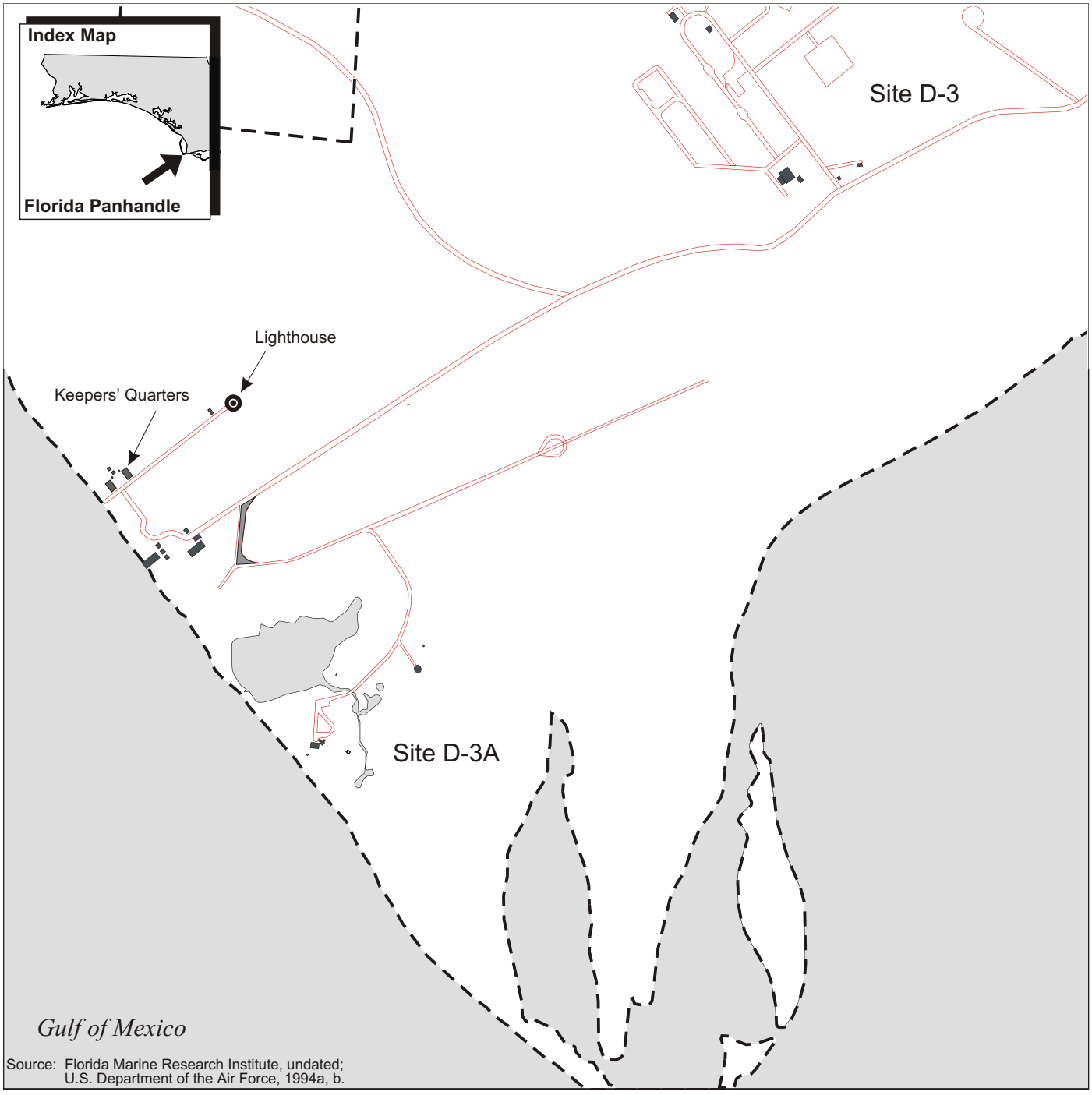
Scale 1:50,000

0 .5 1 Mile

0 .8 1.5 Kilometers

csb-50k-3cult003

Figure 3.1.4-3: Cape San Blas Historic Lighthouse and Keeper's Quarters



Source: Florida Marine Research Institute, undated; U.S. Department of the Air Force, 1994a, b.

EXPLANATION

Lighthouse

Government Property

Coast Guard Lighthouse

NORTH

Scale 1:9600

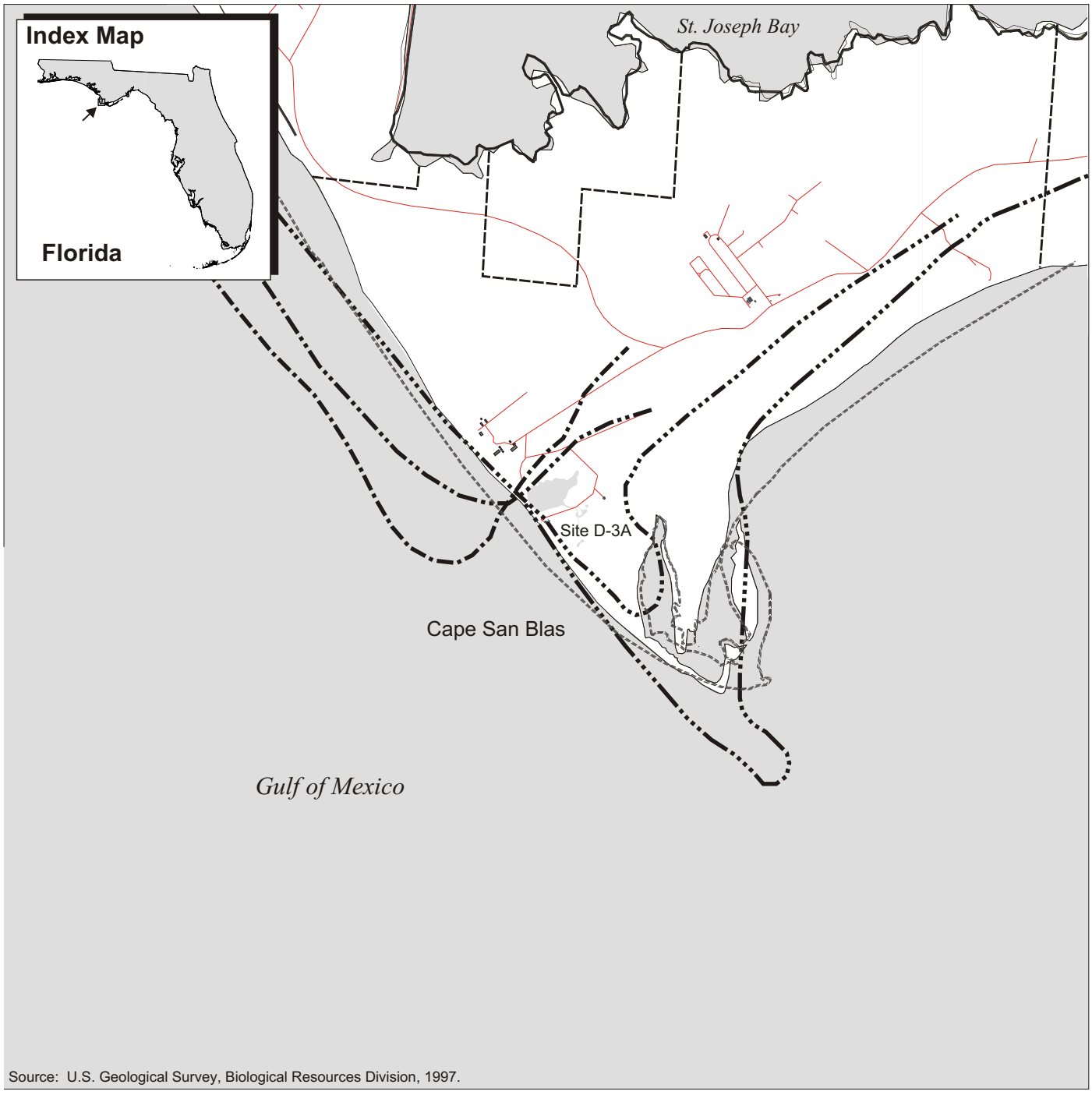
0 400 800 Feet

0 125 250 Meters

Cape San Blas, Florida

Figure 3.1.4-4

csb-9600-3cult001



Source: U.S. Geological Survey, Biological Resources Division, 1997.

EXPLANATION

- Roads
- Government Property
- 1900 (shore line)
- 1914 (shore line)
- 1957 (shore line)
- 1976 (shore line)
- 1994 (shore line)

Scale 1:24,000

0 1,000 2,000 Feet

0 250 500 Meters

NORTH

csb-24k-3gen001

Coastal Erosion and Historic Shorelines

Cape San Blas, Florida

Figure 3.1.4-5

Until 1952, the property was used exclusively for the Cape San Blas lighthouse. In that year, a permit was issued to the Air Force to establish a unit in the Long Range Navigation (LORAN) Radio Chain of Stations. The Coast Guard assumed and maintained custody of the property and responsibility for operation of the LORAN station and lighthouse properties (U.S. Army Space and Strategic Defense Command, 1995). In 1982, the Air Force leased the property from the Coast Guard, and preservation responsibilities regarding the lighthouse and keeper's quarters have been left unresolved. As a result of the unresolved issues regarding the stewardship of these structures and damage sustained from Hurricane Opal on 4 October 1995, the keeper's quarters have fallen into disrepair. In 1978, this site was nominated for listing on the NRHP. These structures are registered as historic sites with the State of Florida. (U.S. Army Space and Strategic Defense Command 1994a) The lighthouse, keeper's quarters, two cisterns, and a fuel storage building are eligible for listing on the NRHP and are located within the ROI for Site D-3A.

3.1.4.4 Environmental Impacts and Mitigations

3.1.4.4.1 Santa Rosa Island

The Santa Rosa Island Site A-15 is potentially eligible for listing on the NRHP because of the BOMARC launches that occurred there from 1959 to 1985. Site preparation activities would have an effect on the character of the property's setting. Flight test activities are not expected to disturb identified sites or substantially change the character of the historical setting.

No-action Alternative

Under the no-action alternative, the proposed ground-based TMD test activities on Santa Rosa Island would not be implemented. Operations at Eglin AFB would continue at their current and planned levels. Cultural resources would continue to deteriorate as a result of existing conditions. Continuing Eglin AFB operations would have negligible effects on potentially eligible NRHP sites.

Site Preparation Activities

Interceptor

No construction requirements have been identified for interceptor launches from Santa Rosa Island. Trailers containing launchers and radar equipment would be set up at the launch location 2 weeks prior to launch.

Target

Site preparation activities at Site A-15 on Santa Rosa Island would disturb 0.8 hectare (1.98 acres) since existing concrete pads and buildings would be used for the launch pad, MAB, launch control building, and ground support equipment. However, some road work may be necessary to facilitate access. Existing facilities at Eglin AFB

main base would also be used for the optics and radar. These activities would not require any site preparation.

Potentially adverse effects to Cold War-era resources associated with BOMARC testing at Site A-15 which are determined to be eligible for listing on the NRHP could occur as a result of site preparation activities required for this proposed action. Building 12555 would undergo renovation for use as a MAB.

The ROI for cultural resources at Santa Rosa Island was previously surveyed for the presence of archaeological sites (Eglin Air Force Base, 1992). No sites were identified within areas of proposed construction.

No construction would be required at the instrumentation sites located at Sites A-10, A-13, A-18, and A-20, including the JB-2 launch sites.

Flight Test Activities

Interceptor and Target

Flight test activities at Site A-15 would consist of missile launches (interceptor or target missiles) and the attendant support activities. Short duration, high intensity noise generated by an interceptor or a target would be unlikely to adversely affect structures that were originally designed to support missile launches.

As part of the flight test activities, radar, telemetry, and optics vehicles would drive to and park at instrumentation sites at Sites A-10, A-13, A-18, and A-20 on existing paved areas. No ground-disturbing activities would be associated with their operations.

Cumulative Impacts

Construction of the TMD test facilities at Santa Rosa Island would take place within Eglin AFB property that was originally developed in 1959 for BOMARC missile testing over the Gulf of Mexico. In the 1980s, the complex was upgraded to test an electromagnetic rail-run for the Strategic Defense Initiative Organization. Current instrumentation sites and activities will continue for the foreseeable future. An additional activity currently proposed for the island is the Open Air Hardware in the Loop project which would involve construction of three towers, three control buildings, and associated support facilities.

Construction of TMD test facilities at Santa Rosa Island may affect potentially significant structures or objects at Site A-15 that were originally constructed to support test launches of the BOMARC missile. Impacts to these facilities are not expected to diminish or increase when combined with reasonably foreseeable actions at Santa Rosa Island. The Santa Rosa Island reconstitution plan would construct facilities at three other sites on the island. These projects may affect prehistoric or historic resources.

Mitigations Considered

If the Santa Rosa Island launch option is selected, a determination of eligibility would be conducted for Site A-15. In compliance with the NHPA Section 106 review and

comment process and the Advisory Council on Historic Preservation's (ACHP's) regulations implementing the Section 106 (36 CFR Part 800), AFDTC would consult with the ACHP and the SHPO to establish and implement measures to mitigate impacts to any properties which are determined to be eligible for listing on the NRHP.

In the event of a mishap, a professional archaeologist would participate on the debris recovery team to assess impacts to cultural resources and to avert further impacts to cultural resources.

In accordance with the NHPA, accidental discovery of historic or pre-historic archaeological resources during ground-disturbing activities, would stop activities until a qualified archaeologist could determine the nature and significance of the site in question. Any Native American burials or associated funerary artifacts would be treated in accordance with the Native American Graves Protection and Repatriation Act (NAGPRA).

3.1.4.4.2 Cape San Blas

Flight test activities at Cape San Blas may adversely affect the structural integrity of the keeper's quarters and possibly damage the fresnel lens in the lighthouse due the dynamic forces generated by the noise of a target missile launch. Other flight test activities are not expected to disturb identified sites or substantially change the character of the historical setting of the lighthouse complex or Cold War-era structures.

No-action Alternative

Under the no-action alternative, the proposed ground-based TMD test activities on Cape San Blas would not be implemented. Operations at Eglin AFB involving Cape San Blas would continue at their current or planned levels. Continuing Eglin AFB operations would have negligible effects on potentially eligible NRHP sites. Natural processes would continue to affect existing cultural resources.

Site Preparation Activities

Interceptor

No construction requirements have been identified for interceptor launches from Santa Rosa Island. Trailers containing launchers and radar equipment would be set up at the launch location 2 weeks prior to launch.

Target

No site preparation activities would occur in the vicinity of the lighthouse and its associated structures or potentially eligible Cold War-era facilities at Site D-3.

The ROI for cultural resources at Cape San Blas were previously surveyed for the presence of archaeological sites (Johnson, 1994). No sites were identified.

Flight Test Activities

Interceptor and Target

Flight test activities at Cape San Blas would consist of missile launches (interceptor or target missiles) and the attendant support activities. Exposure to certain levels of noise-induced vibration could adversely affect unconventional structures such as the lighthouse and keeper's quarters. Proposed target missile launches from Cape San Blas would generate short-term noise levels in excess of 124 dB at the lighthouse and keeper's quarters (figure 3.1.3-18). The force generated by 124 dB noise events has the potential to adversely affect the structural integrity of wood frame structures (Sutherland and Brown, 1990). Launch noise levels are not within the range in which adverse effects to the metal frame of the lighthouse would be expected (Sutherland and Brown, 1990).

Re-entry of target missiles launched from the southern Gulf of Mexico may generate a sonic boom which could adversely impact the lighthouse and keeper's quarters. The overpressure generated by such a sonic boom would depend upon many factors, all of which are launch-specific. That is, each reentry may or may not have the potential to generate a sonic boom that could potentially adversely affect the keeper's quarters. There is no anticipated adverse affect on the metal frame of the lighthouse due to sonic boom overpressure.

No studies exist regarding launch noise or sonic boom overpressure impacting material similar to that of the fresnel lens on the Cape San Blas lighthouse. However, noise levels would be within a range such that damage to the lens is possible. For a discussion of sonic booms, see section 3.2.8.

Cumulative Impacts

Construction of the TMD test facilities at Cape San Blas would take place on a site owned by Eglin AFB that was originally developed in 1959 for monitoring missile testing over the Gulf of Mexico. Airspace monitoring from instrumentation on Cape San Blas has been operational since that time and will continue for the foreseeable future. No other major projects are currently planned. Residential and commercial development on St. Joe Peninsula has proceeded more slowly than for Gulf County as a whole.

No prehistoric archaeological sites have been identified within the ROI for Cape San Blas.

The proposed action could affect the lighthouse keeper's quarters and the lighthouse lens by the high intensity, low frequency sound levels of target launches 562 meters (1,841 feet) away from the houses and 589 meters (1,932 feet) away from the lighthouse. One or both of the lighthouse keeper's quarters may undergo rehabilitation and/or relocation to avoid deterioration resulting from exposure to coastal erosion. If one or both of the quarters are relocated further from the proposed launch pad cumulative impacts due to launch noise would decrease or be eliminated depending on the distance of the new location from the pad.

Rehabilitation of both of the keeper's quarters would likely increase the structural integrity of the keeper's quarters and decrease the probability of adverse effects due to noise. If no action is taken to halt the deterioration of the keeper's quarters they may deteriorate beyond repair. Noise impacts from missile launches could slightly accelerate this deterioration. However, the difference in the rate of deterioration would probably be imperceptible and cumulative impacts from launch noise would be insignificant with respect to the impacts that the keeper's quarters would be experiencing from neglect. No other projects have been identified at this location for the foreseeable future which, when combined with the proposed action, would result in cumulative impacts.

Mitigations Considered

In accordance with the NHPA, accidental discovery of historic or pre-historic archaeological resources during ground-disturbing activities, would stop activities until a qualified archaeologist could determine the nature and significance of the site in question. Any Native American burials or associated funerary artifacts would be treated in accordance with the NAGPRA.

If the Cape San Blas launch option is selected, methods to protect the lighthouse lens would be developed in consultation with the appropriate Federal and state agencies. Possible mitigations would include the removal and curation of the lighthouse lens for the duration of the testing program and restoration of any historic properties damaged as a result of falling missile debris or launch noise.

In the event of a mishap, a professional archaeologist would participate on the debris recovery team to assess impacts to cultural resources and to avert further impacts to cultural resources.

3.1.5 GEOLOGY AND SOILS

Santa Rosa Island site preparation activities would not disturb any wetlands. The Cape San Blas construction would eliminate 0.66 hectare (1.62 acres) of fresh water wetland. Flight test activities would have a temporary effect on soils at either site. Beach erosion may affect the structural integrity of the proposed launch pad at Cape San Blas.

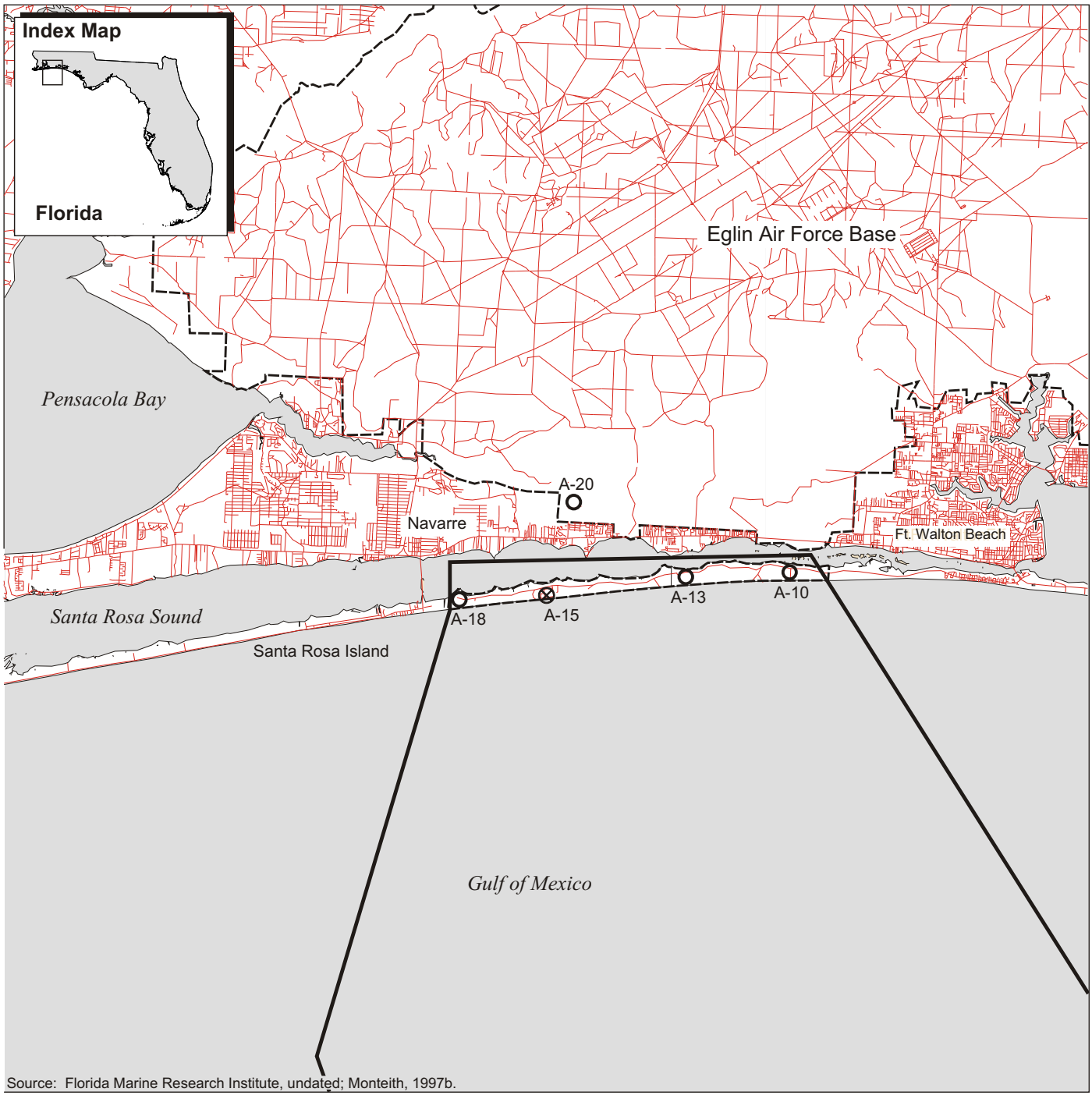
3.1.5.1 Resource Description and Evaluative Methods

The discussion of geology and soils addresses existing geology and topography, soil types and characteristics, and oil and gas exploration and extraction operations for each identified ROI. Although there are no regulations pertaining specifically to geology and soils in the project areas, some water quality regulations are indirectly related with respect to erosion and resultant turbidity in surface waters (National Pollutant Discharge Elimination System [NPDES] permitting program), avoidance of development in floodplains (Executive Order 11988, Floodplain Management), and spill response plans to ensure that groundwater is not adversely impacted.

The approach for evaluating impacts relative to geology and soils involved assessing the degree to which project activities could affect soils, soil erosion, or important geologic features in the various ROIs. Impacts that could result from site preparation activities could include surface disturbance from scraping and grading, and erosion from wind or water. Impacts from flight test activities could result from deposition of launch emissions and dispersion of chemical stimulants and debris. Criteria for assessing geology and soils impacts include the importance of the resource, the area extent of surface disturbance, the duration of the impact, and the degree to which project activities could affect geologic and soils resources. See section 3.1.14 for a discussion of surface water, flood hazards, and groundwater resources and section 3.2.5.4 for impacts to oil and gas exploration facilities.

3.1.5.2 Region of Influence

The ROI for geology and soils on Santa Rosa Island (Site A-15) (figure 3.1.5-1) and Cape San Blas (Site D-3A) (figure 3.1.5-2) is the area that could be affected by project activities such as construction of facilities and deposition of exhaust products. This area is defined as the island area within approximately 2,000 meters (6,500 feet) of the launch pads. The ROI for geology and soils at the proposed missile launch instrumentation sites (Sites A-10, A-15, and A-18) consists of the areas of construction for new facilities and mobile equipment locations.



Source: Florida Marine Research Institute, undated; Monteith, 1997b.

EXPLANATION

- Roads
- Region of Influence (Instrumentation Sites)
- Eglin Air Force Base
- Region of Influence (Launch Hazard Area)

Scale 1:250,000

0 2 4 Miles

0 3 6 Kilometers

NORTH

Sri-250k-3geo001

Region of Influence for Geology and Soils

Santa Rosa Island, Florida

Figure 3.1.5-1

Source: Gulf County, 1990.

EXPLANATION

Roads

Region of Influence (Launch Hazard Area)

Launch Site

Scale 1:50,000

0 .5 1 Mile

0 .8 1.5 Kilometers

NORTH

Region of Influence for Geology and Soils

Cape San Blas, Florida

Figure 3.1.5-2

csb-50k3geo001

3.1.5.3 Affected Environment

3.1.5.3.1 Santa Rosa Island

Geology and Topography

The Eglin AFB sites, including Santa Rosa Island and Cape San Blas, are located in the Gulf Coastal Lowlands, which is that portion of the Coastal Lowlands physiographic province that is adjacent to the Gulf of Mexico. Marine terraces, which were formed when sea level was higher than present levels, are characteristic of the Gulf Coastal Lowlands. Most physiographic features of the Gulf Coastal Lowlands are parallel to the coast and include barrier islands such as Santa Rosa Island, lagoons, estuaries, coastal ridges, sand dune ridges, relict spits and bars, and valleys (U.S. Department of Agriculture, 1995).

The Santa Rosa Island portion of Eglin AFB is a long-shore barrier island located in the Coastal Plain, the geology of which consists of unconsolidated sediments and sedimentary rock ranging in age from Cretaceous to Recent (136 million years ago to present). There are no known economic energy resources within or near the ROI. A few oil and gas exploration wells were drilled in the vicinity of Eglin AFB but were abandoned (U.S. Army Space and Strategic Defense Command, 1994a).

In terms of geologic hazards, Florida is classified as a stable geological area. Florida has no volcanoes and no known active faults, so there is very little chance of an earthquake occurring in the state. Of the approximately 30 historical tremors that have been reported in Florida, it is likely that all were the result of earthquakes that occurred outside of the state, particularly in South Carolina and the Caribbean (Florida Department of Environmental Protection, Division of Administration and Technical Services, 1994). The most recent earthquake was reported in Brewton, Alabama, in November 1997. Brewton is located approximately 72 kilometers (45 miles) north of Santa Rosa Island. (U.S. Department of the Interior, U.S. Fish and Wildlife Service, 1997)

Hydrology

There are two significant aquifers (water bearing geologic units) at Eglin AFB and the surrounding area: the surficial aquifer, also known as the Sand and Gravel Aquifer, and the Floridan Aquifer. Within the western Florida Panhandle, the Sand and Gravel Aquifer extends as much as 200 meters (650 feet) below the surface and the Floridan Aquifer extends as much as 457 meters (1,500 feet) below the surface (Florida Department of Natural Resources, Division of Resource Management; Florida Geological Survey, 1992; U.S. Army Space and Strategic Defense Command, 1994a). The Floridan Aquifer is the main potable water source for Eglin AFB and surrounding municipalities. The Sand and Gravel Aquifer is a generally unconfined, near-surface unit segregated from the underlying limestone Floridan Aquifer by the Pensacola Clay confining bed. Excessive use of the Floridan aquifer has caused an increased risk of saltwater intrusion. While the southern portion of Santa Rosa County continues to draw potable water from the Floridan Aquifer, this aquifer is so saline along other portions of the coast that the county will need to research other alternatives in order to meet expected growth pressures.

At Eglin AFB, the top of the Floridan Aquifer ranges from approximately 240 meters (800 feet) below the surface in the west to approximately 50 meters (165 feet) below the surface in the east (Northwest Florida Water Management District, 1981). On the Santa Rosa Island portion of Eglin AFB, the upper regions of the Floridan Aquifer are the potable water source, while the lower regions are generally considered non-potable. Below Eglin AFB, the Sand and Gravel Aquifer ranges from 91.4 meters (300 feet) thick in the west to approximately 15 meters (50 feet) thick in the east. On Santa Rosa Island, the surficial Sand and Gravel Aquifer is generally considered non-potable (Pratt, 1998). Additional discussion of the areas' hydrology is found in sections 3.1.12.3.1 and 3.1.14.3.1.

Soils

Soil Types. Soils of the barrier islands, including Santa Rosa Island, are sandy and range from excessively drained, well drained, and somewhat poorly drained soils of varying slopes. These soils occur on high dune ridges and in high upland areas. Soil on Santa Rosa Island consists entirely of well-sorted beach and dune sand deposits of the St. Lucie-Paola Association and Newhan-Corolla complex (U.S. Department of Agriculture, Natural Resources Conservation Service, 1995a).

Soil Erosion. Geologic erosion is defined as the wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep (U.S. Department of Agriculture, Natural Resources Conservation Service, 1995b). Based on the information presented in the soil survey for Okaloosa County, soils in the vicinity of Eglin AFB are not expected to exhibit high levels of water erosion. However, these soils may be susceptible to wind erosion.

Oil and Gas Exploration and Extraction Operations

Along the Florida Gulf coast, state lands extend approximately 16 kilometers (10 miles) offshore. With the exception of those leases entered into before 7 June 1991, the lease of offshore state lands and the permitting of oil and gas exploration activities within such areas is currently not being considered (Garrett, 1997). Although petroleum and natural gas are currently being produced in north Santa Rosa and extreme northeast Escambia counties, no oil or gas resources are known to underlie Eglin AFB (U.S. Army Space and Strategic Defense Command, 1994a). See section 3.2.7 for a detailed discussion of oil and gas exploration activities within the northeastern Gulf of Mexico region.

3.1.5.3.2 Cape San Blas

Geology and Topography

The Cape San Blas Missile Tracking Annex lies at the southern tip of the Saint Joseph Peninsula in Gulf County. The area consists of beaches, coastal dunes, and saltwater marshes. The surficial deposits at Cape San Blas consist of well-sorted, unconsolidated, fine- to medium-grained eolian and beach sand deposits. They are underlain by Upper Miocene (less than 26 million years before present) limestones, clayey sands and shell beds of the Choctawhatchee Stage, younger (Pliocene to Recent)

(7 million years to present) clayey sands, and fine sands and silts associated with ancient stream alluvium and ancient shoreline development U.S. Army Space and Strategic Defense Command, 1994a). The near-surface units generally dip to the southwest with the uppermost limestone unit being greater than 76 meters (250 feet) below sea level at the proposed launch site. The top of the confined Floridan aquifer is below this depth at the site.

The entire State of Florida is classified as a stable geological area so the chance of an earthquake or other earthquake-related hazards (in effect, liquefaction and tsunami surge) occurring in the state are considered very remote.

Hydrology

In general, groundwater resources within the vicinity of the Cape San Blas consist of a surficial Sand and Gravel Aquifer, located approximately 12.2 meters (40 feet) below ground level surface, and the Floridan Aquifer, located approximately 121.9 to 137.2 meters (400 to 450 feet) below ground level surface. Groundwater within the Cape San Blas area is generally considered to be non-potable (Pratt, 1997).

There were five wells on the Eglin AFB property at Cape San Blas, all of which were damaged by Hurricane Opal. Four of the five wells have been capped. The remaining well, a non-potable, Floridan aquifer, deep water well, remains for emergency purposes.

Within the State of Florida, wetlands and stormwater management activities are governed by the Florida ERP Program. Under the ERP program, the permit application serves as a joint application to initiate concurrent review by the FDEP and the USACE. The FDEP utilizes the ERP application for the review of stormwater management requirements, application for use of state-owned submerged lands, and for ensuring compliance with state water quality standards. The ERP also serves as an application to the USACE for Federal dredge and fill permitting review. Construction activities at Cape San Blas will require submittal of an ERP application for the determination of applicable stormwater management and dredge and fill permitting requirements. Refer to section 3.1.3 for discussion of impacts to wetland resources.

Soils

Soil Type. There is no published soil survey for Cape San Blas. However, due to the similar geologic origin of the peninsula and Santa Rosa Island, soils on Cape San Blas are believed to be similar to those found on Santa Rosa Island and are believed to be of the St. Lucie-Paola Association (U.S. Army Space and Strategic Defense Command, 1994a).

Soil Erosion. Substantial shoreline erosion is occurring at the Cape San Blas site. Shoreline erosion is a natural physical process controlled partly by the local currents and storms and partly by the physical characteristics of the material being eroded. Shoreline erosion is a significant factor as a land use constraint.

Studies by the University of West Florida indicate an average erosion rate of 1 meter (3 feet) per year along most of the southern end of the Gulf of Mexico side of the Saint Joseph Peninsula between 1957 and 1981 (U.S. Army Strategic Defense Command and Ballistic Missile Defense Organization, 1994). Bathymetric surveys indicate that the shoreline at Cape San Blas eroded slightly less than 0.8 kilometer (0.5 mile) between 1875 and 1942, an average rate of about 11 meters (36 feet) per year (Florida Department of Natural Resources, 1984). However, this is an average rate; generally, erosion occurs during major storm events or cycles. From July to mid-November 1993, the shore at Cape San Blas eroded 6 to 9 meters (20 to 30 feet) on the west side and generally accreted on the southern side. It has been reported that erosion has necessitated moving the nineteenth century lighthouse at Cape San Blas several times. (U.S. Army Space and Strategic Defense Command and Ballistic Missile Defense Organization, 1994)

Oil and Gas Exploration and Extraction Operations

Refer to section 3.2.7.3 for additional information regarding recent oil and gas exploration and extraction activities within the Eastern Gulf region (north of 26° North latitude).

3.1.5.4 Environmental Impacts and Mitigations

3.1.5.4.1 Santa Rosa Island

Site preparation activities would disturb 0.8 hectare (1.98 acres) of the 1,367 hectares (3,380 acres) of Air Force property on Santa Rosa Island. No wetlands would be disturbed by this proposal.

Launches may leave a temporary small deposition of aluminum oxides and hydrogen chloride on the soils.

No-action Alternative

Under the no-action alternative, the proposed ground-based TMD test activities on Santa Rosa Island would not be implemented. Operations at Eglin AFB, including Santa Rosa Island, would continue at current and planned levels. Continuing Eglin AFB operations may have an effect on geological and soil resources.

Site Preparation Activities

Interceptor

No construction requirements have been identified for interceptor launches from Santa Rosa Island. Trailers containing launchers and radar equipment would be set up at the launch location 2 weeks prior to launch.

Target

Site preparation activities at Site A-15 on Santa Rosa Island would require limited ground disturbance since existing concrete pads and buildings would be used for the launch pad, MAB and LCS.

Within the State of Florida, stormwater management activities are also governed by the Florida Environmental Resource Permit (ERP) program. The ERP program applies to alterations of the landscape, including the creation or alteration of wetlands and other surface waters, and alterations of uplands that affect flooding and all stormwater management activities. Under the ERP program, the permit application serves as a joint application to initiate review by the FDEP and the United States Army Corps of Engineers (USACE). The FDEP utilizes the ERP application for the concurrent review of State of Florida stormwater management requirements, application for use of state-owned submerged lands, and for ensuring compliance with state water quality standards. The ERP also serves as an application to the USACE for Federal dredge and fill permitting review. Construction activities will be required to comply with the State of Florida stormwater management requirements.

An Air Force digging permit would be required prior to ground disturbance. Existing facilities at Eglin AFB main base would also be used for the optics and radar and would not require any site preparation.

As described in section 3.1.5.3.1, soils on Santa Rosa Island are well-sorted beach and dune sand deposits of the Newhan-Corolla complex which are considered geologically stable and have a low shrink-swell potential and low potential for erosion.

Flight Test Activities

Interceptor and Target

Launch activities at Santa Rosa Island would result in deposition of combustion emissions on soils within the ROI. Combustion emissions are composed primarily of hydrogen chloride, aluminum oxide, and water. In general, the effects of hydrogen chloride deposition are related to decreased soil pH, and effects associated with aluminum oxide deposition are related to mineral uptake by plants.

The acidity or alkalinity of a soil is often referred to as soil reaction (measured in units of pH) and is a common indicator used in describing impacts to soil quality. In general, soil pH is representative of the soil's hydrogen ion concentration and is expressed in units ranging from 0 to 14. As the concentration of hydrogen ions in the soil increases, soil pH decreases becoming more acidic. A soil pH of 7 is considered neutral. Decreasing pH values from 7 to 0 indicate increasing acidity, and from pH 7 to 14 the soil is increasingly more alkaline.

The major effects of pH on soil quality are biological. A majority of the minerals and nutrients required to sustain plant growth are obtained from the soil. Minerals and nutrients are generally more soluble or available in acidic soils as opposed to neutral or slightly alkaline soils. Consequently, increases in soil pH can reduce the solubility of the

minerals and nutrients contained in the soil. Decreases in soil pH can result in increased solubility. Highly acidic soils (pH 4.5 to 5.0) can result in high concentrations of soluble minerals and nutrients that may be toxic to the growth of some plants and microorganisms (Foth, 1978).

Minimal deposition of hydrogen chloride (a maximum of 1.64 g/m^2) is expected to occur at the launch facility. Because of the relatively low weight and size of hydrogen chloride particles, hydrogen chloride disperses rapidly in the air. Deposition of hydrogen chloride would be greatest in areas nearest the launch facility and is expected to decrease with increased distance from the launch facility. In areas nearest the launch facility, hydrogen chloride deposition may result in a decrease in surface soil pH. However, due to the high permeability of the porous soil and high solubility of hydrogen chloride, decreases in soil pH would be temporary and would be diluted and buffered by rainfall. The majority of soils within the ROI are strongly acidic to very strongly acidic with very low natural fertility. Impacts resulting in temporary decreases in soil pH would be minimal.

Like hydrogen chloride, deposition of aluminum oxide would occur at the launch facility. Because of the relatively low weight and size of aluminum oxide particles, aluminum oxide is expected to disperse rapidly in the air, and deposition is expected to be minimal during nominal launches. Under normal conditions (alkaline to mildly acidic soils), aluminum oxide is a relatively stable compound and is considered insoluble. However, highly acidic soils can result in increased solubility of many minerals, including aluminum. Aluminum oxide deposition may result in an increase of soluble aluminum in the upper soil regions, particularly in regions exhibiting low soil pH associated with hydrogen chloride deposition. However, because the deposition of hydrogen chloride would result in minimal and temporary reductions in soil pH, substantial increases in soluble aluminum resulting from aluminum oxide deposition are not anticipated. The deposition of aluminum oxide would not result in a substantial change in soil fertility or concentrations that would be toxic to the growth of existing plants and microorganisms.

Cumulative Impacts

Construction of the TMD test facilities at Santa Rosa Island would take place within Eglin AFB property that was originally developed in 1959 for BOMARC missile testing over the Gulf of Mexico. In the 1980s, the complex was upgraded to test an electromagnetic rail-run for the Strategic Defense Initiative Organization. Current instrumentation sites and activities will continue for the foreseeable future. The only additional activity currently proposed for the island is the Open Air Hardware in the Loop (OA-HITL) project which would involve construction of three towers, three control buildings, and associated support facilities.

Construction of facilities in support of TMD testing would disturb 0.8 hectares (1.98 acres) of ground at Santa Rosa Island. Of that disturbance, there would be no wetlands disturbance. The Air Force property on Santa Rosa Island has remained relatively undeveloped with a single two-lane access road tying the various small sensor locations together. TMD activities would have a negligible cumulative effect on soils of Santa Rosa Island. Natural events (hurricanes) have had more effect on the island than

has Air Force development. Sand from the hurricanes of 1995 has buried the beach front fence and road along Site A-15.

Mitigations Considered

SOPs used during construction and operations would include: (1) providing site personnel involved in construction activities with an environmental awareness orientation to make the personnel aware of their responsibilities with regard to threatened and endangered species, cultural resources, allowable activities on sensitive and protected lands, erosion control, and hazardous materials management; and (2) implementing an emergency response plan (appendix J) prior to launch which specifies the requirement for an onsite recovery team for spill response and debris recovery.

3.1.5.4.2 Cape San Blas

Site preparation activities would disturb 3.53 hectares (8.72 acres) of the 352-hectare (871-acre) Air Force property on Cape San Blas; having an adverse effect on 0.66 hectare (1.62 acres) of fresh water wetland. Flight test activities would take place primarily on disturbed land. Launches may leave a temporary, small deposit of aluminum oxide and hydrogen chloride on the soils. Beach erosion may affect the structural integrity of the proposed launch pad at Cape San Blas.

No-action Alternative

Under the no-action alternative, the proposed ground-based TMD test activities on Cape San Blas would not be implemented. Current operations at Eglin AFB, which includes Cape San Blas, would continue at current or planned levels. Continuing and planned levels of activities may have an effect on geological and soil resources.

Site Preparation Activities

Interceptor

No construction requirements have been identified for interceptor launches from Cape San Blas. Trailers containing launchers and radar equipment would be set up at the launch location 2 weeks prior to launch.

Target

Site preparation activities at Cape San Blas would primarily consist of road and launch pad area improvements and the potential use of mobile facilities. These activities would be short-term and would create no measurable soil erosion. Standard engineering and construction practices would be followed to minimize surface disturbance of natural soils and prolonged exposure of soils to erosive forces.

Within the State of Florida, stormwater management activities are also governed by the Florida Environmental Resource Permit (ERP) program. The ERP program applies to

alterations of the landscape, including the creation or alteration of wetlands and other surface waters, and alterations of uplands that affect flooding and all stormwater management activities. Under the ERP program, the permit application serves as a joint application to initiate review by the FDEP and the United States Army Corps of Engineers (USACE). The FDEP utilizes the ERP application for the concurrent review of State of Florida stormwater management requirements, application for use of state-owned submerged lands, and for ensuring compliance with state water quality standards. The ERP also serves as an application to the USACE for Federal dredge and fill permitting review. Construction activities will be required to comply with the State of Florida stormwater management requirements.

An Air Force digging permit would be required prior to ground disturbance.

Flight Test Activities

Because soils at Cape San Blas are considered to be similar to those of Santa Rosa Island, impacts to surface soils within the Cape San Blas ROI would be similar to those expected from a launch at Santa Rosa Island.

Cumulative Impacts

Construction of the TMD test facilities at Cape San Blas would take place within Eglin AFB property that was originally developed in 1959 for monitoring missile testing over the Gulf of Mexico. No other major projects are currently planned. Residential and commercial development on St. Joe Peninsula has proceeded more slowly than for Gulf County as a whole.

Construction of facilities in support of TMD testing would disturb 3.53 hectares (8.72 acres) of ground at Cape San Blas. Of that disturbance, 0.66 hectare (1.62 acres) would be wetlands disturbance. Cape San Blas is one of the most active shoreline in Florida, and erodes an average of 1 meter (3.3 feet) per year. The Coast Guard station facilities are evidence of this erosion. Several buildings are in the surf zone now and will soon collapse into the Gulf of Mexico. The proposed launch pad is 55 meters (180 feet) from the beach. No other projects have been identified at this location for the foreseeable future which, when combined with the proposed action, would result in cumulative impacts.

Mitigations Considered

Fill of wetlands would require a Federal dredge and fill permit. Mitigation measures would be determined in the permitting process in consultation with the appropriate agencies.

SOPs used during construction and operations would include: (1) providing site personnel involved in construction activities with an environmental awareness orientation to make the personnel aware of their responsibilities with regard to threatened and endangered species, cultural resources, allowable activities on sensitive and protected lands, erosion control, and hazardous materials management; and (2) implementing an emergency response plan (appendix J) prior to launch which specifies the requirement for an onsite recovery team for spill response and debris recovery.

3.1.6 HAZARDOUS MATERIALS AND HAZARDOUS WASTES

Small quantities of hazardous materials would be used by the TMD program. Classes of hazardous materials proposed for use in TMD test operations are similar to materials currently in use at Eglin AFB. In addition to standard lubricants and solvents, missile propellants (solid and liquid) would be utilized for the program. During normal launch, these fuels are expended and would result in generation of small quantities of hazardous wastes.

3.1.6.1 Resource Description and Evaluative Methods

A variety of regulatory agencies (such as USEPA, USDOT) have promulgated differing definitions of a hazardous material as applied to a specific situation. Of these definitions, the broadest and most applicable is the definition specified by the USDOT for regulation of the transportation of these materials. As defined by the USDOT, a hazardous material is a substance or material which is capable of posing an unreasonable risk to health, safety, or property when transported in commerce and has been so designated (49 CFR 171.8).

Solid waste is defined by USEPA in 40 CFR 261.2 as any discarded material (in effect, abandoned, recycled, inherently waste-like, or no longer suitable for its intended purpose) that is not specifically excluded in 40 CFR 261.4. This definition can include materials that are both solid and liquid (but contained). Hazardous waste is further defined in 40 CFR 261.3 as any solid waste that possesses any of the hazard characteristics of toxicity, ignitibility, corrosivity, or reactivity.

The evaluation consists of comparing the types and quantities of hazardous materials required for the TMD program to the types and quantities of hazardous materials generated at the respective sites. Impacts would occur if the quantities or hazards of materials required for the program were significantly increased from the baseline.

3.1.6.2 Region of Influence

The ROI for Santa Rosa Island would include all geographical areas within the LHA that might be affected by a release of a hazardous substance generated by TMD-related activities.

The ROI for Cape San Blas would include all geographical areas within the LHA that might be affected by a release of a hazardous substance generated by TMD-related activities.

3.1.6.3 Affected Environment

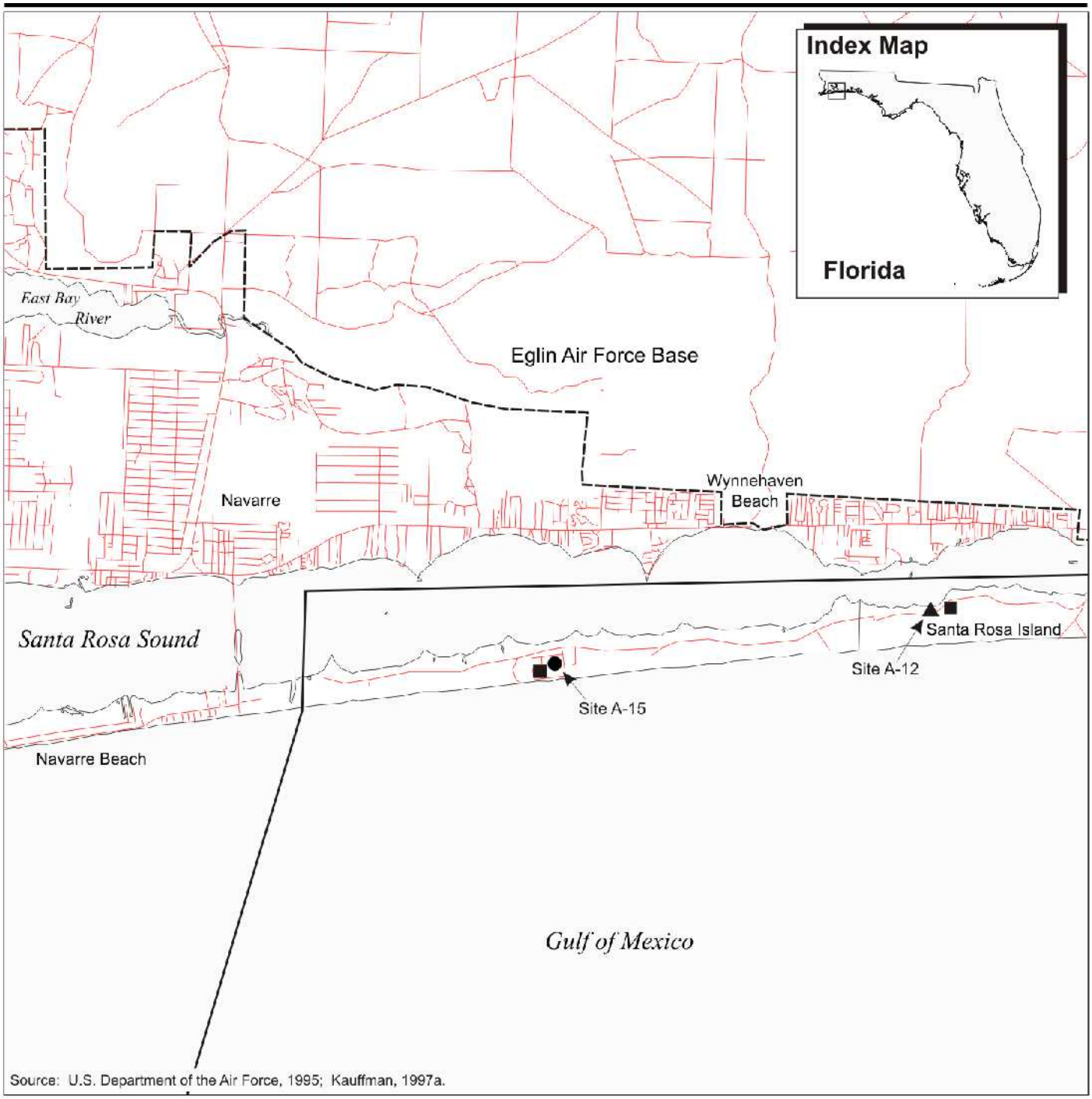
3.1.6.3.1 Santa Rosa Island

Hazardous Materials

Air Force Development Test Center Plan 32-9 Hazardous Materials Management Plan documents existing policy and procedures for organizations requesting, procuring, issuing, handling, storing, and disposing of hazardous materials in accomplishment of the Air Force Development Test Center mission. *AFDTC Plan 32-9* supports Federal, state, and Air Force regulations such as the Resource Conservation and Recovery Act (RCRA), Pollution Prevention Act of 1990, Emergency Planning and Community Right-to-Know Act (EPCRA), Air Force Pollution Prevention Action Plan, and worker right-to-know requirements. The description of the phases of hazardous materials management authorization process; acquisition control; industrial processes; distribution, use, and storage; shelf life management; and turn-in are explained in *AFDTC 32-9*. (Air Force Development Test Center, 1997a)

With the exception of bulk fuels, hazardous materials procured by Eglin AFB are delivered to Base Supply (Building 600) at Eglin AFB, where they are inspected and checked into the base supply system. However, not all hazardous materials are processed through base supply. Some hazardous materials brought on base by outside organizations in support of a specific test directive being performed at Eglin AFB are handled in accordance with *AFDTC Plan 32-9*. Base operating contractors (such as Vitro Services), base tenant organizations, and construction contractors working on Eglin AFB may also bring hazardous materials onto the base. These materials are also handled in accordance with *AFDTC Plan 32-9*. Eglin AFB utilizes a hazardous material cell for the distribution of hazardous materials. The Eglin Supply Squadron (96 SUPS/LGSMH), is responsible for operating the hazardous material cell and distributing hazardous materials to individual Issue Points located throughout Eglin AFB. (Ramsey, 1997a) Users of hazardous materials generally pick up materials at their designated Issue Point for use in individual shops. Issue Points are satellite locations that store hazardous materials for pickup by users. The only Issue Point on Santa Rosa Island is the Missile and Space Research Testing Facility in Building 12522 (Site A-15) operated by Wright Laboratories (figure 3.1.6-1). (U.S. Department of the Air Force, 1995)

The AFDTC/Environmental Management Compliance (AFDTC/EMC) uses the *Oil and Hazardous Substance Pollution Contingency Plan*, *AFDTC Plan 32-6*, to provide information and procedures for response personnel and supporting teams that must control, contain, neutralize, absorb, decontaminate, and/or suppress hazardous material leaks, or spill of hazardous substances due to accidents, incidents, or disaster. It further supports the *Air Force Oil and Hazardous Substance Pollution Contingency Plan*. Table 3.1.6-1 lists of the storage tanks on Santa Rosa Island. Santa Rosa Island has eight aboveground storage tanks (ASTs) and four underground storage tanks (USTs). (Air Force Development Test Center, 1996)



EXPLANATION

- Roads
- Region Of Influence
- Eglin Air Force Base Boundary
- Hazardous Material Issue Point
- Satellite Accumulation Point
- 90-Day Accumulation Site

Scale 1:100,000

0 1 2 Miles

0 1.5 3 Kilometers

NORTH

Hazardous Material and Hazardous Waste Storage Locations

Santa Rosa Island, Florida

Figure 3.1.6-1

Table 3.1.6-1: Storage Tanks on Santa Rosa Island

Tank Location	Tank Identification	Status	AST or UST	Size in liters (gallons)	Contents
Site A-3 (Building #8352)	1	Active	AST	3,785.4 (1,000)	Diesel
Site A-3 (Building #8353)	1	Active	AST	1,892.7 (500)	Diesel
Site A-7 ECOVAULT (Building #9279)	1	Active	AST	3,785.4 (1,000)	Diesel
Site A-7 (Building #9282)	1	Active	UST	3,785.4 (1,000)	MUR
Site A-7 (Building #9282)	3(9283)	Active	AST	18,925 (5,000)	MUR
Site A-10 (Building #9223)	1	Active	UST	3,785.4 (1,000)	MUR
Site A-10 (Building #9207) PHONEREL	1	Active	AST	378.5 (100)	Diesel
Site A-11 (Building #9277)	1	Active	AST	1,135.5 (300)	Diesel
Site A-13A (Building #9285)	1	Active	AST	1,135.5 (300)	Diesel
Site A-15 FDP (Building #12515)	1	Active	AST	1,135.5 (300)	Diesel
Site A-15 (Building #12560)	1	Active	UST	3,785.4 (1,000)	Diesel
Site A-15 (Building #12560)	2	Active	UST	3,785.4 (1,000)	MUR

AST = Aboveground storage tank
MUR = Mogas unleaded regular (gasoline)
UST = Underground storage tank
Source: Air Force Development Test Center, 1996.

Eglin AFB has developed programs to comply with the requirements of EPCRA. These programs require updated inventories of chemicals or extremely hazardous substances in excess of specific threshold limits. In 1996, Eglin AFB had an agreement with the FDEP that they could submit the *AFDTC 32-9* in lieu of a separate Tier II Inventory in an effort to comply with EPCRA. (Stippich, 1997)

Solid Propellant. The Hera's propellant is primarily composed of ammonium perchlorate, polybutadiene, and aluminum. Ammonium perchlorate acts as the oxidizer, while polybutadiene acts as the binder and aluminum is the fuel. The total propellant mass is 6,235 kilograms (13,748.2 pounds).

Hazardous waste is not expected to result from a normal launch because the fuel would be expended. Furthermore, hazardous waste would only be generated from missile assembly activities. Hazardous materials required for the assembly include small quantities of hydraulic oil, ablatives, room temperature vulcanizers, and isopropyl alcohol. (Whitmer, 1997) The approximate amount of hazardous waste generated from missile assembly would be approximately 1 kilogram (2.2 pounds) per launch.

Simulant. Triethyl phosphate may be used as a chemical simulant for testing purposes. Triethyl phosphate is a colorless liquid industrial chemical with a mild odor. It is used as a plasticizer for resins, plastics, and gums; as a lacquer remover; and as a solvent in adhesives on food packages. Triethyl phosphate was selected as a simulant because it is commercially available in quantities necessary for testing, is more environmentally benign than other compounds, and its physical characteristics resemble those of real chemical agents. The USDOT determined that neither the toxicity nor flammability of triethyl phosphate warrant regulating the transportation of it as hazardous material. The USEPA does not regulate triethyl phosphate as a pesticide under the Federal Insecticide, Fungicide, and Rodenticide Act or as a hazardous waste under the RCRA, nor has the OSHA set occupational exposure limits for it. However, triethyl phosphate is listed and regulated in the Toxic Substances Control Act. The maximum amount of triethyl phosphate needed for a launch would be one 208-liter (55-gallon) drum. (U.S. Army Space and Strategic Defense Command, 1994a) This amount is equivalent to 222 kilograms (489.5 pounds). Depleted uranium will not be used in place of warheads (appendix H).

Liquid Propellant. The Lance propellant is primarily composed of UDMH (fuel) and IRFNA (oxidizer). It has a total propellant mass of 611 kilograms (1,347.3 pounds). UDMH is a colorless liquid with an ammonia-like fish odor that is hypergolic with many oxidants (such as IRFNA) and is therefore used as a high-energy propellant for liquid-fueled missiles such as the Lance. UDMH is a flammable liquid and is considered a poison by USDOT. If UDMH becomes a waste, it must be managed according to Federal or state hazardous waste regulations. It is listed on USEPA's Extremely Hazardous Substances List. Emergency Planning and Community Right-to-Know reporting is required for a release of over 4.54 kilograms (10 pounds) and a threshold planning quantity of 453.5 kilograms (1,000 pounds). The reportable quantity of UDMH under Section 311 of the Clean Water Act is 453 kilograms (1,000 pounds).

An Accidental Release Prevention Plan is required for a threshold quantity over 6802.7 kilograms (15,000 pounds). When used in quantities of 453.6 kilograms (1,000 pounds) or more, UDMH is covered by Process Safety Management (PSM) standards such as 29 CFR 19010.119 and Air Force Occupational Safety and Health (AFOSH) 91-119. UDMH is also listed in the USEPA Toxic Substances Control Act (TSCA) Inventory and is a suspected carcinogen and mutagen. Cleanup methods for UDMH spills include activated carbon, alcohol foam, polyurethane foam, and polypropylene fibers. The maximum UDMH (fuel) present at any given time for TMD target launches would be 150 kilograms (330 pounds).

IRFNA is a yellow to red-brown, clear, strongly fuming, very corrosive liquid that releases toxic nitric acid vapor. Hypergolic fuels quickly ignite on contact with IRFNA. If IRFNA becomes a waste, it must be managed according to Federal or state hazardous waste regulations. Emergency Planning and Community Right-to-Know reporting is required for a release over 454 kilograms (1,000 pounds) and a threshold planning quantity of 453 kilograms (1,000 pounds). The reportable quantity of IRFNA under Section 311 of the Clean Water Act is 453 kilograms (1,000 pounds).

An Accidental Release Prevention Plan is required for a threshold quantity over 6,802.7 kilograms (15,000 pounds). Nitric acid (94.5 percent by weight or greater) is

covered under PSM when used in quantities of 226.8 kilograms (500 pounds) or greater. Cleanup methods include flushing any leakage with large quantities of water.

There is also a propellant draining kit (PDK) used in the field to safely drain the IRFNA and the UDMH from the Lance's M5 MMA when it cannot be removed to a draining facility. The complete PDK is comprised of an oxidizer draining kit and fuel draining kit. They are mounted on separate channeled aluminum pallets which can be handled by forklift trucks and transported internally by truck, rail, and aircraft, externally from the CH-47 helicopter. Two techniques are used to drain the MMA: pressure expulsion and pump transfer. A minimum crew of three is required to safely perform the draining operation. Each crew member is equipped with protective clothing and an M20 breathing apparatus. The maximum IRFNA (oxidizer) present at any given time for TMD target launches would be 511 kilograms (1,126.76 pounds) (appendix H).

Hazardous Waste

As defined under RCRA, Eglin AFB is a large quantity hazardous waste generator and has obtained a USEPA/FDEP generator identification number (FL 8570024366) for use in tracking hazardous waste. Management of hazardous waste is the responsibility of the AFDTC/EMC, which follows the procedures outlined in the *Air Force Development Test Center Hazardous Waste Management Plan, AFDTC Plan 32-5*. *Plan 32-5* establishes policies and procedures for the management of hazardous waste at Eglin AFB. It applies to all organizations, (hosts, tenants, contractors, and individuals) which generate hazardous waste and used petroleum products at Eglin AFB. It is designed to identify alternatives for disposing of hazardous waste by reducing or eliminating the volume of waste generated. (Air Force Development Test Center, 1997b)

Under RCRA Part B permit (Cert. Number H046-286388), Eglin AFB is also permitted to operate as a treatment, storage, and disposal facility pursuant to Florida Statutes Section 403.722. Hazardous waste may be stored for up to 1 year at the Defense Reutilization and Marketing Office (DRMO), Building 525, at Eglin AFB. Prior to off-base disposal, hazardous wastes generated by operations at Eglin AFB, including Hurlburt Field and the test areas, are analyzed, packaged, manifested, and inspected. DOD Manual 4160.21-M has specific regulations which govern the transfer of hazardous wastes and are applicable to all generators of hazardous wastes who transfer such wastes to DRMO. DRMO-Eglin will only accept hazardous wastes for which it is permitted. Table 3.1.6-2 shows the storage capacity at the DRMO.

Eglin AFB has an approved RCRA Part B, Subpart X, permit to conduct open burning or open detonation of explosive wastes renewable on 1 September 2001. (Florida Department of Environmental Protection, 1996a). Eglin AFB as a whole generated the amounts of hazardous wastes listed in table 3.1.6-3 from 1992 to 1996.

Table 3.1.6-2: Hazardous Waste Storage Capacity

Location within the DRMO	Hazardous Waste	Purpose	Amount in Liters (Gallons)	Amount in Kilograms (Pounds)*
Bay 1	Flammables, Flammable Toxics, and Combustibles	Storage	59,431 (15,700)	59,431 (131,045)
Bay 2	Flammables, Flammable Toxics, and Combustibles, Oxidizers, Acids, Reactives, and Toxics	Receiving	8,328 (2,200)	8,328 (18,363)
Bay 3	Oxidizers, Acids, Reactives, and Toxics	Storage	23,091 (6,100)	23,091 (50,916)
			Maximum = 90,845 (24,324)	90,845 (202,860)

*Based on an approximate specific gravity of 1.
Source: Florida Department of Environmental Protection, 1996; Ramsey, 1997b.

Table 3.1.6-3: Amount of Hazardous Waste Generated by Eglin Air Force Base

Year	Kilograms (pounds)
1992	51,701 (114,000)
1993	69,841 (154,000)
1994	70,023 (154,400)
1995	30,023 (66,200)
1996	34,104 (75,200)

Source: U.S. Department of the Air Force, 1995; Kauffman, 1997b.

The specific hazardous wastes generated on Santa Rosa Island in 1996 are described in table 3.1.6-4. Hazardous wastes generated by Wright Laboratories are collected at a Site A-12 hazardous waste accumulation site and stored onsite until the waste is disposed of by a licensed waste hauler contracted by the DRMO.

Table 3.1.6-4: Hazardous Wastes Generated on Santa Rosa Island in 1996

Regulated	Location	Chemical	Amount Generated in Kilograms (pounds)
Regulated	A-12	Mercury Switches	376 (829)
Regulated	A-12	Sodium and Calcium Hydroxide	3,155 (6,958)
Total			3,531 (7,787)

Source: Kauffman, 1997a.

To reduce the amount of hazardous waste generated, Eglin AFB has implemented pollution prevention and recycling programs detailed in *AFDTC Plans 32-5, 32-6, and 32-9*.

The Installation Restoration Program (IRP) is used by the Air Force to identify, characterize, and remediate past environmental contamination on Air Force installations.

Although widely accepted at one time, the procedures followed for managing and disposing of wastes resulted in contamination of the environment. The IRP has established a process to evaluate past disposal sites, control the migration of contaminants, identify potential hazards to human health and the environment, and remediate the sites. (U.S. Department of the Air Force, 1995) There are three IRP sites on Santa Rosa Island: Site A-11A, Site A-15, and Site A-17A. Table 3.1.6-5 describes these three sites, and figures 3.1.6-2 and 3.1.6-3 illustrate the location of the three sites. (Air Force Development Test Center, 1997c)

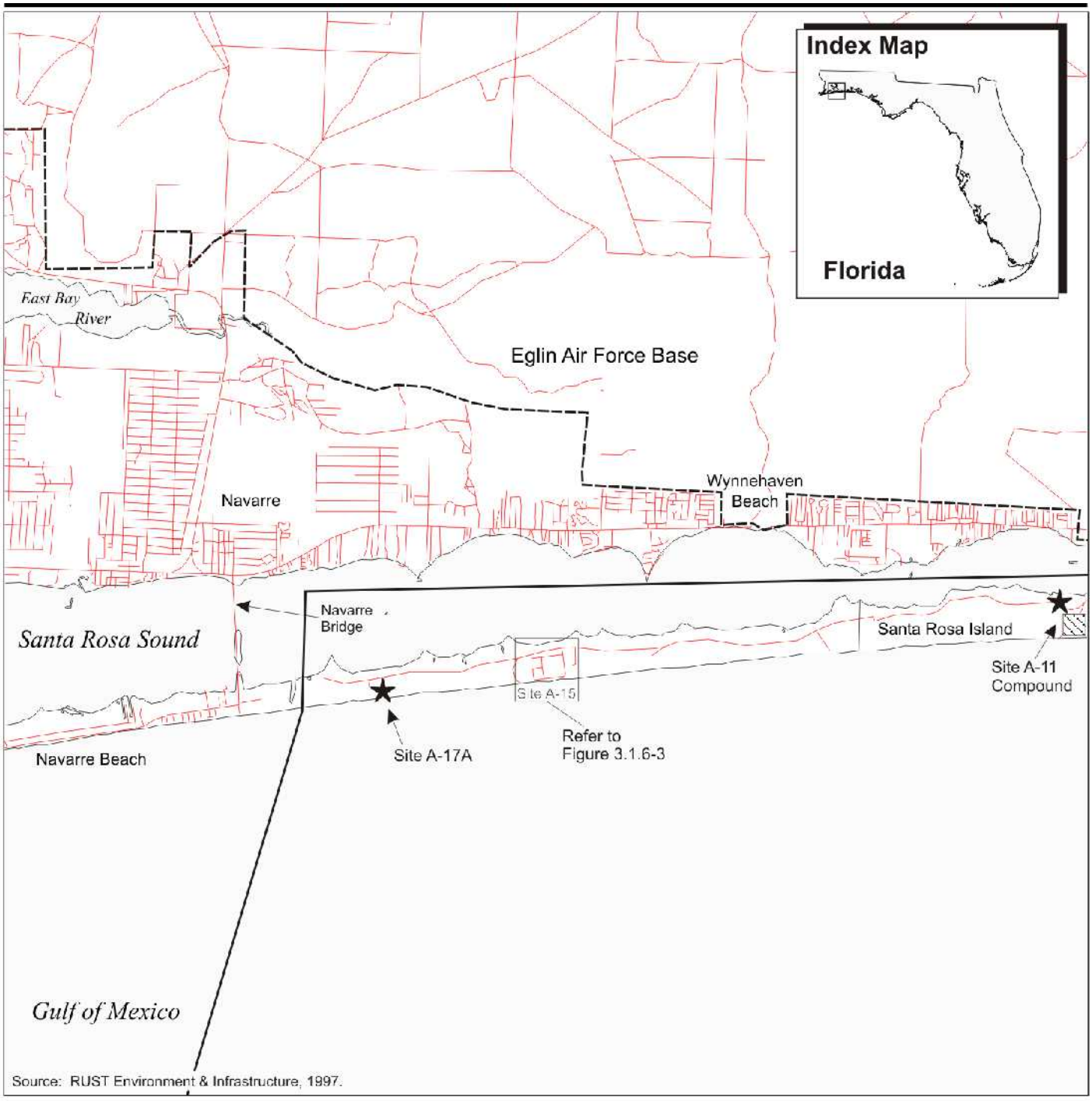
Table 3.1.6-5: Installation Restoration Program Site Summary—Santa Rosa Island

Range Site	Site Number	Name and Description	Site Class	Status
Site A-11A	LF-22	**A-11A Disposal Site.** This site is located south of Hurlburt Field on Santa Rosa Island, approximately 11 kilometers (6.9 miles) west of the base gate. A landfill was operated at this 0.2-hectare (0.5-acre) site during the 1960s and 1970s. Disposed material included hardfill, metal spools, waste oil, and partially full solvent drums. A Site Investigation was conducted during 1995. NFA has been approved for the site other than removal of surface debris.	SWMU	NFA
Site A-15 (figure 3.1.6-3)	RW-42	**Low-level Radioactive Waste Site/Drum Burial (A-15).** This site is located near the center of Santa Rosa Island, on the western side of the A-15 compound, and is approximately 0.8 hectare (2 acres) in size. The exact date of operation is unknown, but materials disposed of include radioactive thorium paint, missile fragments, drums containing petroleum products, and batteries. In April and May 1993, surface debris was removed along with visible drums. A RCRA Facility Investigation was conducted during 1994-95. NFA is planned at the site.	SWMU	NFA
Site A-17A	SS-76	**Site A-17A (Radar Surveillance Site).** This site is located on a remote section of Santa Rosa Island, approximately 3.2 kilometers (2 miles) east of Navarre Bridge. One aboveground storage tank was damaged during Hurricane Opal on 4 October 1995. Approximately 9,463.5 liters (2,500 gallons) of diesel fuel were released.	Regulated by FDEP	NFA

Source: Air Force Development Test Center, 1997c.

Notes: Group I: SWMUs are grouped together because the level of effort required for all sites is similar. This amounts to data collection to close data gaps remaining from earlier studies. At present, no imminent threat to health of environment is known to exist at these sites.
Group II: SWMUs are grouped together because they are in the same phase of study and are being handled by a single project manager. These sites are included in the CAMP because it is anticipated that investigation may show that they contain contaminates other than petroleum.

CAMP Corrective Action Management Plan
FDEP Florida Department of Environmental Protection
LF Landfill
RCRA Resource Conservation and Recovery Act
RW Radioactive Waste
SWMU Solid Waste Management Unit
NFA No Further Action
SI Site Investigation
SS Radar surveillance site



EXPLANATION

- Roads
- Eglin Air Force Base Boundary
- Region Of Influence
- Areas of Concern (AOC) Site
- ★ Installation Restoration Program (IRP) Site

Scale 1:100,000

0 1 2 Miles

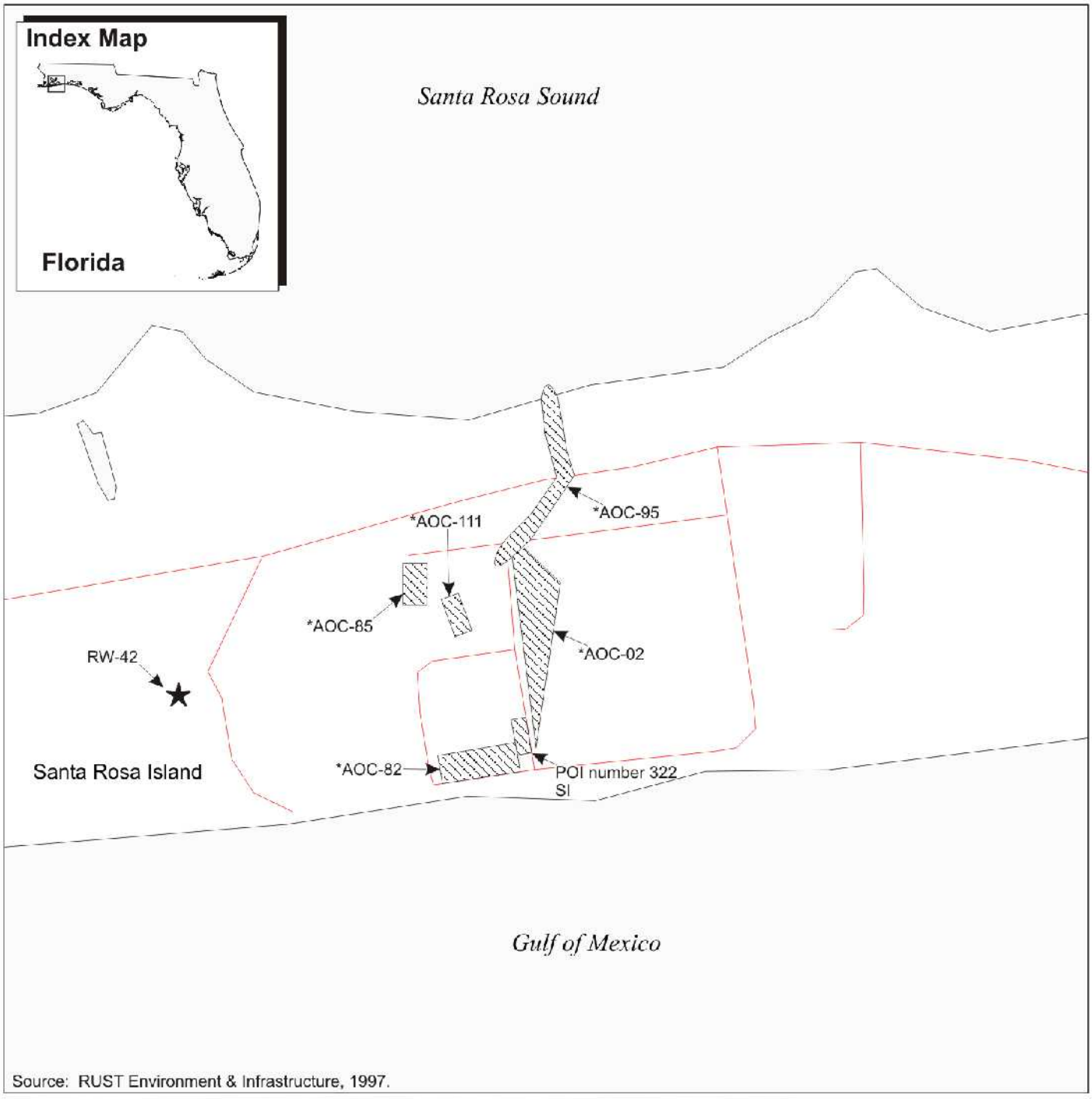
0 1.5 3 Kilometers

NORTH

Installation Restoration Program and Area of Concern Sites

Santa Rosa Island, Florida

Figure 3.1.6-2



Source: RUST Environment & Infrastructure, 1997.

EXPLANATION

Roads

Areas of Concern (AOC) Site (Table 3.1.6-6)

Installation Restoration Program (IRP) Site (Table 3.1.6-5)

* = No Further Action (NFA)

SI = Site Investigation (Cleanup Will Be Initiated FY 98)

POI = Point of Interest

Scale 1:9,600

NORTH

0 400 800 1,200 1,600 Feet

0 125 250 375 500 Meters

Site A-15 Installation Restoration Program, Area of Concern, and Point of Interest Sites

Santa Rosa Island, Florida

Figure 3.1.6-3

In addition to the IRP sites described above, eight Areas of Concern (AOC), were identified during a Basewide Preliminary Assessment (table 3.1.6-6). Figures 3.1.6-2 and 3.1.6-3 show AOCs within the ROI. (Air Force Development Test Center, 1997c)

A battery storage building located on Site A-15 is not an IRP site or an AOC. It was not a disposal site, only a temporary storage location for lead/acid batteries. The stored batteries have since been recycled or reclaimed. (Bjorklund, 1997)

3.1.6.3.2 Cape San Blas

Hazardous Materials

For purposes of these hazardous materials management activities, Cape San Blas functions as a separate operating location of Eglin AFB. (Kauffman, 1997b) For details of these management activities, see section 3.1.6.2. Figure 3.1.6-4 illustrates the location of hazardous material and hazardous waste storage locations on Cape San Blas.

Site D-3, however, operates under several Eglin Operating Procedures (EOP) that relate to hazardous materials management: *EOP 4-016 (Hazardous Material/Hazardous Waste Management Plan), EOP 4-023 (Fuel Spill Plan for Gasoline, Diesel, and Jet Fuel Dispensing Stations),* and *EOP 4-024 (Occupational Health Program Plan) (*Brogdon, 1997). Moreover, the AFDTC/EMC currently coordinates an *Oil and Hazardous Substance Pollution Contingency Plan*, *AFDTC Plan 32-6*, to manage the wide variety of hazardous materials used to support the ongoing mission at Cape San Blas. Table 3.1.6-7 lists of the storage tanks at Cape San Blas. There are six ASTs and no USTs at Cape San Blas.

Hazardous Waste

Management of hazardous waste is the responsibility of the AFDTC/EMC, which follows the procedures outlined in the *Air Force Development Test Center Hazardous Waste Management Plan, AFDTC Plan 32-5*. For purposes of these hazardous waste management activities, Cape San Blas functions as another unit, or operating location of Eglin AFB. (Kauffman, 1997a) For details of these management activities, see section 3.1.6.3.1.

Hazardous wastes generated by Cape San Blas are collected at a Site D-3 satellite accumulation site and stored onsite until the waste is disposed of by a licensed waste hauler contracted by the DRMO. DOD Manual 4160.21-M has specific regulations which govern the transfer of hazardous wastes and are applicable to all generators of hazardous wastes who transfer such wastes to DRMO. The DRMO at Eglin will only accept hazardous wastes for which it is permitted. Table 3.1.6-8 lists specific types of hazardous wastes that were generated on Cape San Blas in 1996.

One Point of Interest (POI) has been identified on Cape San Blas: POI 332. A POI is functionally the same as an AOC. That is, it is a pre-regulatory term used to identify a potential area of contamination based largely on limited historical or circumstantial information. (Air Force Development Test Center, 1997c.)

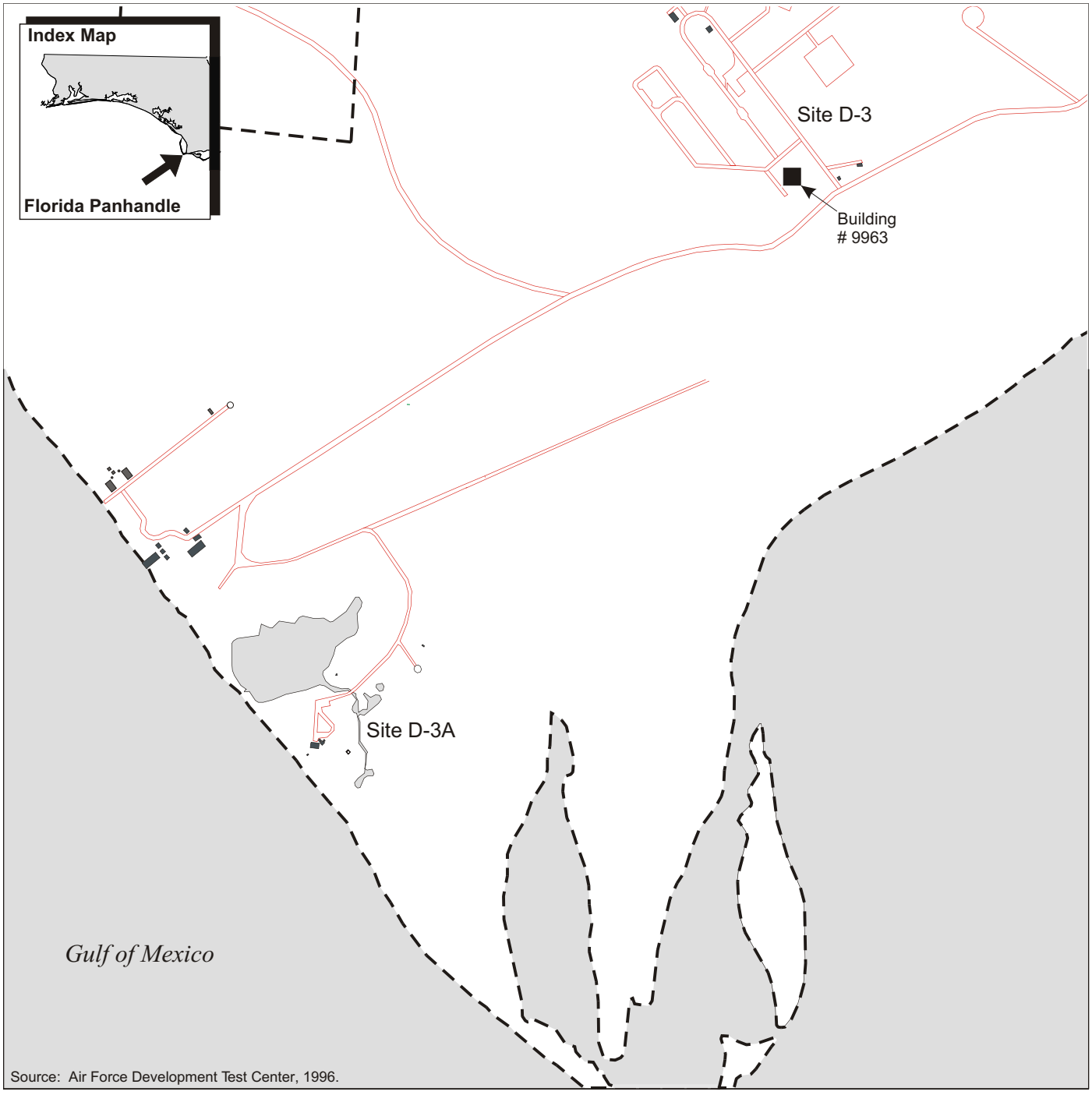
There are two Formerly Used Defense Sites (FUDS) located within the ROI which are eligible for more investigation based on limited historical or circumstantial information.

Table 3.1.6-6: Area of Concern Site Summaries—Santa Rosa Island

AOC	Location	Name	Description
2	Site A-15	Site A-15 Former Power Plant Facility	The Site A-15 compound is located on Santa Rosa Island and has been involved with the handling and storage of hazardous materials, including various petroleum products. The facilities utilized a diesel AST and below ground concrete sumps that contained oil and grease. The Power Plant Facility was active in the 1960s to support the BOMARC missile test program. The 1994 AOC Investigation concludes that it is possible that chemical constituents have been released to the environment. SI (RFA) activities included groundwater and soil sampling. The concrete sumps will be cleaned out with material disposed of properly. Requires no further action.
43	Site A-15	BOMARC Launch Facility	This site is also the location of IRP site RW-42, which is unrelated to AOC 43. The site has been inactive since the late 1960s. Reportedly, a drain field receives discharge from building floor drains. Two hydraulic fluid reservoirs and associated pipework and historic hydrazine and nitric acid spills are reported. Appropriate removal actions and tank removals have been accomplished. FAC Rule 17-76 site closure assessment and groundwater data indicate no contamination present. Tanks were filled in place. Requires no further action.
82	Site A-15	Site A-15 Compound Disposal Area	The Disposal Area was inactive as of 1981 or earlier, and it has been closed with a soil cover. The 1994 AOC Investigation concluded that because of the innocuous nature of the waste deposited, there is minimal potential for adverse effects to human health or the environment. SI geophysics located site in SW portion of the compound. SI results indicate no impacts to groundwater. Recommend no further action.
85	Site A-15	Site A-15 Compound Fire Training Area	There have been two independent structures utilized for fire training exercises. The primary Fire Training Area was active from 1985 to 1987. The second area was also active in the mid-1980s and is the former location of fuel storage tanks. Fires at both locations were the result of a small quantity of liquid fuel and straw, and were extinguished by water with perhaps other compounds, such as aqueous film-forming foam. SI activities indicate no groundwater or soil impacts. No further action is required.
94	Site A-11	Site A-11 Storage Bunkers	Two Site A-11 Storage Bunkers were identified by Eglin AFB personnel as potential storage facilities for napalm and its constituents. Reportedly, the bunkers were constructed in the 1950s for vertical probe-sounding rocket testing. Rocket engines and solid propellants were stored in the bunkers between test missions. It was later found that napalm was not stored there. SI indicates no impacts to groundwater. No further action is necessary.
95	Between a pier protruding in the Santa Rosa Sound and Site A-15	Abandoned Radar Site Pipeline	The 304.8-meter-long (1,000-foot-long) pipeline was active during the 1960s BOMARC test program, and was identified by former Eglin AFB personnel as a potential source of environmental contamination as a result of diesel fuel handling. The pipeline was removed in 1990 and fuel recovery from the pipeline was necessary. Appropriate FAC 62-770 sampling conducted. All analyses results were below detection limit.
111	Site A-15	Site A-15 Compound Neutralization Pit	The former neutralization pit was identified by Eglin AFB personnel as a potential source of contamination. The pit is a 0.28-square-meter (3-square-foot) sump, approximately 7.6 meters (25 feet) deep. The pit was used to neutralize acids produced in connection with the BOMARC test compound during the 1960s. SI activities indicate no soil or groundwater concentration above COPCs. Requires no further action.
POI 322	Site A-15	Eglin AFB Site A-15 Compound, Santa Rosa Island	The PCB Cleanup is located at an abandoned electric substation within the Site A-15 Compound. The facility is abandoned and restricted by a chain-link fence. In 1983, PCB-contaminated soil and transformer oil were removed from the site. Additional soil sampling is being accomplished to determine if past excavation removed all the PCBs.

AOC	Area of Concern	IRP	Installation Restoration Program	AST	Aboveground Storage Tank
BOMARC	Boeing Michigan Aeronautical Research Center	RW	Radioactive Waste	SI	Site Investigation
FAC	Florida Administrative Code				

Source: Air Force Development Test Center, 1997c.



EXPLANATION

- Roads
- Government Property
- Hazardous Material Issue Point (There are None)
- Satellite Accumulation Point
- 90-Day Accumulation Site (There are None)

NORTH

Scale 1:9,600

0 400 800 Feet

0 125 250 Meters

Hazardous Material and Hazardous Waste Storage Locations

Cape San Blas, Florida

Figure 3.1.6-4

csb-9600-3hazmat001

Table 3.1.6-7: List of Storage Tanks on Cape San Blas

Tank Location	Tank Identification	Status	AST or UST	Size in liters (gallons)	Contents
Cape San Blas (Building 9955)	1	Active	AST	3,785 (1,000)	MUR
Cape San Blas (Building 9955)	2	Active	AST	1,014.4 (268)	Diesel
Cape San Blas (Building 9963)	1	Active	AST	18,925 (5,000)	Diesel
Cape San Blas (Building 9963)	2	Active	AST	18,925 (5,000)	Diesel
Cape San Blas (Building 9990) - USCG	1	Active	AST	1,892.5 (500)	Diesel
Cape San Blas (Building 9991) - USCG	1	Active	AST	1,135.5 (300)	Diesel

AST = Aboveground storage tank
MUR = Mogas unleaded regular
USCG = U.S. Coast Guard
UST = Underground storage tank

Source: Air Force Development Test Center, 1996; Brogdon, 1997.

Table 3.1.6-8: Hazardous Wastes Generated on Cape San Blas in 1996

Storage Area	Chemical	Amount Generated in Liters (gallons)	Amount Generated in Kilograms (pounds)
D-3 (Bldg. 9963)	Flammable liquid	(Approx) 15.14 (4)	15.14 (33.38)
D-3 (Bldg. 9963)	POL*	(Approx) 378.54 (100)	378.54 (834.68)
D-3 (POL area)	POL*	(Approx) 1,892.7 (500)	1,892.7 (4,173.40)
Total			2,286.38 (5,041)

Source: Brogdon, 1997.

*POL = Oil of any kind or in any form, including but not limited to petroleum, sludge, oil refuse, and oil mixed wastes other than dredged spoil. Oil mixed with a hazardous substance should be treated as a hazardous substance.

3.1.6.4 Environmental Impacts and Mitigations

If the proposed action is selected, there may be potential for hazardous materials and hazardous waste impacts during site preparation activities and during flight test activities. Site preparation activities could result in construction-related hazardous materials and hazardous waste impacts, the severity of which would be dependent upon the level and type of construction required at each site. Flight test activities could also result in hazardous materials and hazardous waste impacts from activities such as site preparation, missile assembly, and post-launch activities.

3.1.6.4.1 Santa Rosa Island

Small quantities of hazardous materials would be used by TMD program activity on Santa Rosa Island. AFDTC Plan 32-9 Hazardous Materials Management Plan documents existing policies and procedures which would be implemented for the TMD program. In addition to standard lubricants and solvents, missile propellants (solid and liquid) would be utilized for the program. During normal launch these fuels are expended and would result in generation of small quantities of hazardous wastes.

No-action Alternative

For the no-action alternative, the proposed TMD test activities on Santa Rosa Island would not be implemented. Operations at Eglin AFB involving Santa Rosa Island would continue at current and planned levels.

Site Preparation Activities

Interceptor

Since there is no proposed substantial site preparations activities, there would be no hazardous materials generated.

Target

Construction would last approximately 8 months and would consume typical hazardous materials and generate typical hazardous wastes such as oily rags and incidental cleaning fluids, etc. This would amount to less than 100 kilograms (220.5 pounds) of hazardous wastes for the period of construction.

Flight Test Activities

Interceptor and Target

Activities prior to each launch may include, but are not limited to, transport, assembly, and pre-flight testing of the missile, operational tests of C^3 equipment and remote instrumentation equipment, and moving the missile to the launch pad. Potential hazardous waste may be generated during missile assembly and pre-flight testing.

Classes of hazardous materials proposed for use in TMD target missile flight test operations are similar to hazardous materials currently in use at Eglin AFB. Proposed uses of these materials would represent only a small increase in Eglin AFB's total usage of hazardous materials. Actual procurement, handling, and use of hazardous materials will be performed by the DOD program conducting the test. However, Eglin AFB will oversee operations to ensure the activities are conducted in accordance with established procedures and permits. The existing hazardous material storage and handling capabilities will be adequate to ensure that all materials are handled and stored safely and in accordance with all applicable regulations. Applicable regulations will be followed

regarding handling and transport of the explosives and rocket motors as well as any generated hazardous waste.

Interceptor Missiles

Interceptor missile launch batteries are mobile, and would be driven onto the proposed interceptor launch site and set up for the test approximately 2 weeks in advance. There would be little site preparation before an interceptor launch other than installing instrumentation and communications and ensuring security.

The PAC-3 interceptor is being used for analysis purposes. It is composed of aluminized hydroxyl-terminated polybutadiene, with a total propellant mass of 160 kilograms (350 pounds). Polybutadiene is reported in the TSCA Inventory. There could be a lethality enhancer of approximately 8.2 kilograms (18 pounds) per missile (U.S. Army Space and Strategic Defense Command, 1996).

The maximum number of interceptor launches that would occur at Site A-15 per year is 48 launches; therefore, the maximum projected hazardous wastes as follows:

- Missile assembly per year: Negligible
- Lethality Enhancer: None expected, 393.6 kilograms (864 pounds) expended

Target Missiles

For purposes of analysis, two types of target missiles could potentially be used for TMD testing at Santa Rosa Island: SRM and liquid fuel propellants. The Hera is the SRM missile example, and the Lance is an example for a liquid-fueled missile.

All missile components will be packaged in appropriately designed containers, labeled, and handled in accordance with applicable USDOT regulations for the transport of hazardous materials.

The components of the target missile will be shipped in accordance with applicable USDOT regulations to the launch site to be assembled by contractor personnel in the MAB.

The maximum number of target launches that would occur at Site A-15 per year is 24 launches. Therefore, the maximum projected hazardous waste is as follows:

- Missile assembly per year: 24 kilograms (52.9 pounds)
- Chemical simulant per year: None expected, 5,328 kilograms (11,748.2 pounds) expended

If liquid fuel missiles (such as the Lance) are selected as target missiles, there is a remote possibility for spills of UDMH and IRFNA, although each Lance missile would arrive at the proposed launch site pre-fueled and stored in its own container. No more than three Lance missiles would be stored at any one location at any one time. For a description of a possible spill, see section 3.1.9.

The maximum number of launches that would occur at Site A-15 is 24 launches. Therefore the maximum projected hazardous waste is as follows:

- Missile assembly per year: None expected
- Chemical simulant per year: None used

Cumulative Impacts

Construction of the TMD test facilities at Santa Rosa Island would take place within Eglin AFB property that was originally developed in 1959 for BOMARC missile testing over the Gulf of Mexico. In the 1980s, the complex was upgraded to test an electromagnetic rail-run for the Strategic Defense Initiative Organization. Current instrumentation sites and activities will continue for the foreseeable future. Additional activity currently proposed for the island is the Open Air Hardware in the Loop project which would involve construction of three towers, three control buildings, and associated support facilities.

Construction would last approximately 8 months and would consume typical hazardous materials and generate typical hazardous wastes such as oily rags and incidental cleaning fluids, etc. This would amount to less than 100 kilograms (220.5 pounds) of hazardous wastes for the period of construction.

Flight test activities would generate approximately 1 kilogram (2.2 pounds) of hazardous waste per test event, or 24 kilograms (52.9 pounds) per year.

Eglin AFB hazardous waste generation numbers have been reduced, reflecting Air Force management attention to reducing the amount of hazardous materials through the pharmacy management approach. Hazardous materials use at Santa Rosa Island is also likely to continue this decreasing trend.

The maximum number of launches that would occur at Site A-15 is 24 launches per year. The maximum of projected hazardous waste is listed in table 3.1.6-9.

Table 3.1.6-9: Maximum Projected Hazardous Waste for Site A-15 for a 10-year Period

Missile	Activity	Amount
Hera target	Missile assembly	240 kilograms (529.2 pounds)
	Chemical simulant	None expected, 53,280 kilograms (117,482 pounds) expended
Lance target	Missile assembly	None expected
	Chemical simulant	None used
PAC-3 interceptor	Missile assembly	Minimal
	Chemical simulant	None expected, 3,936 kilograms (8,690 pounds) expended

Because hazardous materials and hazardous wastes activities would follow applicable regulations and procedures, no cumulative impacts would result.

Mitigations Considered

SOPs used during construction and operations would include: (1) providing site personnel involved in construction activities with an environmental awareness orientation to make the personnel aware of their responsibilities with regard to threatened and endangered species, cultural resources, allowable activities on sensitive and protected lands, erosion control, and hazardous materials management; and (2) implementing an emergency response plan prior to launch which specifies the requirement for an onsite recovery team for spill response and debris recovery.

Possible mitigations would include minimization refueling operations during construction.

3.1.6.4.2 Cape San Blas

Small quantities of hazardous materials would be used by the TMD program activity on Cape San Blas. AFDTC Plan 32-9 Hazardous Materials Management Plan documents existing policies and procedures which would be implemented for the TMD program. In addition to standard lubricants and solvents, missile propellants (solid and liquid) would be utilized for the program. During normal launch, these fuels are expended and would result in generation of small quantities of hazardous wastes.

No-action Alternative

For the no-action alternative, the proposed TMD test activities on Cape San Blas would not be implemented. Operations at Eglin AFB, involving Cape San Blas, would continue at their current or planned levels. Continuing testing and training activities would use and generate minimal quantities of hazardous materials and wastes.

Site Preparation Activities

Interceptor

Since there is no proposed substantial site preparations activities, there would be no hazardous materials generated.

Target

Construction would last approximately 8 months and would consume typical hazardous materials and generate typical hazardous wastes such as oily rags and incidental cleaning fluids, etc. This would amount to less than 100 kilograms (220.5 pounds) of hazardous wastes for the period of construction.

Flight Test Activities

For a description of flight test activities, refer to section 3.1.6.4.1.

Cumulative Impacts

Construction would last approximately 8 months and would consume typical hazardous materials and generate typical hazardous wastes such as oily rags and incidental cleaning fluids, etc. This would amount to less than 100 kilograms (220.5 pounds) of hazardous wastes for the period of construction.

Flight test activities would generate less than 1 kilogram (2.2 pounds) of hazardous waste per test event, or 24 kilograms (52.9 pounds) per year.

Eglin AFB hazardous waste generation numbers have been in a downward trend reflecting the general Air Force management attention to reducing the amount of hazardous materials ordered and the distribution controls within the organization through the pharmacy management approach. This trend is likely to continue. Hazardous materials use at Cape San Blas Island is also likely to continue this decreasing trend.

Mitigations Considered

SOPs used during construction and operations would include: (1) providing site personnel involved in construction activities with an environmental awareness orientation to make the personnel aware of their responsibilities with regard to threatened and endangered species, cultural resources, allowable activities on sensitive and protected lands, erosion control, and hazardous materials management; and (2) implementing an emergency response plan (appendix J) prior to launch which specifies the requirement for an onsite recovery team for spill response and debris recovery.

Possible mitigations would include the minimization of onsite refueling operations during construction.

3.1.7 LAND AND WATER USE

Site preparation and flight test activities may affect land and water use for sites on Santa Rosa Island. Proposed land use on Santa Rosa Island would be compatible with the Okaloosa County Comprehensive Plan and with the Eglin AFB Base Comprehensive Plan. Eglin AFB owns the sites and the land immediately adjacent to Site A-15. There is no non-Federal land within the proposed LHA.

Site preparation and flight test activities may affect land and water use for sites on Cape San Blas. The proposed LHA overlaps eight parcels, including five non-Federal parcels which compose 16.4 percent of the property within the proposed LHA. Proposed land use on Cape San Blas would be compatible with the Gulf County Comprehensive Plan and with the Eglin AFB Base Comprehensive Plan. Clearance of the LHA at Cape San Blas prior to each flight test would require the temporary closure of County Road 30E, restricting access to residential and recreational areas.

3.1.7.1 Resource Description and Evaluative Methods

The purpose of the Land and Water Use Resource section is to assess the potential affect of the proposal upon use of the land or water within a ROI and address the compatibility of the proposed action and its alternatives with respect to the surrounding land and water uses and activities. For the purposes of this document, there are three primary categories encompassed under the term Land Use:

- Community uses of land for living and commerce, as typically addressed in state and local Comprehensive Plans in the State of Florida
- Consistency with the process of the Coastal Management Act
- Land uses and activities within military compounds that would host the proposed action and its alternatives
- Uses of water in the immediate vicinity of the coast, especially water-based recreation

Land and water use resource impacts are related to alternatives at Eglin AFB in terms of compatibility with host installation land uses, compatibility with adjacent land uses, and compatibility with current or planned uses of the Gulf of Mexico. The Comprehensive Plans of the counties were reviewed for their current and planned use of the subject locations.

Compatibility with host installation land use plans is evaluated in terms of the extent of construction impacts and land use compatibility with current mission uses and potential facility or operational displacement.

Compatibility with adjacent land uses and local plans is evaluated in terms of non-Federal property impacts within the proposed LHA, recreation area exclusion, and compatibility with adjacent protected land uses.

3.1.7.2 Region of Influence

The ROI consists of land and water within the proposed LHA of each launch location.

3.1.7.3 Affected Environment

3.1.7.3.1 Santa Rosa Island

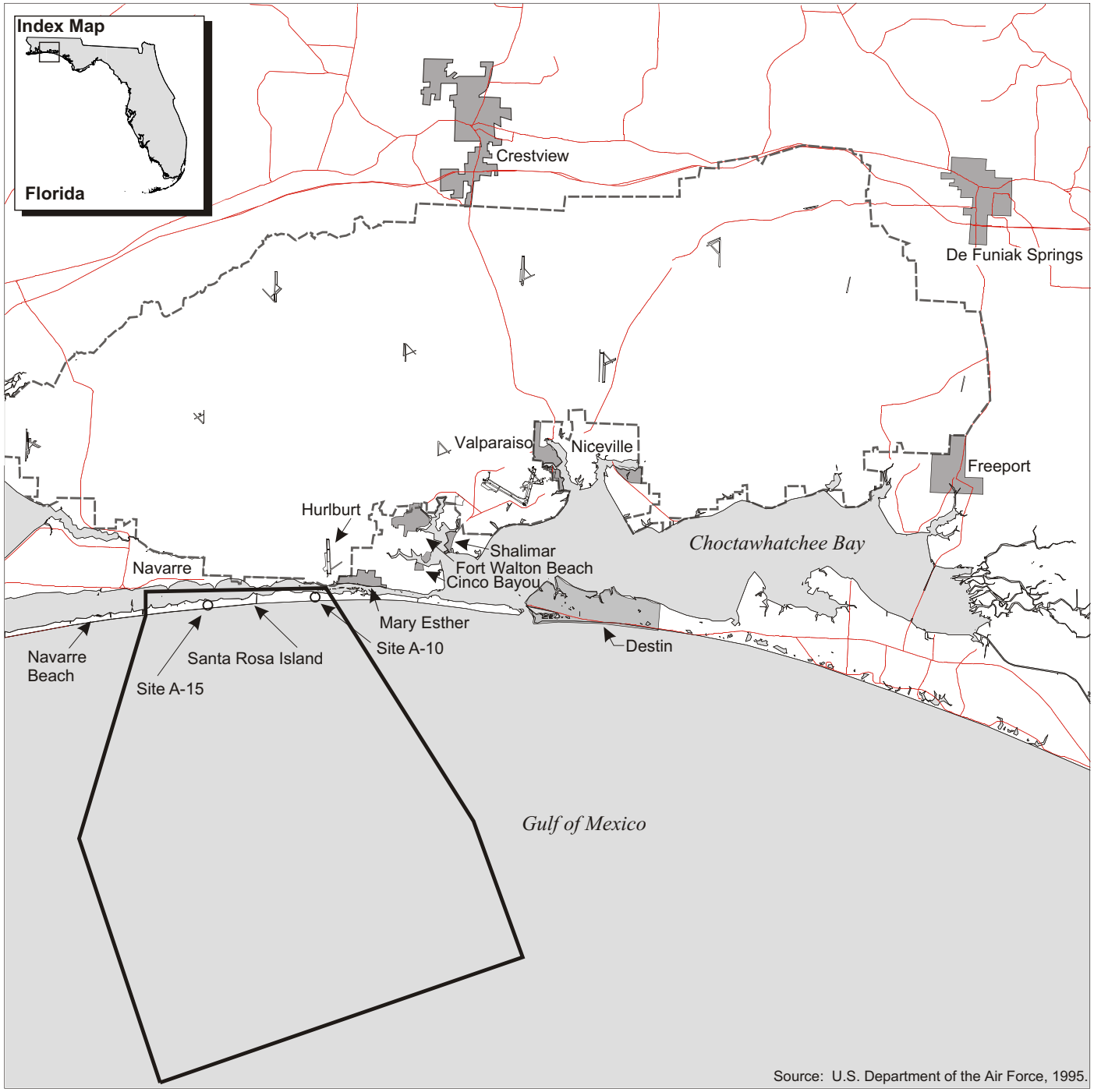
The southwest boundary of Eglin AFB is Santa Rosa Island. Santa Rosa Island is a barrier island that lies directly off the coast and extends approximately 72 kilometers (45 miles) from Choctawhatchee Bay to the east and Pensacola Bay to the west, forming Santa Rosa Sound (figure 3.1.7-1). Site A-15 is located at the southeastern corner of Santa Rosa County.

Eglin AFB owns two large parcels of Santa Rosa Island. The western parcel, which contains the proposed launch site, is approximately 16 kilometers (10 miles) long. The eastern parcel of Air Force land runs from Fort Walton Beach approximately 6.9 kilometers (4.3 miles) to Destin Pass.

Population centers located near Site A-15 include Pensacola, Pensacola Beach, Gulf Breeze, and Navarre Beach to the west and Wynnhaven, Mary Esther, and Fort Walton Beach to the east in Okaloosa County. The closest population is the development along U.S. 98 in Wynnhaven Beach located 2 kilometers (1.3 miles) across Santa Rosa Sound north of Site A-15. A private residence is located 1.9 kilometers (1.2 miles) northeast of the proposed launch site (Bristol, 1997).

Navarre Beach extends 6.5 kilometers (4 miles) from the boundary with Eglin AFB property. The Gulf Islands National Seashore extends an additional 12.8 kilometers (8 miles) west of Navarre Beach. Navarre Beach (figure 3.1.7-1) is within the jurisdiction of Santa Rosa County.

Navarre Beach is under lease agreement for 99 years from Escambia County, which owns the property after acquiring it from the Federal government in 1956. In 1991, Santa Rosa County executed a lease with Escambia County to administer the area and to issue leases to private interests for development purposes. The county executes and administers the lease agreements, collects fees, and operates and maintains the Navarre Beach community and its infrastructure as an enterprise (Florida State University, Institute of Science and Public Affairs, 1996). Navarre Beach includes numerous condominiums, a municipal building, and a fire department. The two primary land use classifications in Navarre Beach are residential and commercial. Commercial activities are concentrated along Gulf Boulevard, State Road 399.



EXPLANATION

- Roads
- Eglin Air Force Base Boundary
- Launch Hazard Area

Vicinity Location Map

Scale 1:500,000
0 4 8 Miles
0 6.5 13 Kilometers

NORTH

Santa Rosa Island, Florida

Figure 3.1.7-1

sri-500k-3land001

General Land Use

Development near Site A-15 is concentrated north on the mainland in Navarre and to the west in Navarre Beach. Land use in Navarre includes commercial, low density residential, and conservation land uses (Okaloosa County, 1993) (figure 3.1.7-2). Santa Rosa Island is connected to Navarre by the State Road 399 toll bridge. Site A-15 is located approximately 4.8 kilometers (3 miles) east of the toll bridge on Santa Rosa Island. There is no public access through the western Eglin AFB boundary with Navarre Beach. The area between Navarre Beach and Site A-15 includes a boat launch and park on the north side of the island. The area west of the State Road 399 toll bridge is Navarre Beach.

Base Land Use

Site A-15 is a former missile launch and weapons testing site. Most of the existing structures were built between 1959 and 1961; several others were constructed in 1990. Only 3 of the 26 buildings are occupied—Buildings 12512, 12517, and 12515. Building 12515, the Fire Station, is used at times for firefighting training. Except for the firefighting trainees, the maximum normal daily working population at Site A-15 is approximately 20 people.

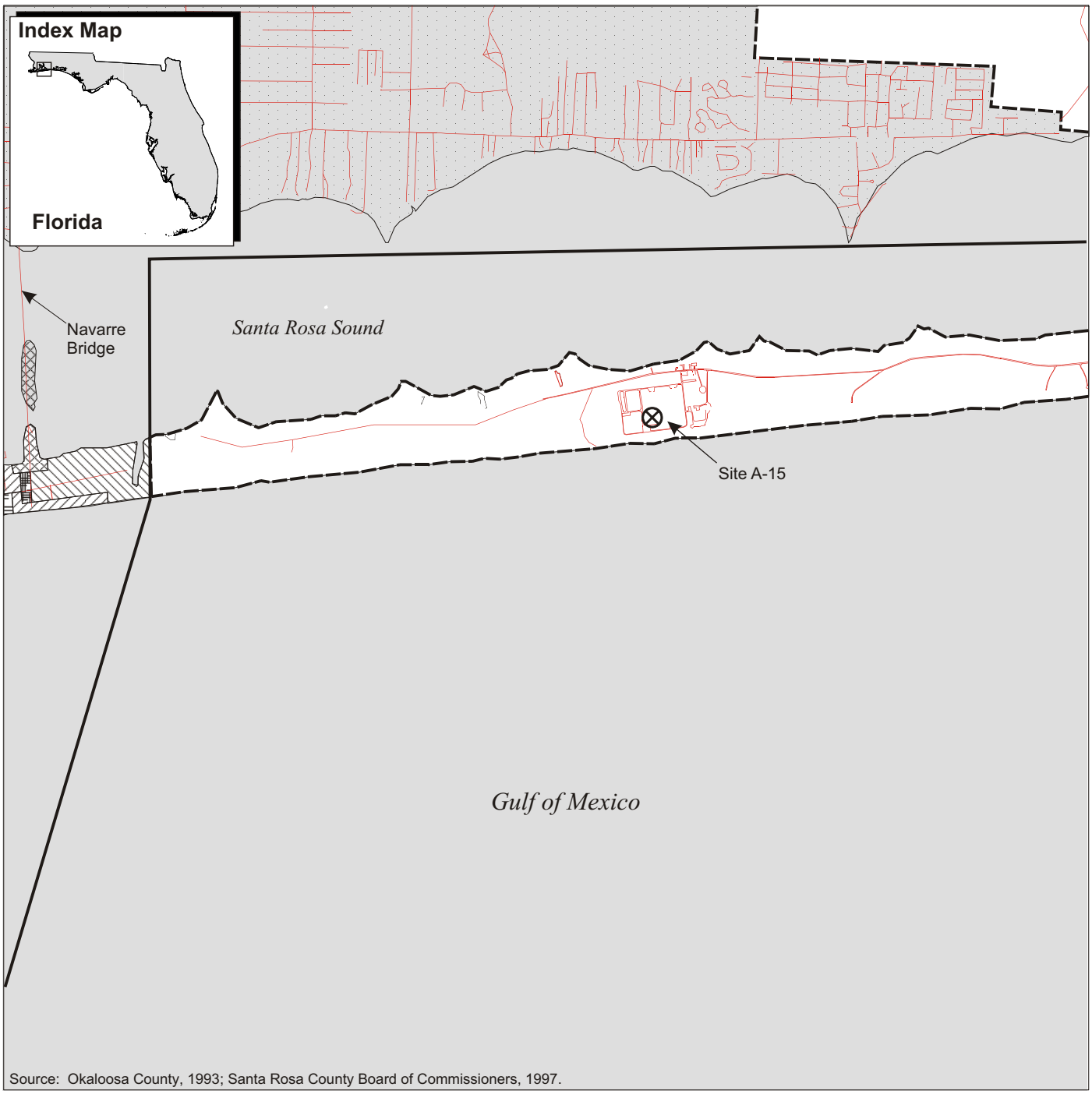
Under the proposed Santa Rosa Island Reconstitution Test Capabilities Program, the preferred alternative requires construction at three sites located on Santa Rosa Island. This construction would include Site A-17A as the westernmost focus site and additional focus sites at A-1 and A-13/A-14. Site A-13/14 would include one 91.4-meter (300-foot) tower with instrumentation and equipment at one focus site, three control buildings, two 30.5-meter (100-foot) towers at Sites A-1 and A-17A, and several pads and other equipment mounting stations. Other support facilities would include guard houses, parking and access roads, security fences, a seawall (only if necessary), and utility connections, including communications infrastructure. The OA-HITL tower is expected to be a steel skeleton structure with nominal height of 91.4 meters (300 feet) above grade level with a 36.6-meter (120-foot) base and 15.2 meters (50 feet) in diameter in the upper portion (U.S Air Force, 1998).

Land Ownership

Site A-15 is on land owned by Eglin AFB. The closest non-Federal property on Santa Rosa Island occurs in Navarre Beach approximately 5.8 kilometers (3.6 miles) west of the proposed launch site (figure 3.1.7-1). The closest property to the north is along the northern waterfront of Santa Rosa Sound, approximately 2.1 kilometers (1.3 miles) from the proposed launch site.

Recreation Activities

The primary recreation activities in the area are associated with beach and water sports. Recreational facilities in the area include boat ramps, fishing piers, and campgrounds.



EXPLANATION

- Roads
- Government Property
- Launch Hazard Area
- Launch Site
- Eglin AFB
- Open Land
- Recreation
- Transportation
- Commercial
- Mixed Use
- Residential

NORTH

Scale 1:50,000

0 .5 1 Mile

0 .8 1.5 Kilometers

Adjacent Land Use

Santa Rosa Island, Florida

Figure 3.1.7-2

sri-50k-3land001

Recreation facilities in the vicinity of Site A-15 (figure 3.1.7-3) include a boat launch and park (7) located on Santa Rosa Sound, immediately east of the State Road 399 toll bridge, a fishing pier (6) located immediately west of the bridge, and a boat ramp (5) located 4 kilometers (2.5 miles) west of Site A-15. Camping facilities include Long View Campground located 8.6 kilometers (5.4 miles) west of Site A-15, Navarre Beach Campground (9) located 2.6 kilometers (1.6 miles) northwest of Site A-15, and Emerald Beach Campground (8) located 1.6 kilometers (1 mile) east of Site A-15.

Recreation areas located 2.8 kilometers (1.75 miles) north of Site A-15 on the mainland include Magnolia Beach Campground (10) and Gulfwinds Campground (11). Another campground is located 16 kilometers (10 miles) northeast of Site A-15 on Upper Pritchard Long Point.

Protected Areas

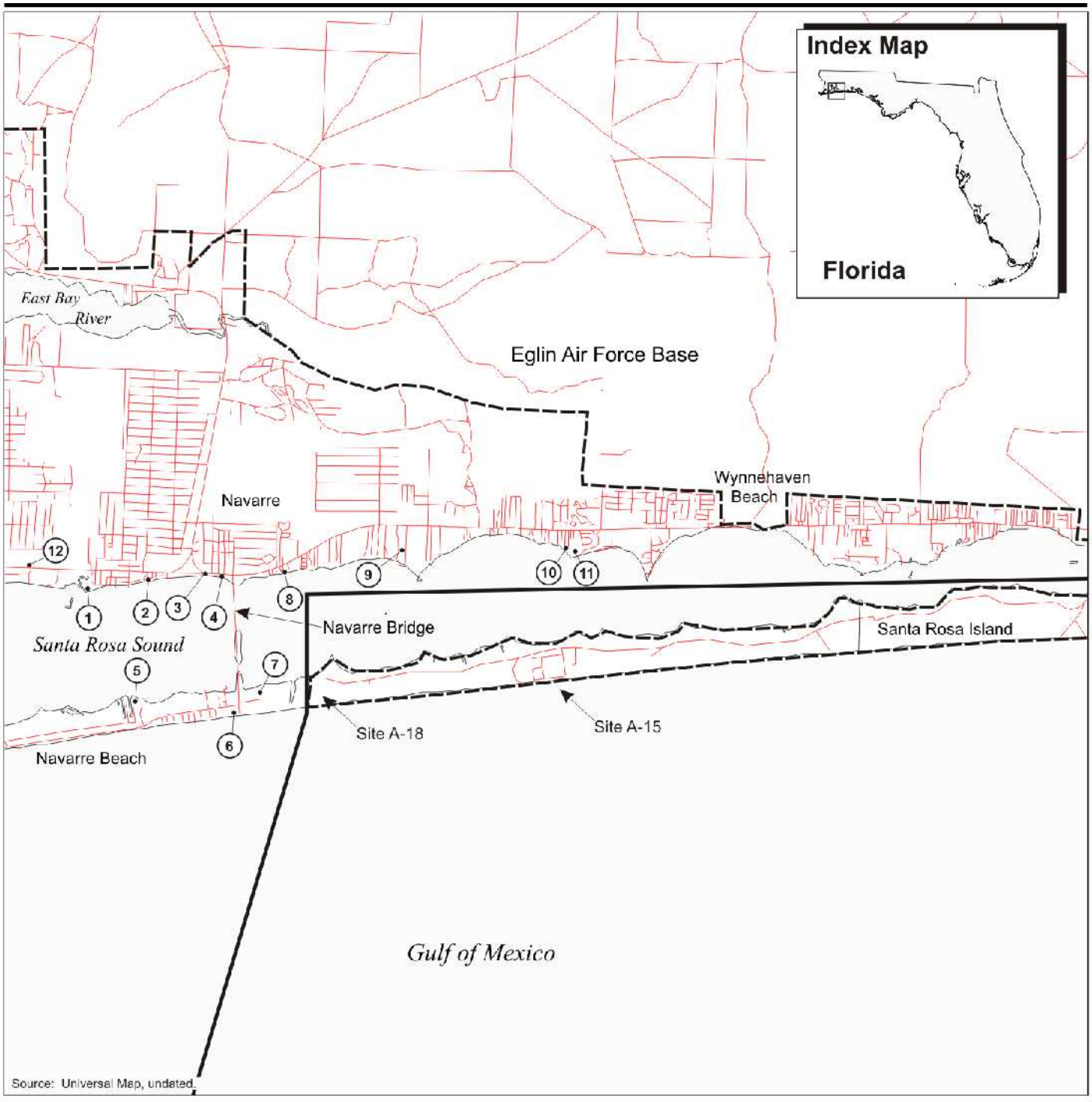
The Gulf Islands National Seashore is a mosaic of 11 separate units that extend eastward 241.4 kilometers (150 miles) from West Ship Island, Mississippi, to the eastern tip of Santa Rosa Island.

The National Seashore Organization administers property for which they have title, including the Fort Pickens area located on the far western tip of Santa Rosa Island, the Santa Rosa Island area from Pensacola to Navarre Beach, the Naval Live Oak Area (east of Gulf Breeze on U.S. 98) and the Okaloosa area located southeast of Fort Walton Beach. The Santa Rosa Island portion of the Gulf Island National Seashore is approximately 14.4 kilometers (9 miles) long. The Santa Rosa Island portion of the Gulf Islands National Seashore is six percent of the total National Seashore. Approximately 4 to 4.5 million people visit the National Seashore each year. Facilities at the National Seashore include picnic, camping, a visitor center, and nature trails.

The Coastal Barrier Resource Act protects barrier island units from growth pressures by placing restrictions on Federal program funds, such as Federally funded infrastructure and flood insurance. Unit FL 97 covers approximately (1 mile) 1.6 kilometers of Santa Rosa Island between the Navarre toll bridge and the westernmost boundary of the Eglin property on Santa Rosa Island. Unit FL 97 does not include any portion of the test area. (Kilcollins, 1996) See appendix B. However, under 16 U.S.C. TY3505(a)(4), use of areas within these boundaries would require consultation with the Secretary of the Department of Transportation.

3.1.7.3.2 Cape San Blas

Site D-3A is located at Cape San Blas on the St. Joseph Peninsula approximately 67 kilometers (42 miles) southeast of Panama City, Florida (figure 3.1.7-4). The St. Joseph Peninsula is connected to the mainland by a 4.8-kilometer (3-mile) long arm that extends westward from the mainland. The spit bends northward at Cape San Blas and extends approximately 24 kilometers (15 miles) to the north in a convex arc. The peninsula is generally less than 1.6 kilometers (1 mile) wide.



EXPLANATION

- Roads
- Eglin AFB Boundary
- Launch Hazard Area

1. Alpine Beach
2. Campsite
3. Boat Ramp
4. Neighborhood Park
5. Boat Ramp
6. Fishing Pier
7. Boat Launch and Park
8. Emerald Beach Campground
9. Navarre Beach Campground
10. Magnolia Beach Campground
11. Gulfwinds Campground
12. Public Beach Access

Recreation

Scale 1:100,000

0 1 2 Miles

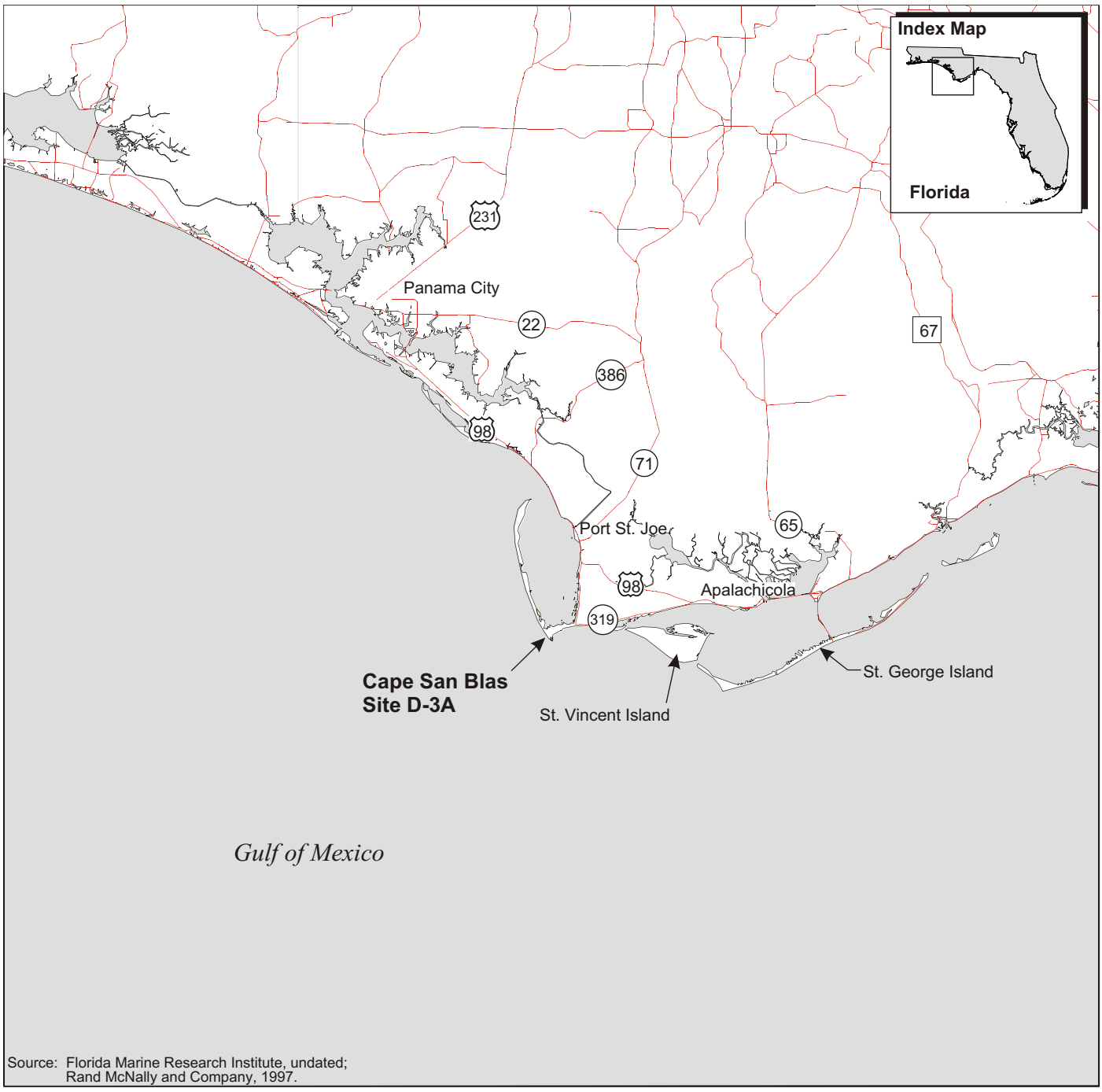
NORTH

0 1.5 3 Kilometers

Santa Rosa Island, Florida

Figure 3.1.7-3

srl-100k-3land001



Source: Florida Marine Research Institute, undated; Rand McNally and Company, 1997.

EXPLANATION

- Roads
- County Roads
- State Highways
- U.S. Highways

Scale 1:1,000,000

0 15 30 Miles

0 25 50 Kilometers

NORTH

csb-1m-3gen001

Vicinity Location Map

Cape San Blas, Florida

Figure 3.1.7-4

Affected Environment

Cape San Blas is located in Gulf County, a sparsely populated and predominantly rural area. The primary economic activities in the area include forestry, farming, and commercial and sports fishing. Port St. Joe and Wewahitchka are the only incorporated municipalities in the county. Port St. Joe, located on St. Joseph Bay, is the industrial center of the county. Wewahitchka is located approximately 64.4 kilometers (40 miles) inland. Other unincorporated communities include Beacon Hill and Highland View located west of Port St. Joe on U.S. 98. Areas east of Port St. Joe include White City and Howards Creek.

Residential land uses near Cape San Blas are primarily one story single family homes located in small communities along State Road 30 and U.S. 98. These communities include Port St. Joe located 16 kilometers (10 miles) north of Site D-3A, Beacon Hill 27.2 kilometers (17 miles) north, Highland View 17.6 kilometers (11 miles) north, St. Joe Beach 24 kilometers (15 miles) north, Oak Grove 13.6 kilometers (8.5 miles) north, and Indian Peninsula 25.6 kilometers (15 miles) east on 30B. The primary industrial areas are in the northwest section of Port St. Joe. Industries include Raffield Fisheries, Arizona Chemical, and the Florida Coast Paper Company.

General Land Use

The St. Joseph Peninsula north of D-3A consists of the William J. Rish Recreational Park, St. Joseph Peninsula State Park, and mixed commercial and residential development (figure 3.1.7-5). Protected areas near Site D-3A include the Saint Joseph Bay State Aquatic Preserve and the Pig Island portion of the St. Vincent National Wildlife Refuge.

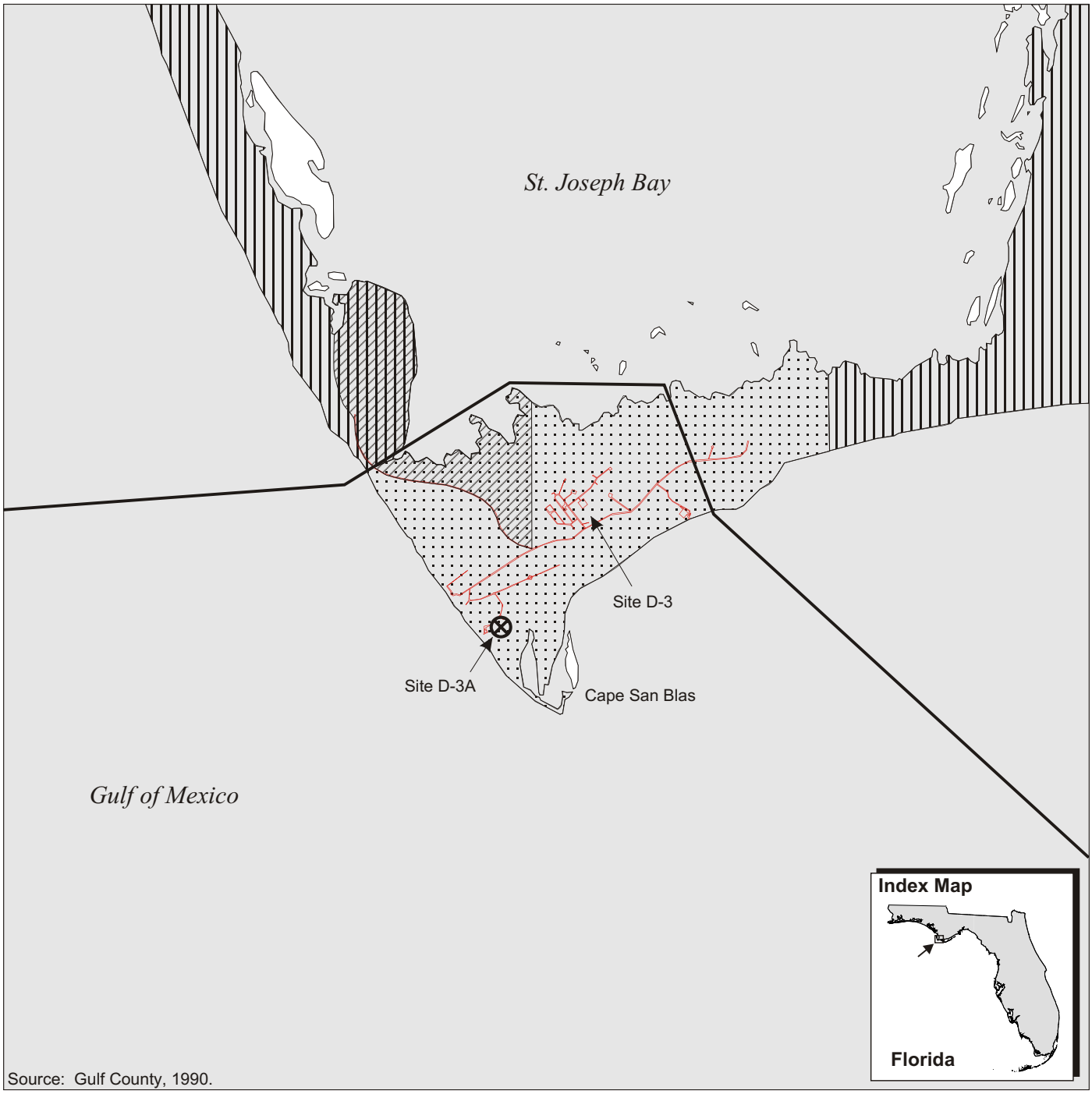
The St. Joseph Peninsula south of the State Park has been subdivided into lots that range in size from 1.2 hectares (0.5 acre) to 12.3 hectares (5 acres) in size. Development has been sporadic and does not follow a discernible subdivision pattern. An exception is the Barrier Dunes subdivision, located adjacent to the State Park. The remaining area consists of single family and duplex beach homes that are mixed irregularly with townhouses (up to eight units per acre) and undeveloped lots. These residences serve primarily as second homes. The area also includes four small convenience stores and a handful of docks. The area to the immediate north of Site D-3A includes vacant beach property that is for sale.

The area east of Cape San Blas includes approximately 30 houses and 10 quadruplexes. Two houses, one abandoned structure, and an RV-campsite are located within 8 kilometers (5 miles) east of Site D-3A.

Base Land Uses

Eglin AFB Site D-3 has approximately 20 employees. All occupied buildings are at Site D-3 north of County Road 30E.

The southern portion of the site contains radar sites and an unoccupied building (E282). Site D-3A is about 210 hectares (520 acres) south of County Road 30E and



Source: Gulf County, 1990.

EXPLANATION

- Roads
- Launch Hazard Area
- Agriculture
- Launch Site
- Mixed Commercial/Residential - Low Density
- Public

Scale 1:50,000

0 .5 1 Mile

0 .8 1.5 Kilometers

NORTH

Adjacent Land Use

Cape San Blas, Florida

Figure 3.1.7-5

includes an existing launch pad and a small distribution building (13.4 square meters [144 square feet]). Other launch pads previously at the site were destroyed by a hurricane in 1995. Site D-3A also includes the Eglin AFB MTA, U.S. Coast Guard Loran Station, and a lighthouse. The MTA contains radar systems, telemetry systems, instrumentation, command and control equipment, and other electromagnetic test equipment. The site is also used for national and U.S. Special Operations Command-directed training and continuous Medical Readiness training by Tyndall AFB. The existing designation for Site D-3A is "public." (U.S. Army Space and Strategic Defense Command, 1994a) There are no land use or facilities plans covering this area.

Site D-3A has been previously used for the launch of missiles for test flights. A new launch pad adjacent to the proposed TMD launch site was constructed in 1996.

Land Ownership

The LHA for Site D-3A includes eight parcels that account for 377.3 hectares (932.3 acres). The three Federally owned parcels of land account for 283.5 hectares (700.4 acres). The Federally owned parcels include all of the vacant U.S. Coast Guard Loran Facilities, the launch pads, the control center, and the helicopter pads of Site D-3A. The remaining five parcels are non-Federal. The total area for these five parcels is 48.6 hectares (120.0 acres). Those parcels are currently zoned agricultural and mixed commercial residential.

Approximately 16.4 percent of the property within the proposed LHA is non-Federal. These parcels are zoned agriculture and are not expected to be developed in the future.

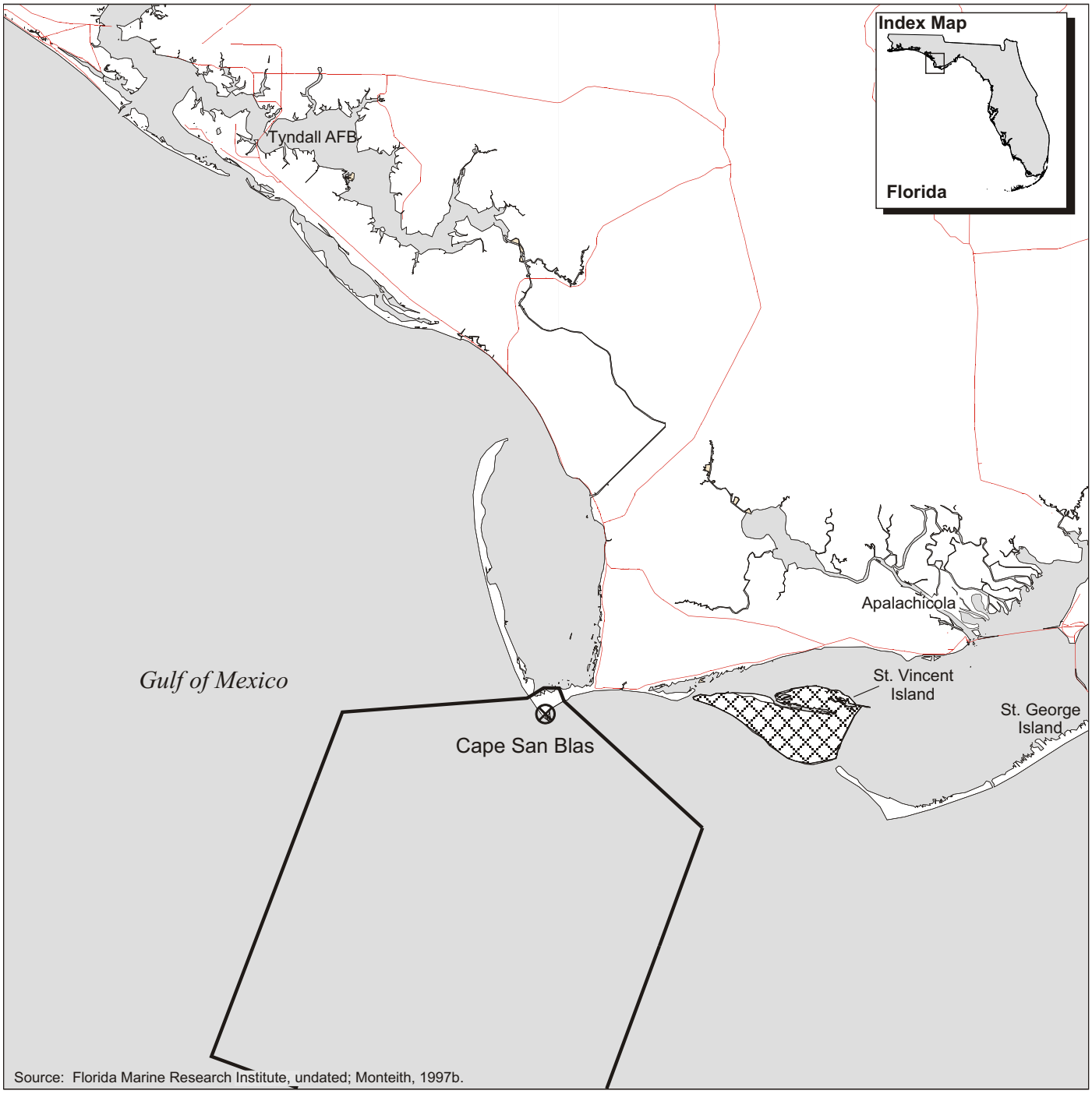
Recreation Activities

Recreation activities near Site D-3A are primarily associated with water sports and natural areas (figure 3.1.7-6). Activities include picnicking, swimming, camping, saltwater fishing, scalloping, spearfishing, snorkeling, diving, boating, birdwatching, and wildernesses hiking. The beaches around the cape are accessible to the public and are classified as "drive-on" if a vehicle-issue permit is obtained from Gulf County. (U.S. Army Space and Strategic Defense Command, 1994a).

Recreation facilities located within 9 kilometers (5.6 miles) from Site D-3A include a hunting preserve, 5 campgrounds, 1 beach, 4 boat ramps, 18 boat slips, and a hiking trail.

Tourists use the St. Joseph Bay State Aquatic Preserve for birdwatching, sportfishing, and recreational shellfish harvesting.

The Florida Department of Children and Family Services operates Sunland's William J. Rish Recreation Park located 7.2 kilometers (4.5 miles) north of Site D-3A. The park is 40 hectares (98.1 acres) with eight cabins or shelters, a 804.7-by-19.8-meter (2,640-by-65-foot) beach, recreation center, swimming pool, and outdoor courts. The facility is for disabled residents of Florida and their families.



EXPLANATION

- Roads
- Launch Hazard Area
- St. Vincent Wildlife Refuge
- Proposed Launch Site

NORTH

Scale 1:500,000

0 4 8 Miles

0 6.5 13 Kilometers

Launch Hazard Area and St. Vincent Wildlife Refuge

Cape San Blas, Florida

Figure 3.1.7-6

csb-500k-4land001

The Cape San Blas Camping Resort is 3 kilometers (2 miles) east of Site D-3A. The resort includes camp sites, cottages, a swimming pool, a store, and beach access.

The Magnolia Lodge Fish Camp is a privately owned 1.3-hectare (3.3-acre) camp located (6.4 kilometers [4 miles] east of Site D-3A). The facility includes 3 RV trailer sites, 5 cabins, and 10 marina slips.

Salinas Park is located 4.6 kilometers (2.9 miles) east of Site D-3A. The park is 2.2 hectares (5.5 acres) with picnic sites and beach access.

Presnell Fish Camp, located 5.6 kilometers (3.5 miles) east of Site D-3A, is 18.5 hectares (7.9 acres) with 36 RV or trailer sites, 36 picnic tables, and 8 marina slips.

Protected Areas

St. Joseph Bay Aquatic Preserve, regulated by the FDEP, includes Cape San Blas's western shoreline. In total, the preserve encompasses 29,500 hectares (73,000 acres) of tidal lands, islands, sandbars, banks, submerged bottom, and land waterward of the mean high water of state-held lands. Approximately one third of the preserve is located within the ROI.

The Pig Island portion of the St. Vincent National Wildlife Refuge is located 3.2 kilometers (2 miles) north of Site D-3A and in the southern region of St. Joseph Bay. Pig Island is 18.6 hectares (46 acres) of slash-pine mixed understory. The mission of the St. Vincent National Wildlife Refuge Pig Island Unit is to manage the island in order to preserve the native plant and animal communities. Access to the island is by boat only during daylight hours. The island is for primitive use only, motorized vehicles and equipment are not permitted.

The Coastal Barrier Resource Act protects barrier island units from growth pressures by placing restrictions on Federal program funds, such as Federally funded infrastructure and flood insurance. Unit P30 covers the Cape west of the intersection of Highway 30 and Highway 30E, including the entire spit. (Kilcollins, 1996). See appendix B. Use of areas within these boundaries would require consultation with the Secretary of Transportation.

3.1.7.4 Environmental Impacts and Mitigations

3.1.7.4.1 Santa Rosa Island

Site preparation and flight test activities may temporarily affect land and water use for sites on Santa Rosa Island. Proposed land use on Santa Rosa Island would be compatible with the Okaloosa County Comprehensive Plan and with the Eglin AFB Base Comprehensive Plan. The State of Florida has determined that the action is consistent with the process of the CZMA. Eglin AFB owns the sites and the land adjacent to Site A-15. There is no non-Federal land within the proposed LHA.

Interceptor

No construction requirements have been identified for interceptor launches from Santa Rosa Island. Trailers containing launchers and radar equipment would be set up at the launch location 2 weeks prior to launch.

No-action Alternative

Under the no-action alternative, the proposed ground-based TMD test activities on Santa Rosa Island would not be implemented. Current operations at Eglin AFB, which includes Santa Rosa Island, would continue.

The proposed LHA for Site A-15 includes 258 hectares (637.8 acres) of land, all of which is owned by Eglin AFB. Future land use is expected to remain military. No non-Federal property is located within the proposed LHA.

Under the no-action alternative, Site A-15 would continue to be used for current or presently planned military purposes. Continuing Eglin AFB use of Sites A-10 and A-15 would have negligible effects on local land and water use. The Santa Rosa Island Reconstitution Test Capabilities project is currently being evaluated.

Site Preparation Activities

Target

All construction at Site A-15 for the proposed project would take place within existing previously disturbed areas. Other improvements would be in the form of renovations and retrofit of existing structures for project-related use. Additionally, some minor road improvements would be made.

The proposed use of Site A-15 is consistent with existing on-base land use and is consistent with the original missile launch mission at the site.

The proposed MAB would be Building 12555, an abandoned electricity research engineering facility. The 131.7-meter (432-foot) ESQD associated with the MAB would not affect any occupied structures. The 274.3-meter (900-foot) ESQD includes Building 12517; use of Building 12555 as the MAB could therefore result in the temporary displacement of up to 20 employees in that building. No other occupied buildings or equipment in use would be affected. The 274.3-meter (900-foot) ESQD associated with the target launch site would affect two currently occupied structures.

The AFDTC Installation Development Committee has approval authority over all development plans at Eglin AFB main base and satellite sites, including Site A-15. Facilities Board subcommittees include Space Utilization, Traffic, Resource Allocation, Encroachment, Range Development, and Industrial Development Council (IDC). The proposed land use and site layout of the TMD launch facilities would be submitted to the appropriate subcommittees for review and approval.

Flight Test Activities

Interceptor and Target

The proposed LHA (figure 3.1.7-1) would require the evacuation of two unrelated mission structures at Site A-15 for the duration of the mission.

Recreational facilities located within 9 kilometers (5.6 miles) of Site A-15 include four boat ramps, one fishing pier, five campgrounds, and several beaches. The recreation clearance zone would include any water body located within the boundaries of the proposed LHA (figure 3.1.7-1). The recreation clearance zone would be cleared for approximately 1 to 4 hours on up to 24 occasions a year. Based on these figures, the maximum amount of time in which people would be cleared from recreational activity within the proposed LHA would be 96 hours a year. Economic impacts of tourism-related recreation are addressed in the socioeconomic section of this report.

There are no specific restrictions within the Gulf Islands National Seashore that apply to the proposed action. Other issues pertaining to protected areas are addressed in Biological Resources (section 3.1.3), Safety (section 3.1.9), and Water Resources (section 3.1.14). Military activities are exempt from the Coastal Area Resource Act but require consultation with the Secretary of Interior (see appendix B). The State of Florida has determined that this action is consistent with the process of the Coastal Zone Management Act (CZMA) (See appendices B and E).

Cumulative Impacts

Construction of TMD test facilities at Santa Rosa Island would take place in a complex of facilities that were originally constructed in 1959 for the purpose of launching missiles south over the Gulf of Mexico. This complex has been altered over the years, but its initial purpose has been retained. In the 1980s, the complex was upgraded to test an electromagnetic rail-gun for the Strategic Defense Initiative Organization, the predecessor to the BMDO. This TMD proposal is consistent with the historic land use of the site.

The Santa Rosa Island portion of Eglin AFB has been used and maintained for its original purpose that is to give Eglin AFB surveillance of flight activities in the Gulf of Mexico. Instrumentation sites on Santa Rosa Island enhance the value of the airspace over the Gulf of Mexico by allowing operations and test activities conducted over the Gulf of Mexico to be monitored. Facilities damaged by the hurricanes of 1995 are to be repaired or replaced in consolidated locations along Santa Rosa Island.

In addition, the Air Force is considering using Santa Rosa Island for a project known as Santa Rosa Island Reconstitution Test Capabilities. This program would involve construction of three towers, three control buildings, and associated equipment and instrumentation. Candidate sites on Santa Rosa Island include Sites A-1, A-3, A-11, A-13, A-14, and A-17A. The preferred alternative would consist of multiple towers and support facilities on sites A-1, A-13/14, A-17A. Although detailed information is not available at this time, the OA-HITL project would be consistent with proposed land use on Santa Rosa Island.

Mitigations Considered

Possible mitigations would include:

- Provide and distribute advance notification of closure dates and durations to the local public, DEM, FMP, Coast Guard, and marinas.

3.1.7.4.2 Cape San Blas

Site preparation and flight test activities would result in temporary impacts on land and water use on Cape San Blas. The proposed LHA overlaps eight parcels, including five non-Federal parcels which compose 16.4 percent of the property within the proposed LHA. Proposed land use on Cape San Blas would be compatible with the Gulf County Comprehensive Plan and with the Eglin AFB Base Comprehensive Plan. The State of Florida has determined that the action is consistent with the process of the CZMA. Clearance of the LHA at Cape San Blas prior to each flight test would require the temporary closure of County Road 30E, restricting access to residential and recreational areas.

No-action Alternative

Under the no-action alternative, the proposed ground-based TMD test activities on Cape San Blas would not be implemented. Current operations at Eglin AFB, which includes Cape San Blas, would continue at current or planned levels.

The Gulf County Future Land Use Map shows the land use for the test site as public. Land north of U.S. 1 is shown as either agricultural or low density commercial and residential. Continuing Eglin AFB operations including monitoring of flight testing and training and periodic missile launches would have minimal effects on land and water use.

Site Preparation Activities

Interceptor

No construction requirements have been identified for interceptor launches from Cape San Blas. Trailers containing launchers and radar equipment would be set up at the launch location 2 weeks prior to launch.

Target

Approximately 3.56 hectares (8.8 acres) would be disturbed at Site D-3, of which 3.3 hectares (5.8 acres) was previously undisturbed land. All appropriate permits would be obtained prior to any construction activity. This disturbance would represent a 4.4 percent increase in disturbed area at Site D-3A. The proposed use of Cape San Blas is consistent with current military land use.

The proposed ESQDs for the MAB and target launch pad would not affect any occupied structures or equipment in use.

The AFDTC Installation Development Committee has approval authority over all development plans at Eglin AFB main base and satellite sites, including Cape San Blas. Subcommittees include Space Utilization, Traffic, Resource Allocation, Encroachment, Range Development, and IDC.

Flight Test Activities

Clearance of an LHA at Cape San Blas (figure 3.1.7-6) prior to each test flight would require the temporary closure of County Road 30E. This restricted access would impact property owners and recreational visitors north of the Air Force property to St. Joseph Peninsula State Park. This road is the main access to St. Joseph Peninsula State Park and recreational vehicle and campgrounds, St. Joseph State Aquatic Preserve, St. Vincent National Wildlife Refuge Pig Island Unit, and commercial businesses and resort communities north of St. Joseph Peninsula State Park (figure 3.1.7-6).

AFDTC would negotiate agreements with property owners prior to launch.

The closure of County Road 30E would occur for approximately 1 to 4 hours up to 24 events a year. Based on these figures, the maximum amount of time in which people would be delayed access to and from St. Joseph Peninsula would total 96 hours a year.

Development of the St. Joseph Peninsula has continued steadily over the last 15 years. According to the USFWS, the St. Joseph Peninsula contained only 93 structures in 1982. Between 1982 and 1990, 351 new residential units were constructed. These residential units include single family homes, townhouses, and condominiums, multifamily, high density units. Other development has included related facilities such as convenience stores, shops, cafes, and recreational amenities such as tennis courts, fitness centers, swimming pools, and chip-and-putt golf facilities. Since 1992, at least 101 additional residential units have been permitted for development on over 148 hectares (366 acres) of land. (General Accounting Office, 1992)

Analysis of 1994 air photos indicates that there are currently 489 structures located on St. Joseph Peninsula beginning 1.6 kilometers (1 mile) north of Site D-3A. Extrapolation of building permit trend data for 1995-1997 indicates that 180 additional units will be added over the next 10 years for a total of 669 buildings.

The LHA buffer around the proposed launch point would include the building with approximately 20 employees at Site D-3. If it were necessary to evacuate the 1,828.8-meter (6,000-foot) buffer during the 4-hour period before and during a launch, these employees would be temporarily dislocated unless they were considered mission essential.

Currently there are no non-Federal structures within the LHA. Therefore, no evacuation from non-Federal property within the LHA is anticipated. Appropriate current and future land owners would be informed prior to test activities. An MOA would be in place with private land owners prior to launch. Recreational access to the LHA would be cleared for approximately 4 hours during each test event.

The proposed LHA would overlap 5 private parcels on the western boundary of Site D-3. These 5 parcels were eroded by the hurricanes of 1995. These parcels are not buildable because the erosion removed the major portion of each parcel. There is less than 16 meters (50 feet) remaining between the road County Road 30E and the waterline.

Peak recreation times on the peninsula are from late May through September. The St. Joseph Peninsula beaches, vacation resorts, and rental properties are most heavily used beginning in late spring until after Labor Day weekend. However, visitors in the off-season months of September through February have been increasing.

The peak number of visitors to St. Joseph Peninsula State Park, in July 1995, was 20,331 people. About half visited the park during the week and half on weekends. The park is open between 6:00 a.m. and 10:00 p.m., but most people visit between 11:00 a.m. and 4:00 p.m. Peak average attendance between 6:00 a.m. and 9:00 a.m. is estimated to be approximately 20 people. Closure of County Road 30E for 4 hours during test events testing procedures would delay approximately 80 visitors per test event.

Evacuation of the LHA would occur for 1 to 4 hours up to 24 times a year. Based on these figures, the maximum amount of time in which people would be delayed access to and from recreational activity in the area would be 96 hours a year.

Road closure and LHA activation would be short-lived, usually lasting less than 4 hours. This curtailed access to the beach and residential structures, while inconvenient, would not cause any permanent land use impacts. The highway has been previously closed for adverse weather conditions and missile launches. The St. Joseph Peninsula State Park visitor center, 11 kilometers (7 miles) to the northwest, would not be within the ROI.

There are no specific land use restrictions in the management goals of the St. Vincent National Wildlife Refuge or the St. Joseph Bay State Aquatic Preserve that apply to the proposed action. The State of Florida has determined that this action is consistent with the process of the Coastal Zone Management Act (CZMA).

Cumulative Impacts

Construction of TMD test facilities at Cape San Blas would take place in a complex of facilities that were originally constructed in 1959 for the purpose of monitoring missiles launches south over the Gulf of Mexico. This complex has been altered over the years, but its initial purpose has been retained. This TMD proposal is consistent with the historic land use of the site.

The Cape San Blas portion of Eglin AFB has been used and maintained for its original purpose, that is to give Eglin AFB accessibility to the Gulf of Mexico. Instrumentation sites on Cape San Blas enhance the value of the airspace over the Gulf of Mexico by allowing operations and test activities conducted over the Gulf of Mexico to be monitored.

Land use in Gulf County has been changing at a slow pace in the last 5 years. Residential and tourist development has increased the density of population along the St. Joseph Peninsula.

Another possible cumulative impact of the program is the cumulative effect of increased economic activity on land use in the ROI. The proposed action could generate increased demand for housing and businesses in the area. Spending by military personnel may generate increased demand for commercial services that would result in an indirect demand for additional employees to staff these commercial services. These employees, if new to the area, may in turn require additional housing and would thereby increase housing demand. This may have an indirect impact on land use in the area over the long-term.

Mitigations Considered

Possible mitigations would include:

- Provide and distribute advance notification of closure dates and durations to the local public, DEM, FMP, Coast Guard, and marinas.
- Easements and agreements would be in place with private land owners prior to launch.

3.1.8 NOISE

There would be no health-related sound exposures beyond the LHA. There is a small relative increase in noise for a large population in a minimal impact on Santa Rosa Island. Cape San Blas would experience a large relative increase in noise for a small population.

3.1.8.1 Resource Description and Evaluative Methods

Noise is usually described as unwanted sound. Characteristics of sound include amplitude, frequency, and duration. Sound can vary over an extremely large range of amplitudes. The decibel (dB), a logarithmic unit that accounts for the large variation in amplitude, is the accepted standard unit for the measure of sound. Noise levels of common sources are provided in table 3.1.8-1.

Table 3.1.8-1: Noise Levels of Common Sources

Source	Noise Level (dBA)	Comment
Air raid siren	120	at 15.2 meters (50 feet) (threshold of pain)
Rock concerts	110	
Airplane, 747	102.5	at 304.3 meters (1,000 feet)
Jackhammer	96	at 3.0 meters (10 feet)
Power lawn mower	96	at 0.9 meters (3 feet)
Football game	88	Crowd size: 65,000
Freight train at full speed	88 - 85	at 9.1 meters (30 feet)
Portable hair dryer	86 - 77	at 0.3 meters (1 foot)
Vacuum cleaner	85 - 78	at 1.5 meters (5 feet)
Long range airplane	80 - 70	inside
Conversation	60	
Typical suburban background	50	
Bird calls	44	
Quiet urban nighttime	42	
Quiet suburban nighttime	36	
Library	34	
Bedroom at night	30	
Audiometric (hearing testing) booth	10	Threshold of hearing without hearing loss

Source: Cowan, 1994.

Because an individual's reaction to noise and attitude toward noise sources varies, it is impossible to accurately predict how an individual will react to a particular noise. However, when entire communities are considered, community reaction to noise may be represented with a high degree of confidence.

In cases where a potential change in the noise environment exists due to a proposed project, sensitive elements exposed to this change must be considered. These elements are referred to as noise sensitive receptors.

The potential noise associated with proposed TMD activities include target and interceptor launches, sonic booms from reentering target missiles, noise from construction, and noise from portable electric generators.

This analysis uses two descriptors for assessing the potential impacts due to probable noise events related to the proposed action. These two descriptors are Sound Level Weighted Population (LWP) and Noise Impact Index (NII) (National Academy of Sciences, National Research Council, 1977).

The LWP is derived from the annual average noise environment (yearly day-night noise level [YDNL]) experienced by the population within the ROI. The LWP is a single number that represents the noise impact on the population of a given area. In this case the given area is the 9 kilometers (5.6 miles) ROI around each launch site. This single number (LWP) represents the concept that a small number of people exposed to a loud noise environment is equivalent to a large number of people exposed to a quieter noise environment.

The reference point is a YDNL of 75 dBA. If 1,000 people within a given area were each exposed to a YDNL of 75 dBA, the LWP would be 1,000 (table 3.1.8-2). If this same 1000 people were each exposed to a YDNL of 60 dBA, the LWP would decrease to 235. If fewer people (for instance 500) were each exposed to the 75 dBA YDNL, the resulting LWP would be 500.

Table 3.1.8-2: Noise Impact Indices Corresponding to Various Average Noise Environments

Average Noise Environment	Noise Impact Index (NII)
YDNL = 90 dBA	2.647
YDNL = 85 dBA	1.966
YDNL = 80 dBA	1.428
YDNL = 75 dBA	1.000
YDNL = 70 dBA	0.664
YDNL = 65 dBA	0.412
YDNL = 60 dBA	0.235
YDNL = 55 dBA	0.124
YDNL = 50 dBA	0.061
YDNL = 45 dBA	0.029
YDNL = 40 dBA	0.013
YDNL = 35 dBA	0.006

Note: Population = 1,000 people.
Source: National Academy of Sciences, National Research Council, 1977.

The LWP allows for the description of the ROI in terms of its noise environment with a single number (LWP) that is derived from the number of people in that area and the average annual noise levels in that area. Changes in the noise environment of that area can be portrayed, and the relative noise environments of various areas can be compared using the LWP.

Background YDNL values used in the baseline LWP calculations were determined for each census tract within the ROI based on population density. In order to keep the analysis as simple and conservative as possible, no additional noise sources are included in the determination of the YDNLs for the census tracts. Inclusion of additional sources, such as traffic on major highways and aircraft, would increase the background YDNL. See appendix M for details of the noise environment calculations and traffic noise exclusion.

YDNL values for the proposed action were calculated for each census tract using the baseline population as above with the noise due to the launch of 24 Hera target missiles (12 at the Keys sites) added. These "new" YDNL values were then used to calculate the LWP that would be expected to occur if the proposed action were implemented.

The NII is determined by dividing the LWP by the total population in the ROI. This gives the "average" noise impact that an individual within the ROI can be expected to experience.

These two values are used to represent different aspects of the potential predicted noise impacts. The LWP is used to show overall potential impacts of the proposed action on an area around the launch sites. The NII is used to show potential impact to individuals within the ROI at each of the launch sites.

3.1.8.2 Region of Influence

The *Guidelines for Preparing Environmental Impact Statements on Noise* (National Academy of Sciences, National Research Council, 1977) recommends that a base YDNL be established for each EIS. Residential areas that are predicted to be exposed to increased values of YDNL are to be included in the ROI (National Academy of Sciences, National Research Council, 1977).

The USEPA has established an outdoor Sound Pressure Level (SPL) of Day-Night Average Noise Level (L_{dn}) = 55 dBA as sufficient to protect the public health and welfare (U.S. Environmental Protection Agency, 1974). It is recommended that the base YDNL not be set at a value higher than 55 dBA (National Academy of Sciences, National Research Council, 1977).

The ROI for launch noise is a circle with a radius of 9 kilometers (5.6 miles) around each of the proposed launch sites. The maximum launch rate (24 missiles per year) of the largest missile (the Hera), all launched during the penalty period (within the hours of 10:00 p.m. and 7:00 a.m.), would cause a YDNL of 55 dBA at no more than 9 kilometers. All other missiles are smaller than the Hera and are estimated to generate less noise. Therefore, the 9 kilometers (5.6 miles) launch noise ROI is sufficient to analyze the launch of all proposed missiles.

This analysis assumed calm weather conditions. Weather conditions, such as wind and inversions, can cause noise levels to extend beyond the distances calculated for calm conditions. However, the weather conditions that would be acceptable for a Hera launch would not vary much from calm conditions. Therefore, the calculated ROI should be sufficient for all launches.

The ROI for noise generated by construction and by portable diesel-fueled power generators is that area which could be exposed to eight-hour time-weighted average SPLs equal to or greater than 85 dBA. Under OSHA regulations (29 CFR 1910.95), which are designed to assure safe and healthy working conditions, workers exposed to eight-hour time-weighted average SPLs of 85 dBA and 90 dBA are required to be monitored and to be provided with hearing protection, respectively. While this standard is for workers, it is used as a reasonable guidance in assessing the potential impact to people in general. Details of the noise calculations are given in appendix M (Noise).

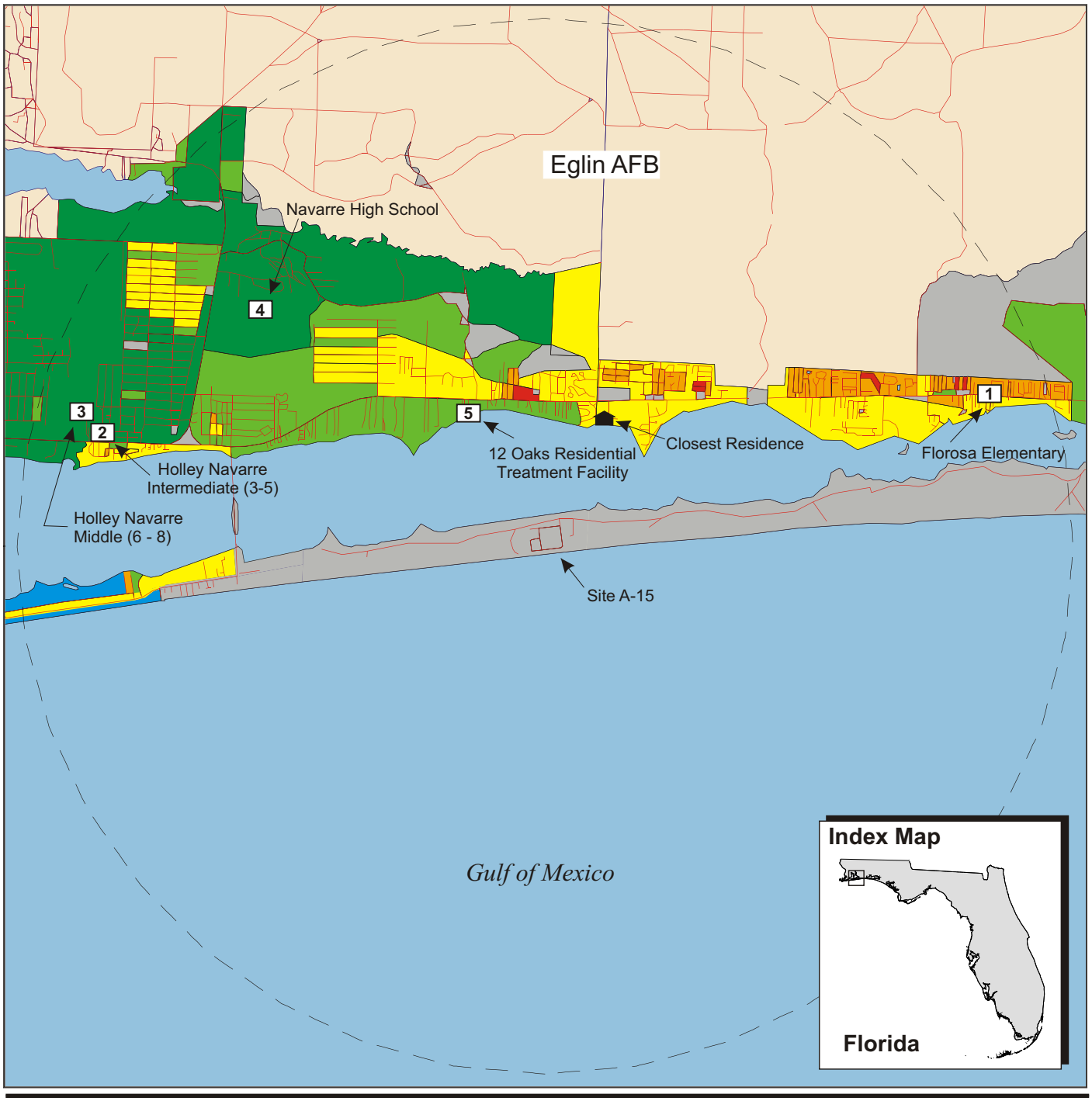
3.1.8.3 Affected Environment

3.1.8.3.1 Santa Rosa Island

The existing noise environment at Site A-15 is affected by a wide range of activities including:

- Military and civilian (both commercial and private) aircraft departures and arrivals from various airfields
- Military aircraft on various training routes
- Military aircraft in military operating areas
- Military aircraft in supersonic operating areas
- Rocket and missile launches
- Munitions testing and firing ranges
- Traffic on local roads and highways
- Civilian (both commercial and private) motor boats

The acoustical environment at the proposed Santa Rosa Island launch site, as calculated by the methodology of *Guidelines for Preparing Environmental Impact Statements on Noise* (National Academy of Sciences, National Research Council, 1977), is characterized by an LWP of 1,330 and an NII of 0.109. Details of the land area and population (1990 census) within each 5 dBA YDNL increment are given in table 3.1.8-3. These background noise levels of the noise ROI for the proposed Site A-15 launch site are depicted in figure 3.1.8-1.



EXPLANATION

- Roads
- Noise Sensitive Receptor
- Noise ROI
- Closest Residence

L_{dny} for Event in dBA

Excluded from Analysis*	40-45
<25	45-50
25-30	50-55
30-35	55-60
35-40	60-65

Note: Sound Level Weighted Population = 1330
Noise Impact Index = 0.109
* Eglin AFB census tracts were excluded from the analysis

Scale 1:100,000
0 1 2 Miles
0 1.5 3 Kilometers
NORTH

Site A-15 Background Yearly Average Day-Night Sound Level (dBA)

Santa Rosa Island, Florida

Figure 3.1.8-1

Table 3.1.8-3: Background Noise Environment for Site A-15

YDNL (dBA)	Total Land Area (Square miles)	Population	Noise Sensitive Receptors+	Percent Highly Annoyed*	Number Highly Annoyed
< 25	11.38	0	-	0.05	0
25-30	-	-	-	-	-
30-35	-	-	-	-	-
35-40	1.57	65	-	0.41	0
40-45	9.77	1,562	2, 3, 4	0.83	13
45-50	7.66	2,315	5	1.66	38
50-55	4.23	4,529	-	3.31	150
55-60	0.84	3,160	1	6.48	205
60-65	0.08	625	-	12.29	77
TOTAL	-	12,256	-	3.94	483

*Reference: Finegold, Harris, and VonGierke, 1992.
+ Noise sensitive receptors from table **3**.1.8-4.
Level Weighted Population =1330
Noise Impact Index = 0.109 (appendix M)

Table 3.1.8-3 also indicates the number and percent of persons highly annoyed by the current noise environment, as calculated by the method of Finegold et al. (1992). Of the approximately 12,000 population in the Site A-15 ROI, nearly 4 percent are estimated to be highly annoyed by existing background noise.

The noise sensitive receptors identified within the Site A-15 launch noise ROI are given in table 3.1.8-4. For each of the receptors, the table shows the estimated baseline annual noise, the equivalent noise level if a Hera missile were launched from the proposed launch site, and the projected background annual noise level for 24 Hera launches per year. No noise ordinances for Santa Rosa Island have been identified (Wibberg, 1997).

Table 3.1.8-4: Noise Sensitive Receptors within the Noise ROI for Santa Rosa Island

Receptor Number	Site	Population	Distance From Site	YDNL Baseline (dBA)	YDNL Proposed Action (dBA)	Launch Event Noise Level (dBA)*
1	Florosa Elementary School	600 students	8.0 kilometers (5.0 miles)	55 to 60	55 to 60	68
2	Holley-Navarre Intermediate School	1,040 students	7.9 kilometers (4.9 miles)	40 to 45	45 to 50	75
3	Holley-Navarre Middle School	930 students	8.2 kilometers (5.1 miles)	40 to 45	45 to 50	68
4	Navarre High School	590 students	6.5 kilometers (4.0 miles)	40 to 45	45 to 50	75
5	Twelve Oaks Residential Care Facility	60 beds	2.8 kilometers (1.7 miles)	45 to 50	45 to 50	80

* Equivalent sound level that would last for approximately 1 minute.

3.1.8.3.2 Cape San Blas

The existing noise environment at the proposed Cape San Blas launch site includes:

- Traffic on local roads and highways
- Occasional rocket and missile launches
- Military aircraft

The number and percent of persons highly annoyed by the noise environment, as calculated by the method of Finegold, Harris, and VonGierke (1992), are also given in table 3.1.8-5. No noise ordinances for Cape San Blas have been identified (Wibberg, 1997). Of the approximately 260 population in the Site D-3A ROI, less than 1 percent are estimated to be highly annoyed by existing background noise.

Table 3.1.8-5: Background Noise Environment for Site D-3A

YDNL (dBA)	Total Land Area (square miles)	Population	Noise Sensitive Receptors	Percent Highly Annoyed*	Number Highly Annoyed
< 25	7.24	3	-	0.05	0
25-30	2.07	9	-	0.10	0
30-35	2.53	23	-	0.20	0
35-40	6.95	171	+	0.41	1
40-45	0.17	21	-	0.83	0
45-50	0.13	35	-	1.66	1
TOTAL	-	262	-	0.76	2

*Reference: Finegold, Harris, and VonGierke, 1992.
+ William J. Rish Recreational Park

Level Weighted Population = 4
Noise Impact Index = 0.014

The acoustical environment at the proposed Site D-3A launch site, as calculated by the methodology of *Guidelines for Preparing Environmental Impact Statements on Noise* (National Academy of Sciences, National Research Council, 1977), is characterized by an LWP of 4 and an NII of 0.014. Details of the land area and population within each 5 dBA YDNL increment are given in table 3.1.8-5. This illustrates that of the 262 people within 9 kilometers (5.6 miles) of Site D-3A at Cape San Blas, 2 people are highly annoyed with the ambient noise environment. The background noise levels of the noise ROI for the proposed Site D-3A launch site are depicted in figure 3.1.8-2.

The only noise sensitive receptor identified within the Site D-3A launch noise ROI is the William J. Rish Recreational Park. The park has 113 beds and is located 8.9 kilometers (5.6 miles) from the proposed launch site. The baseline annual noise (YDNL) at the park is estimated to be in the range of 35 to 40 dBA. If a Hera missile were launched from the proposed launch site, the park would be expected to experience an equivalent noise level of approximately 68 dBA for 43 seconds. For 24 launches per year, the background annual noise level at the park would be raised to a YDNL in the range of 50 to 55 dBA.

EXPLANATION

- Roads
- Noise Sensitive Receptor
- Noise ROI
- Closest Residence

L_{dny} for Event in dBA

Excluded from Analysis	40-45
<25	45-50
25-30	50-55
30-35	55-60
35-40	60-65

Note: Sound Level Weighted Population = 4
Noise Impact Index = 0.0140

Scale 1:100,000
0 1 2 Miles
0 1.5 3 Kilometers
NORTH

Site D-3A Background Yearly Average Day-Night Sound Level (dBA)

Cape San Blas, Florida

Figure 3.1.8-2

Csb-100k-3noise002

3.1.8.4 Environmental Impacts and Mitigations

TMD activities that have the potential to affect the noise environment include launch noise from the launches of target and interceptor missiles, detonation of the Hera second stage during a mishap, sonic boom from a reentering target missile, noise from construction, and noise from portable electric generators.

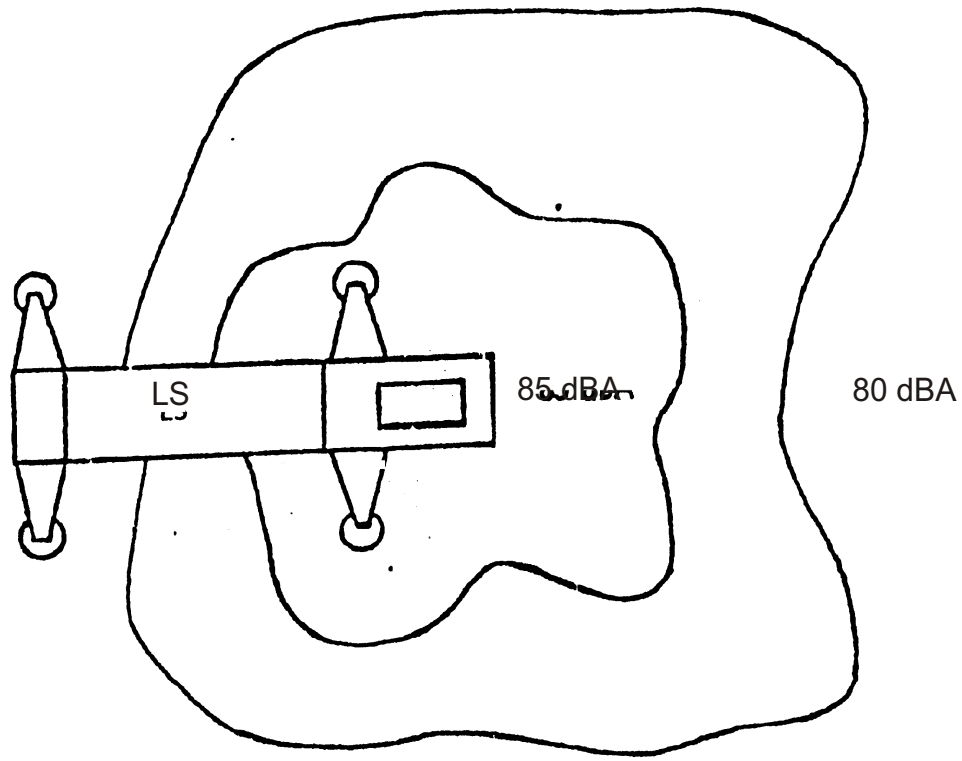
Potential noise-related impacts to flora and fauna are addressed in sections 3.1.3, 3.2.3, and 3.3.3 (Biological Resources). Potential impacts to historic structures from noise are addressed in sections 3.1.4 and 3.3.4 (Cultural Resources). Potential impacts to land use from noise are addressed in sections 3.1.7 and 3.3.7 (Land Use). Potential impacts to program personnel from noise are addressed in section 3.1.9 (Safety).

Portable electric generators would be preset at each launch and instrumentation site. For noise analysis purposes, the PATRIOT generator was used to represent the generators that would be located at each of these sites. Figures 3.1.8-3 and 3.1.8-4 show the noise contours of the launcher and the control sections, respectively.

OSHA regulations (29 CFR Section 1910.95) limit the exposure of workers to no more than 15 minutes per day of sound levels of 115 dBA. As members of the public would be excluded from the LHA during a launch, no member of the public will be closer than 1.5 kilometers (0.9 mile) to the launch site during a launch. The data in table 3.1.8-6 indicates that, barring the effects of meteorology on the transmission of noise, a peak sound pressure level of approximately 104 dBA would be expected to occur at a distance of 1.5 kilometers (0.9 mile) from the launch site. This sound pressure level would be expected to occur for only a fraction of a second. Using the information in table 3.1.8-6, an equivalent sound pressure level of approximately 94 dBA would be expected to occur for less than a minute at 1.5 kilometers (0.9 mile) from the launch site. Both predicted sound pressure levels are less than the OSHA limit of 115 dBA for 15 minutes.

Table 3.1.8-6: Monitored Noise Data from October 1996 Launch of a Hera Missile

Distance from launch site	0.5 kilometer (0.3 mile)	1.0 kilometer (0.6 mile)	2.0 kilometers (1.2 miles)	4.0 kilometers (2.5 miles)	8.0 kilometers (5.0 miles)
Peak (dBA)	112.4	107.1	97.8	91.5	76.7
Leq (dBA)	85.6 for 41.25 seconds	86.3 for 44.25 seconds	79.7 for 49.25 seconds	74.6 for 55 seconds	68.0 for 43.25 seconds
Sound Exposure Level (dBA) [outdoor]	102	103	97	92	84
Peak (dBC)	127.0	118.5	111.5	101.9	92.9
Leq (dBC)	105.5 for 41.25 seconds	99.1 for 44.25 seconds	93.7 for 49.25 seconds	89.3 for 55 seconds	85.0 for 43.25 seconds
Peak (dB)	124	121	115.2	103.6	93
Leq(dB)	102.0 for 41.25 seconds	100.0 for 44.25 seconds	95.5 for 49.25 seconds	90.4 for 55 seconds	85.2 for 43.25 seconds



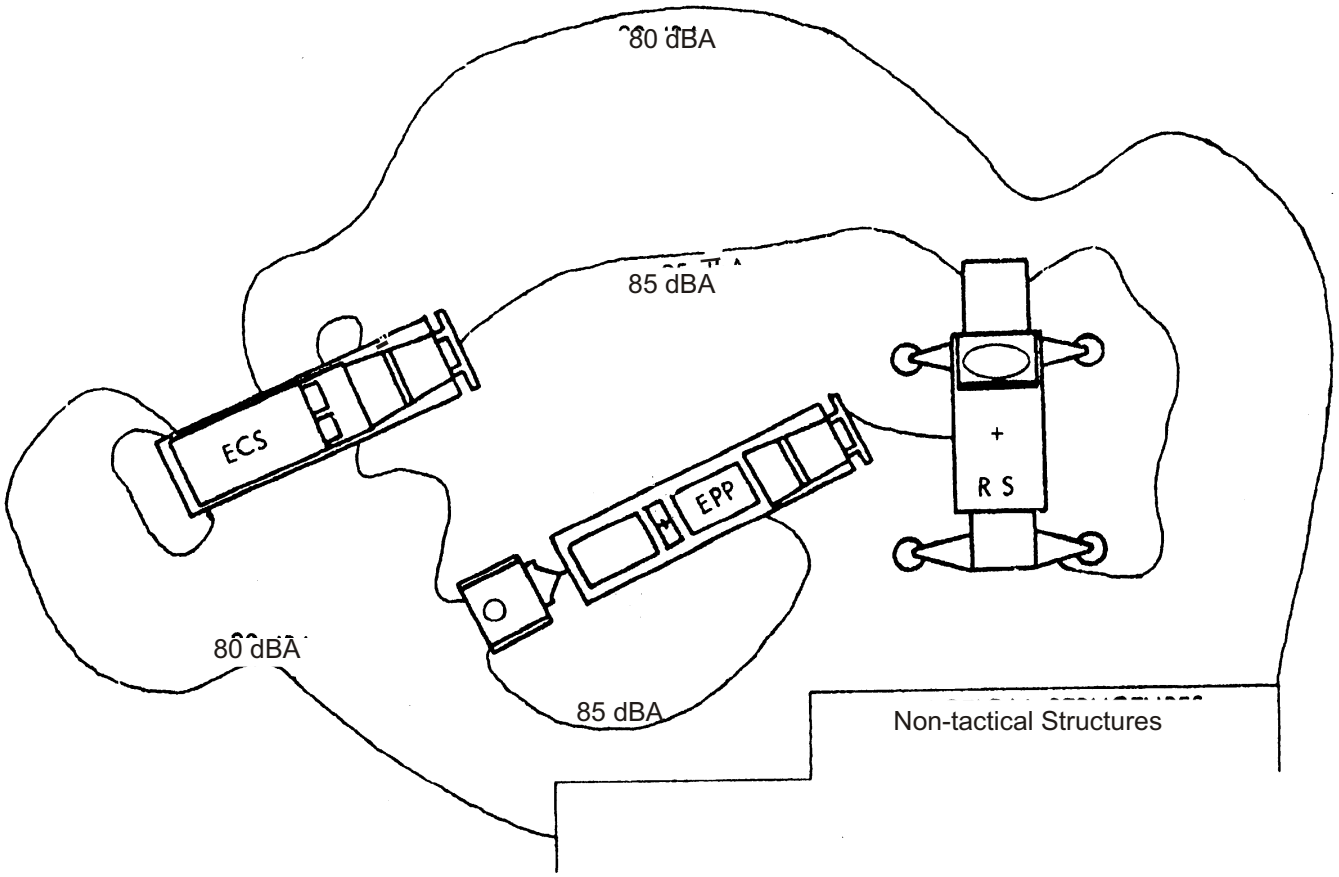
Source: U.S. Department of the Army, 1979.

EXPLANATION
LS = Launching Station

PATRIOT Launcher Generator

Scale
0 5.5 11 Feet
0 1.7 3.3 Meters

Figure 3.1.8-3



Center to Center Distances:

ECS	-	RS	20 Meters
ECS	-	EPP	11 Meters
EPP	-	RS	10 Meters

Source: U.S. Department of the Army, 1979.

EXPLANATION

ECS = Engagement Control Station
EPP = Electric Power Plant
RS = Radar Set

PATRIOT Fire Control System

Scale
0 9.2 18.4 Feet
0 2.8 5.6 Meters

Figure 3.1.8-4

The most commonly accepted relationship between noise and sleep disturbance is shown in figure 3.1.8-5. This gives the relationship between the indoor Sound Exposure Level and the percent of sleeping people awakening. This prediction curve is based on statistical adjustment of the most recent laboratory sleep disturbance studies conducted by Pearsons et al., 1989.

This prediction curve is based on statistical adjustment of the most recent laboratory sleep disturbance studies conducted by Pearsons et al., 1989.

The Hera launch data available was for outside noise. In order to determine the number of people that would be disturbed by this launch noise, the noise level was reduced for indoor conditions. For buildings with normal construction, a 20 dB noise level reduction between from outside to inside sound levels is the standard assumption, with a 15 dB reduction for open windows and a 25 dB reduction for closed windows (U.S. Environmental Protection Agency, 1974).

For the number awakened analysis associated with the proposed Hera launches, a noise level reduction of 20 dB was used. Therefore, more people could be awakened than was calculated if windows were opened during launch activities. However, a recent review (Pearsons, Barber, and Tabachnik, 1989) of the literature for sleep disturbance demonstrated that the relationship, based exclusively on laboratory studies, predicts greater sleep disturbance than that likely to occur in a home setting. Therefore, the number used for the number awakened due to a Hera launch is a conservative estimate (table 3.1.8-7).

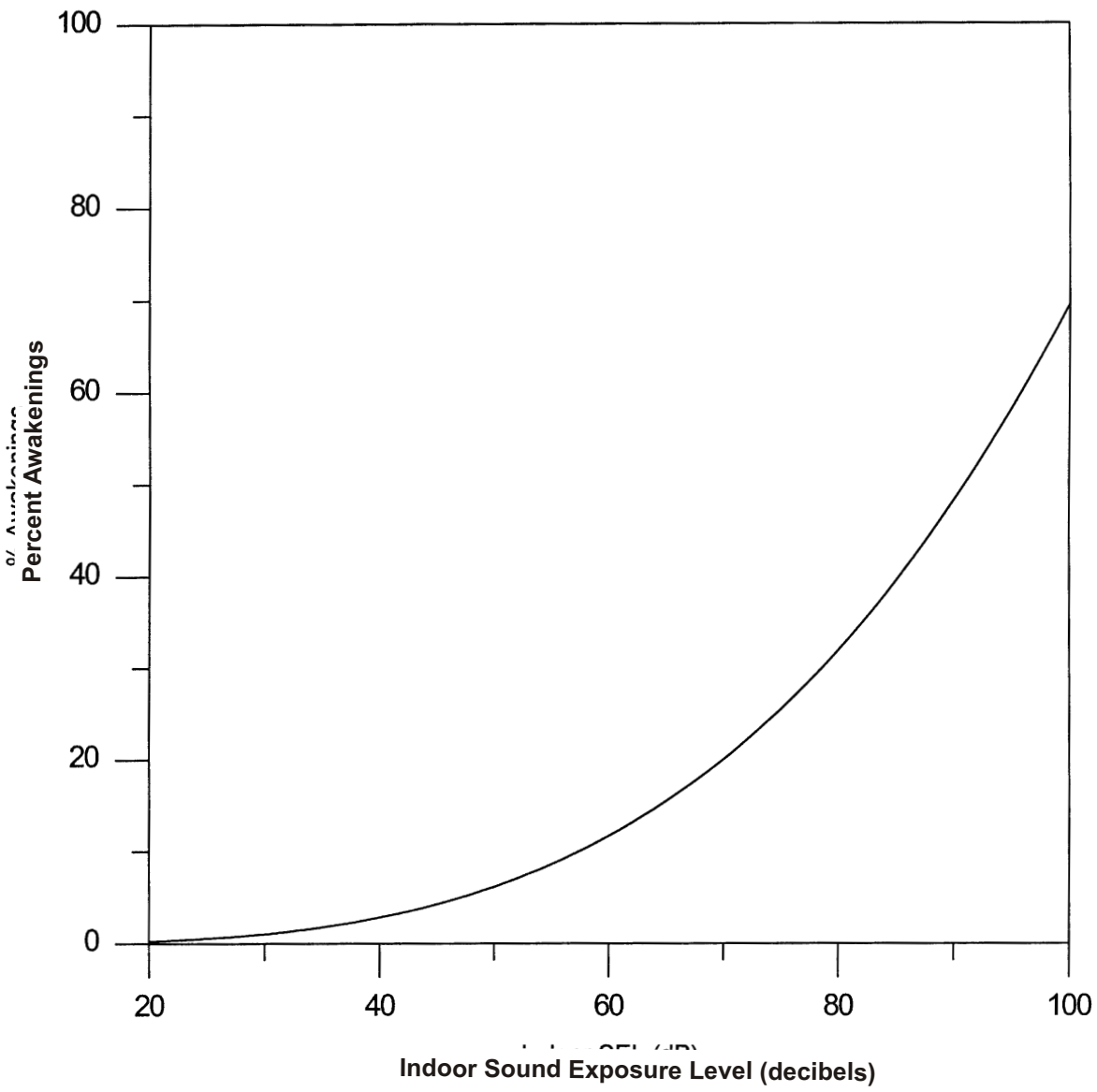
Table 3.1.8-7: Sleep Disturbance for Hera Launches

Launch Sites	Total Population	Number Awakening	Percent Awakening
Site A-15	12,256	3,276	27
Site D-3A	262	50	19

The general range of human hearing is usually defined as being between 20 and 20,000 Hz. Sound having dominant frequency components below 20 Hz cannot be heard but can be felt as vibrations. A significant amount of the sound from a Hera launch is associated with low frequencies. Therefore, a potential for felt vibrations, and rattling of windows and bric-a-brac exists.

3.1.8.4.1 Santa Rosa Island

The construction-related noise at Santa Rosa Island would be temporary in nature and would present typical occupation-related noise exposure for the construction workers. Flight test activities would increase the percentage of the population within the ROI that are highly annoyed from the current 3 to 4 percent. There would be no health-related sound exposures beyond the LHA.



Source: Finegold, Harris, and Van Gierke, 1992.

Relationship Between Sound Exposure Level and Percent People Awakening

Figure 3.1.8-5

No-action Alternative

Under the no-action alternative, the proposed ground-based TMD activities on Santa Rosa Island would not be implemented. Continuing Eglin AFB use of Site A-15 at current or planned levels would generate minimal noise from road traffic. Selection of this alternative would not change the noise environment which is displayed in table 3.1.8-3.

Site Preparation Activities

Interceptor

Portable electric generators would be present at each launch and instrumentation site. For noise analysis purposes, the PATRIOT generator was used to represent the generators that would be located at each of these sites. Figures 3.1.8-3 and 3.1.8-4 show the noise contours of the launcher and the control sections respectively.

Target

Site preparation activities would involve routine construction activities. These operations are routinely accomplished in both military and civilian construction operations, and present only occupation-related effects on noise exposure for the workers involved in the performance of construction activities only. Such noise would occur only for the duration of the construction activities, and is a routine part of normal construction activities. The proposed work locations on Santa Rosa Island do not present any unique construction-related noise exposure to personnel.

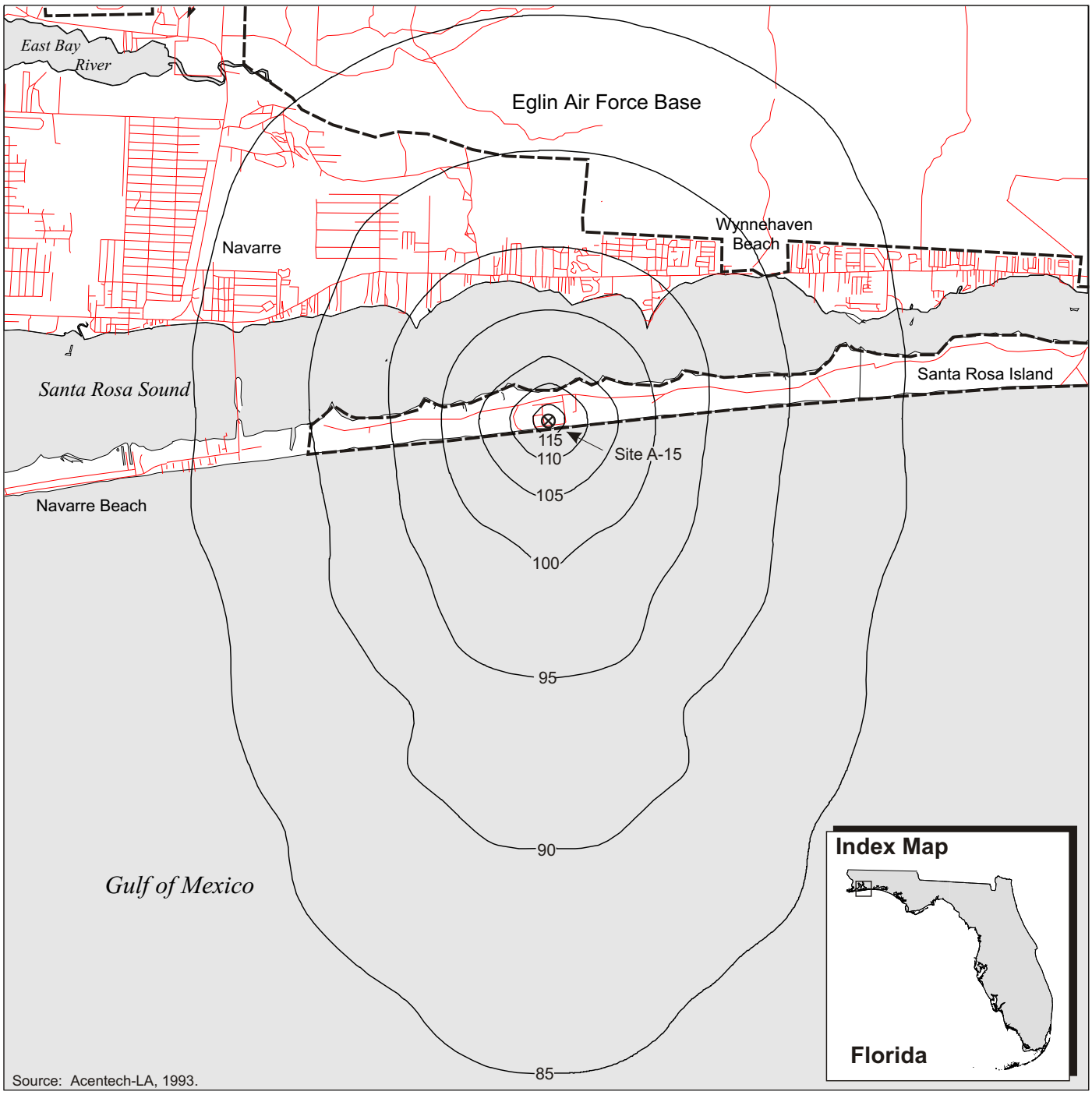
Flight Test Activities

Interceptor

Interceptor noise analysis was conducted for the TMD EIS. The results of that analysis state that peak noise level for TMD defensive missile launches is greater than 115 dB (A-weighted) within approximately 100 meters (328 feet) of the launch site (see figure 3.1.8-6). Exposure to 115 dB for the time involved in a missile launch is less than 0.4 percent of the daily exposure permitted by OSHA (U.S. Department of Labor, 1981). However, all personnel will be excluded from the launch area and thus would be protected from noise effects (U.S. Army Strategic Defense Command, 1994).

Interceptor missile launch peak noise levels would be approximately 115 dBA at 100 meters (328 feet) from the launch site (see figure 3.1.8-6). This noise is composed of a number of frequencies, known as incoherent sound. The physics of incoherent sound transmission through the air-water interface are not well understood; it is not, however, believed to be an efficient translation; therefore, a small proportion of the energy would translate into the water column.

The Safety section programmatically addresses all test activities including both target and interceptor launches.



EXPLANATION

- Roads
- Proposed Launch Site
- Peak Noise Levels (Contours in dBC)

Scale 1:100,000

0 1 2 Miles

0 1.5 3 Kilometers

C-Weighted Peak Noise Levels for a Single Launch of a Defensive Missile

Santa Rosa Island, Florida

Figure 3.1.8-6

sri-100k-3noise005

Target

In order to estimate the maximum possible impact, a maximum launch scenario of 24 Hera launches per year, all occurring during the penalty period (between 10:00 p.m. and 7:00 a.m.), was used for the analysis. Figure 3.1.8-7 shows the sound levels for the proposed action. Details of the results of the proposed 24 Hera missile launches per year are given in table 3.1.8-8.

Table 3.1.8-8: Noise Environment for Site A-15 for Proposed Hera Launches

YDNL (dBA)	Total Land Area (Square miles)	Population	Noise Sensitive Receptors[+]	Percent Highly Annoyed[*]	Number Highly Annoyed
30-35	0.02	0	-	0.20	0
35-40	-	-	-	0.41	-
40-45	8.69	244	-	0.83	2
45-50	15.87	3,485	2, 3, 4, 5	1.67	58
50-55	10.09	4,719	-	3.31	156
55-60	0.85	3,183	1	6.48	206
60-65	0.08	625	-	12.29	77
TOTAL	-	12,256	-	4.07	499

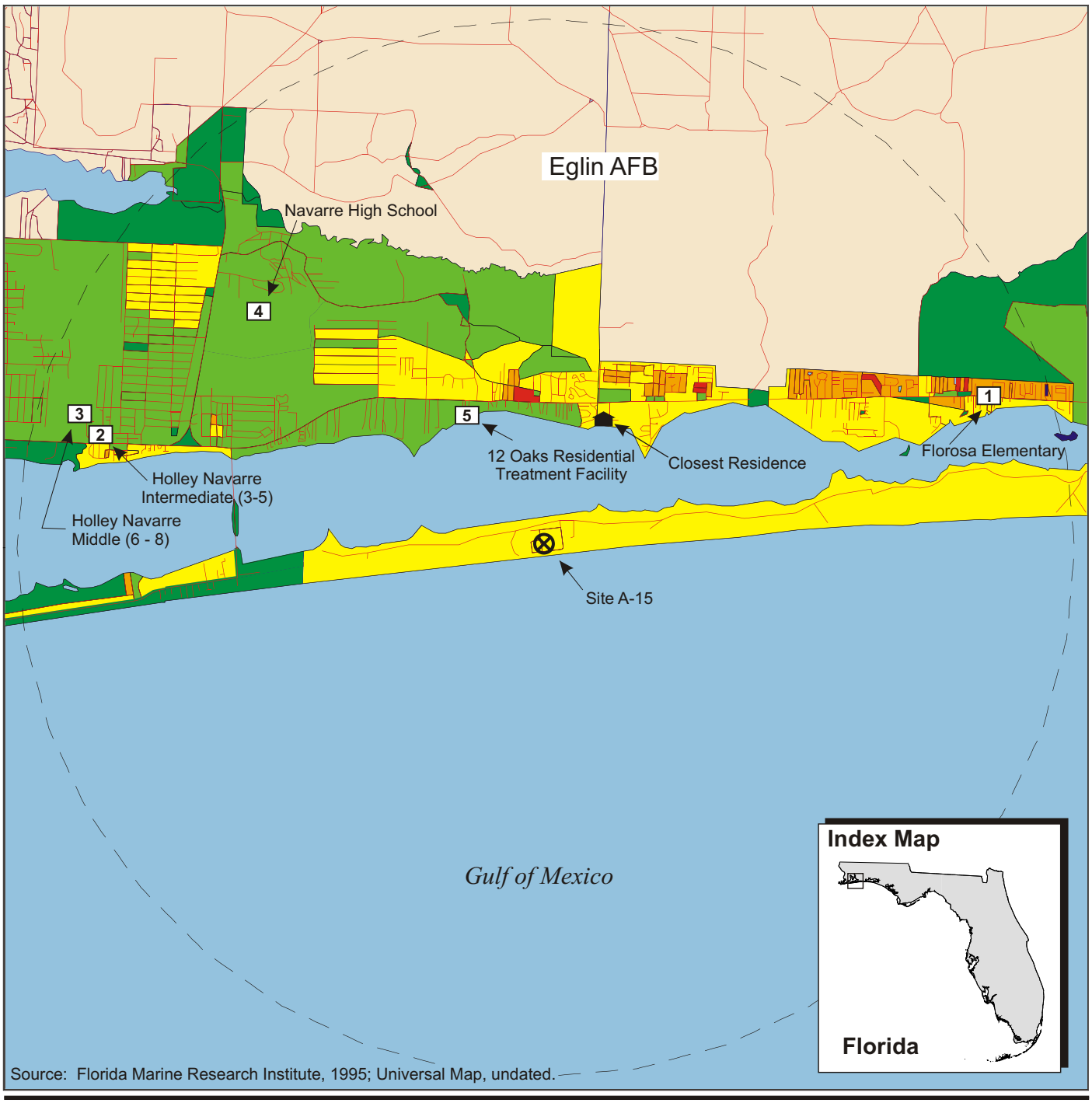
*Reference: Finegold, Harris, and VonGierke, 1992.
[+]Noise receptor numbers from table 3.1.8-4
Level Weighted Population (LWP) = 1376
Noise Impact Index = 0.112

Using this information, and the monitored Hera launch noise levels in table 3.1.8-6, a maximum number and percent of people awakened by the launch of a Hera missile was calculated. This calculation used the 1990 block census data and assumes all people in the launch noise ROI are asleep at the time of the launch. These results are summarized in table 3.1.8-7.

OSHA limits exposure to noise of 115 dBA to 15 minutes per day. Levels of 112 dBA for a duration of less than one minute are expected to occur at a distance of 0.5 kilometers (0.3 miles) from the launch site. Therefore, no potential short-term hearing loss exists at 0.5 kilometer (0.3 mile) or greater from the launch site.

The instrumentation sites associated with Santa Rosa Island include Sites A-10, A-13, A-18, A-20, and Eglin AFB (figure 2.2.1-1). The noise levels created at these sites by generators are not expected to exceed 85 dBA at a distance of 9.8 meters (32 feet). A launcher generator would be located at Site A-15 (figure 2.2.1-3) with noise levels no greater than 85 dBA at 6.1 meters (20 feet).

Using the methodology recommended in *Guidelines for Preparing Environmental Impact Statements on Noise* (National Academy of Sciences, National Research Council, 1977), one of the ways the potential impact to the acoustical environment at each site has been described is by the calculation of an LWP and an NII (see appendix M). The current and expected LWP and NII for each of the proposed launch sites with Site A-15 highlighted, are given in table 3.1.8-9.



EXPLANATION

- Roads
- Noise Sensitive Receptor
- Noise ROI
- Site A-15
- Closest Residence

L_{dny} for Event in dBA

Excluded from Analysis*	40-45
<25	45-50
25-30	50-55
30-35	55-60
35-40	60-65

Note: Sound Level Weighted Population = 1376
Noise Impact Index = 0.112
* Eglin AFB census tracts were excluded from the analysis

NORTH

Scale 1:100,000
0 1 2 Miles
0 1.5 3 Kilometers

Site A-15 - 24 Hera Launches Per Year Between 10 PM and 7 AM, Yearly Average Day-Night Sound Level (dBA)

Santa Rosa Island, Florida

Figure 3.1.8-7

sri-100k-4noise005

Annoyance is currently the best available measure of a community's response to long-term noise exposure. Consequently, the percent of people highly annoyed (%HA) is one of the measures used to characterize both the baseline and predicted noise environment.

Table 3.1.8-9: Summary of Sound Level Weighted Population and Noise Impact Index Results

			Site A-15	Site D-3A
Total Population in ROI			12,256	262
Sound Level Weighted Population (LWP)	Baseline	Value	1,330	4
	Launch	Value	1,376	19
Noise Impact Index (NII)	Baseline	Value	0.109	0.0140
	Launch	Value	0.112	0.0724
Percent Highly Annoyed (%HA)	Baseline	Value	4	1
	Launch	Value	4	3

In addition to the LWP, NII, and %HA, the impact of launch noise has also been assessed in terms of sleep interference. Considerably less conclusive research has been done to determine the effects of noise on sleep interference than on the other common noise concerns: annoyance, speech interference, and hearing loss (Cowan, 1994).

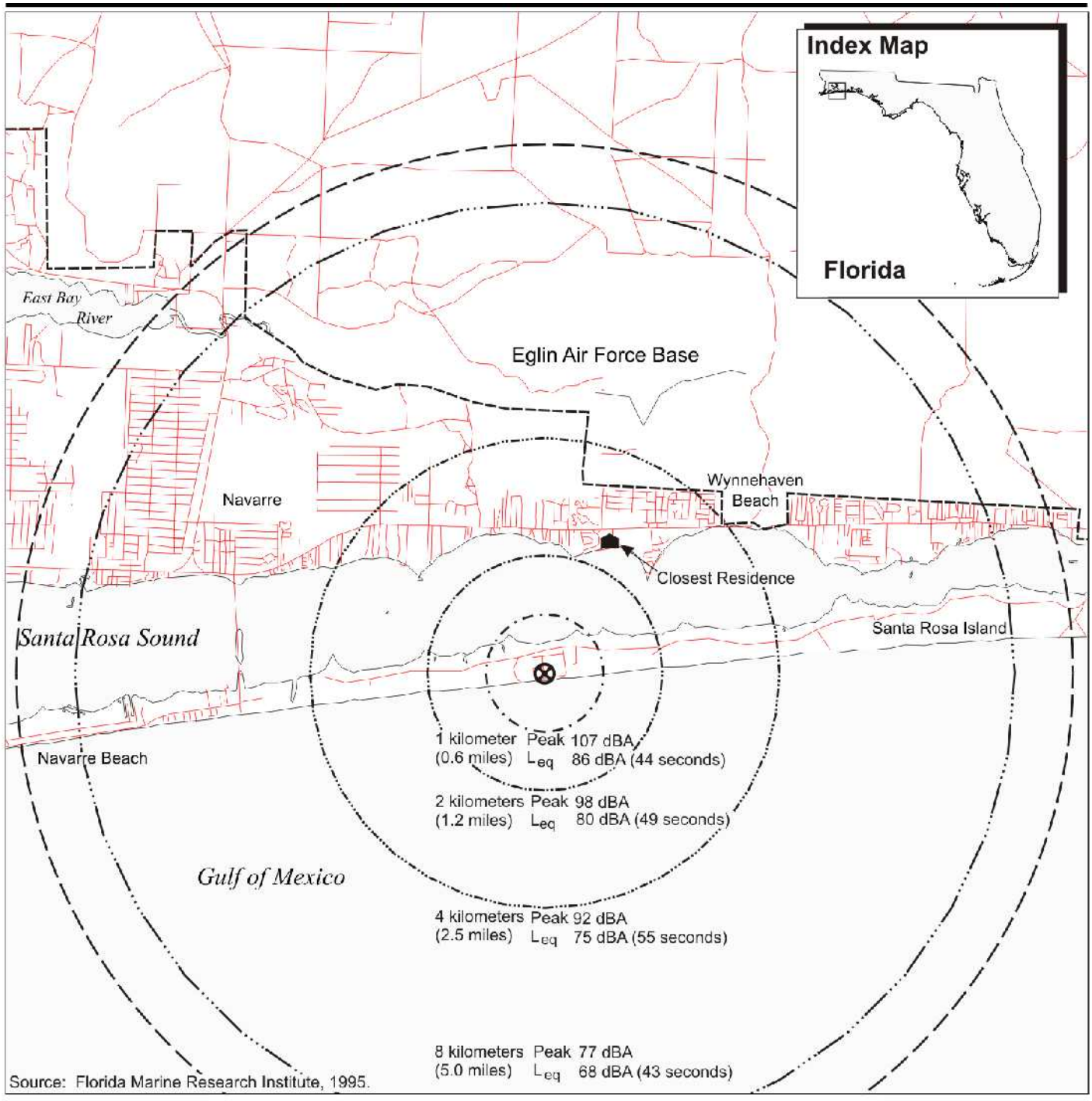
The sound levels that would occur if launches were conducted at Site A-15 have been estimated. For the purpose of analysis, the maximum of 24 Hera launches per year, all of which are assumed to occur during the penalty period (between 10:00 p.m. and 7:00 a.m.), were used to calculate the sound levels that would occur.

According to guidelines provided by the Federal Interagency Committee on Urban Noise, it is assumed that noise levels of 65 dBA would not affect a healthy population. However, noise levels of 55 dBA may affect special populations that are considered noise sensitive receptors.

Table 3.1.8-10 displays the most conservative assessment of the number of people that may be exposed to each increment of YNDL for the existing conditions, and the number of people exposed to the same increment for 24 launches of Hera during the 10:00 p.m. to 7:00 a.m. penalty period.

No individuals would be exposed to a YNDL of 65 to 70 dBA as a result of the flight test activities of the proposed action.

Figure 3.1.8-8 shows the potential peak and equivalent noise levels, based on table 3.1.8-6, that could occur for a single Hera launch at Site A-15.



EXPLANATION

- Roads
- Eglin Air Force Base Boundary
- Closest Residence
- 1 kilometer (0.6 miles)
- 2 kilometers (1.2 miles)
- 4 kilometers (2.5 miles)
- 8 kilometers (5.0 miles)
- 9 kilometers (5.6 miles)

Scale 1:100,000

0 1 2 Miles

0 1.5 3 Kilometers

NORTH

Peak and Equivalent Noise Levels From Single Hera Launch

Santa Rosa Island, Florida

Figure 3.1.8-8

Table 3.1.8-10: Santa Rosa Island Population of Noise Environment

YNDLs	Existing Conditions	Flight Test Activities
< 25 dBA	0	0
25 – 30 dBA	0	0
30 – 35 dBA	0	0
35 – 40 dBA	65	0
40 – 45 dBA	1,562	244
45 – 50 dBA	2,315	3,485
50 – 55 dBA	4,529	4,719
55 – 60 dBA	3,160	3,183
60 – 65 dBA	625	625
65 – 70 dBA	0	0
Total Population	12,256	12,256

Note: Noise Environment (YNDLs) calculated for 24 Nighttime Hera Launches.

For a loud noise that occurs over a short time interval, such as the noise from a rocket launch, the difference between the peak noise level of the event and the background noise level gives a qualitative indication of the obtrusiveness of the noise. For distances that correspond to locations outside the LHA, monitored peak noise levels from the launch of a Hera missile ranged from 98 dBA to 77 dBA (see table 3.1.8-6).

In the Santa Rosa Island area background noise levels range from 40 dBA to 65 dBA. Thus the launch of a Hera missile would cause peak noise levels that would be from 12 dBA to 58 dBA above background noise levels. This would be perceived as a noise that lasts for less than a minute and is twice to 64 times as loud as the background noise.

At Santa Rosa Island the nearest residence is approximately 2,000 meters (7,000 feet) from the proposed launch site. Therefore, during a launch a person standing outside at this residence would experience a peak noise level of approximately 94 dBA and an average noise level of approximately 80 dBA for about 50 seconds.

Cumulative Impacts

Many of the standard measures used to assess noise impacts (such as YDNL, LWP, NII, and %HA) are cumulative by their definition. These measures include both noise from the proposed activities and background noise.

Construction of TMD test facilities at Santa Rosa Island 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 noise levels to exceed health-based guidance levels. Other than vehicular traffic, no major sources of noise are known in this area.

The Air Force plan for the reconstitution of the instrumentation facilities on Santa Rosa Island may bring more military activity, but it would likely be concentrated at the three sites, leaving the remainder unaffected. Depending upon the site selected for the proposed tower and the timing of the construction, there could be two concurrent construction projects ongoing. These construction projects could cause noise levels on Santa Rosa Island greater than those of the TMD construction alone.

TMD flight testing may include up to 48 interceptor launches or 24 target missile launches per year. However, the total number would likely be much less, with only a fraction of them occurring at any one site. The Patriot missile is considered as representative of the noise generated by the other interceptors. The Hera is the target missile that is used for analysis because it generates the loudest noise of the potential target missiles. Because the noise levels for the Hera are both louder and of greater duration than those estimated for the Patriot, the greatest impact would occur if 24 Hera missiles were launched annually. As discussed above, the launch of 24 Hera missiles per year would not cause the annual average noise level to exceed the established guidelines for residential land use.

Mitigations Considered

Possible mitigations would include:

- Minimize nighttime construction activities.
- Notify noise sensitive receptors of scheduled launch events.
- Construct sound barriers surrounding the launch pad to reduce launch noise.

3.1.8.4.2 Cape San Blas

The construction-related noise at Cape San Blas would be temporary in nature and would only present typical occupation-related noise exposure for the construction workers. There would be no health-related sound exposures beyond the LHA. Flight test activities would increase the percentage of the population within the ROI that are highly annoyed from the current 1 to 3 percent.

No-action Alternative

Under the no-action alternative, the proposed ground-based TMD test activities on Cape San Blas would not be implemented. Current operations at Cape San Blas would continue at their current or planned levels. The principle source of noise at Cape San Blas is vehicular traffic to Site D-3 and along County Road 30E. Missiles have been launched from Site D-3A periodically. Military aircraft overfly the site periodically. Selection of this alternative would not change the noise environment which is displayed in table 3.1.8-5.

Site Preparation Activities

Interceptor

Portable electric generators would be present at each launch and instrumentation site. For noise analysis purposes, the PATRIOT generator was used to represent the generators that would be located at each of these sites. Figures 3.1.8-3 and 3.1.8-4 show the noise contours of the launcher and the control sections respectively.

Target

Installation activities for TMD support facilities would involve routine construction activities.

Flight Test Activities

Interceptor

Interceptor noise analysis was conducted for the TMD EIS. The results of that analysis state that peak noise level for TMD defensive missile launches is greater than 115 dB (A-weighted) within approximately 100 meters (328 feet) of the launch site (see figure 3.1.8-9). Exposure to 115 dB for the time included in a missile launch is less than 0.4 percent of the daily exposure permitted by OSHA (U.S. Department of Labor, 1981). However, all personnel will be excluded from the launch area and thus would be protected from noise effects (U.S. Army Strategic Defense Command, 1994).

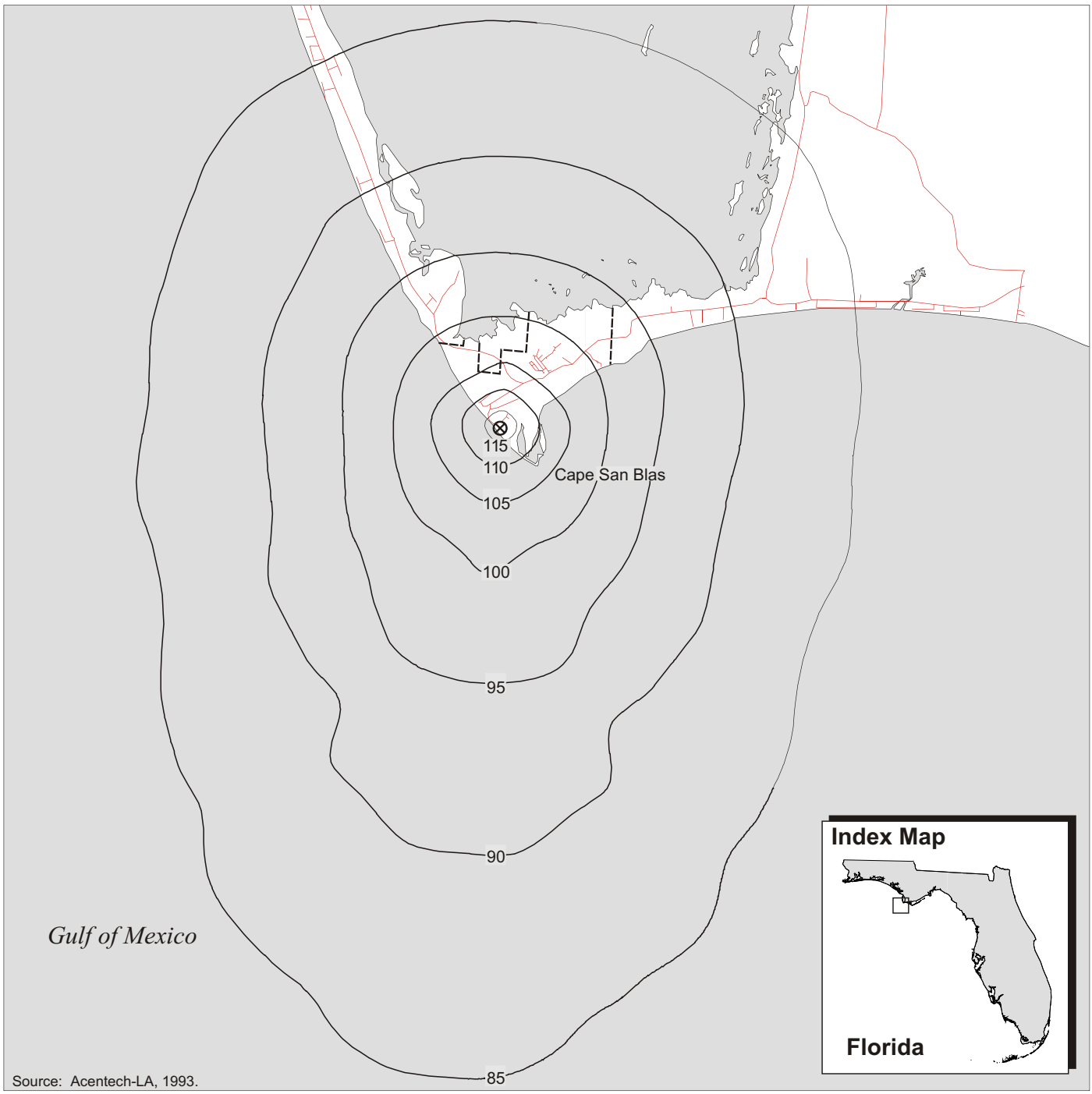
Interceptor missile launch peak noise levels would be approximately 115 dBA at 100 meters (328 feet) from the launch site (see figure 3.1.8-6). This noise is composed of a number of frequencies, known as incoherent sound. The physics of incoherent sound transmission through the air-water interface are not well understood; it is not, however, believed to be an efficient translation; therefore, a small proportion of the energy would translate into the water column.

Target

In order to estimate the maximum noise impact, a worst-case scenario of 24 Hera launches per year, all occurring during the DNL penalty period (between 10:00 p.m. and 7:00 a.m.) was used for the analysis. Figure 3.1.8-10 shows the estimated yearly average noise levels.

Figure 3.1.8-11 shows the potential peak and equivalent noise levels, based on table 3.1.8-6, that could occur for a single Hera launch at Site D-3A.

As discussed in section 3.1.8, levels of 112 dBA for a duration of less than 1 minute are expected to occur at a distance of 0.5 kilometers (0.3 miles) from the launch site. Therefore, no potential short-term hearing loss exists at 0.5 kilometers (0.3 miles) or greater from the launch site.



EXPLANATION

- Roads
- Proposed Launch Site
- Peak Noise Levels (Contours in dBC)

Scale 1:100,000

0 1 2 Miles

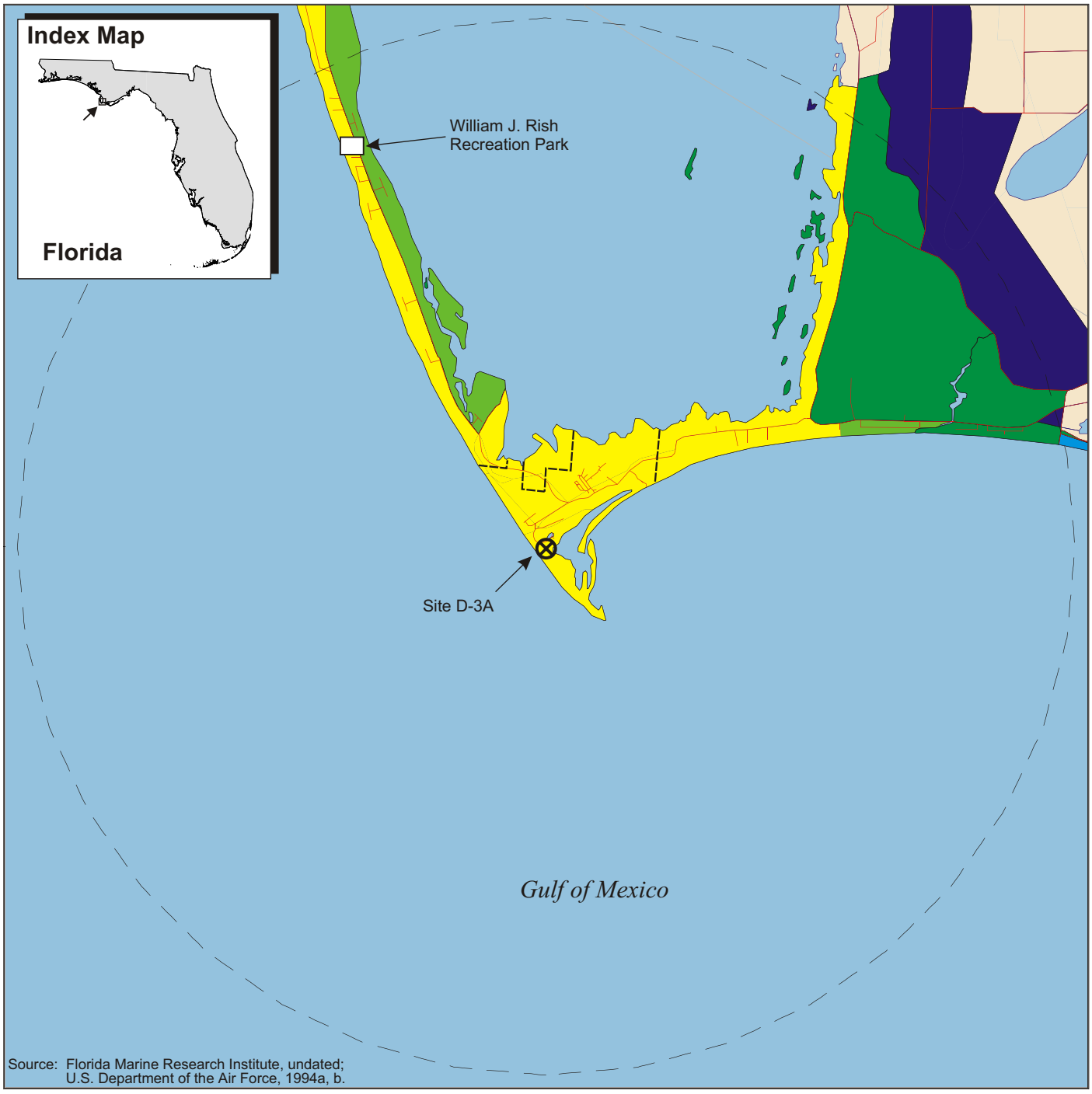
0 1.5 3 Kilometers

C-Weighted Peak Noise Levels for a Single Launch of a Defensive Missile

Cape San Blas, Florida

Figure 3.1.8-9

csb-100k-3noise003



EXPLANATION

- Roads
- Noise Sensitive Receptor
- Noise ROI
- Site D-3A

L_{dny} for Event in dBA

Excluded from Analysis	40-45
<25	45-50
25-30	50-55
30-35	55-60
35-40	60-65

Note: Sound Level Weighted Population = 19
Noise Impact Index = 0.072

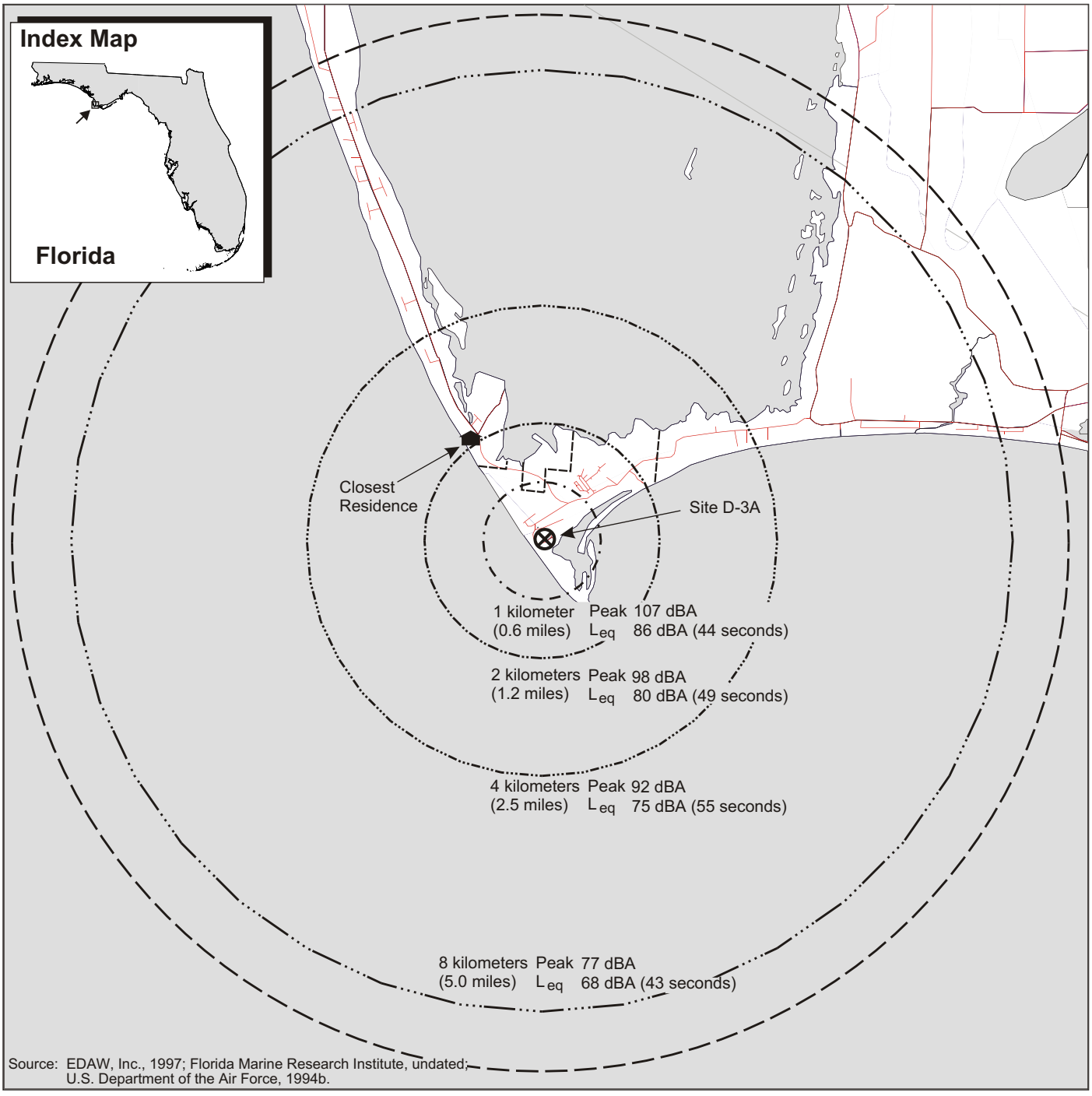
Scale 1:100,000
0 1 2 Miles
0 1.5 3 Kilometers
NORTH

Site D-3A - 24 Hera Launches Per Year Between 10 PM and 7 AM, Yearly Average Day-Night Sound Level (dBA)

Cape San Blas, Florida

Figure 3.1.8-10

Csb-100k-4noise005



Source: EDAW, Inc., 1997; Florida Marine Research Institute, undated; U.S. Department of the Air Force, 1994b.

EXPLANATION

- Roads
- Proposed Launch Site
- Closest Residence
- 1 kilometer (0.6 miles)
- 2 kilometers (1.2 miles)
- 4 kilometers (2.5 miles)
- 8 kilometers (5.0 miles)
- 9 kilometers (5.6 miles)

Scale 1:100,000

0 1 2 Miles

0 1.5 3 Kilometers

NORTH

Peak and Equivalent Noise Levels From Single Hera Launch

Cape San Blas, Florida

Figure 3.1.8-11

The instrumentation sites associated with Cape San Blas include Site D-3A and Eglin AFB (figure 2.2.1-2). The noise levels created at these sites by generators are not expected to exceed 85 dBA at a distance of 9.8 meters (32 feet). A launcher generator would be located at Site D-3A with noise levels on greater than 85 dBA at 6.1 meters (20 feet).

Details of the results for the proposed launch of 24 Hera missiles per year are given in table 3.1.8-11. This table also contains the details of the annoyance calculations. The increase in sleep disturbance attributable to Hera launches is shown in table 3.1.8-7.

Table 3.1.8-11: Noise Environment for D-3A for Proposed Hera Launches

YDNL (dBA)	Total Land Area (Square miles)	Population	Noise Sensitive Receptors	Percent Highly Annoyed*	Number Highly Annoyed
25-30	0.02	0	-	0.10	0
30-35	4.94	9	-	0.20	0
35-40	0.17	2	-	0.41	0
40-45	4.55	18	-	0.83	0
45-50	1.48	65	-	1.67	1
50-55	7.92	168	+	3.31	6
TOTAL	-	262	-	2.67	7

*Reference: Finegold, Harris, and VonGierke, 1992
+William J. Rish Recreational Park

Level Weighted Population =1376
Noise Impact Index = 0.112

Table 3.1.8-12 displays the most conservative analysis that the population may be exposed to for each increment of YDNL for the existing conditions and the 24 night-time launches of Hera.

Table 3.1.8-12: Cape San Blas Population of Noise Environment

YNDLs	Existing Conditions	Flight Test Activities
< 25 dBA	3	0
25 – 30 dBA	9	0
30 – 35 dBA	23	9
35 – 40 dBA	171	2
40 – 45 dBA	21	18
45 – 50 dBA	35	65
50 – 55 dBA	0	168
55 – 60 dBA	0	0
60 – 65 dBA	0	0
65 – 70 dBA	0	0
Total Population	262	262

* Noise Environment calculated for 24 nighttime Hera launches.

For a loud noise that occurs over a short time interval, such as the noise from a rocket launch, the difference between the peak noise level of the event and the background noise level gives a qualitative indication of the obtrusiveness of the noise. For distances that correspond to locations outside the LHA, monitored peak noise levels from the launch of a Hera missile ranged from 98 dBA to 77 dBA (see table 3.1.8-6).

In the Cape San Blas area background noise levels range from 25 dBA to 50 dBA. Thus the launch of a Hera missile would cause peak noise levels that would be from 27 dBA to 73 dBA above background noise levels. This would be perceived as a noise that lasts for less than a minute and is 8 to 128 times as loud as the background noise.

Cumulative Impacts

Site preparation activities at Cape San Blas would have equivalent noise impacts to the Santa Rosa Island proposal discussed above. There is no currently identified large-scale construction program at Cape San Blas.

The predicted long-term effect of the noise from these launches when combined with the existing noise is shown in tables 3.1.8-9 and 3.1.8-11.

The noise from TMD program activities would no cause the overall YDNL to be raised to 70 dBA, at which there is no potential for hearing loss from long-term exposure. Nor would it cause the overall YDNL to exceed the established guidelines for residential land use.

Due to its short duration and transient nature, no cumulative impacts are expected from either construction or portable generator noise.

Mitigations Considered

Possible mitigations would include:

- Minimize nighttime construction activities.
- Notify noise sensitive receptors of scheduled launch events.
- Construct sound barriers surrounding the launch pad to reduce launch noise.

3.1.9 SAFETY

Air Force safety and health regulations and procedures are designed and enforced to minimize safety hazards to service members and the public.

3.1.9.1 Resource Description and Evaluative Methods

Safety is defined as the consideration of those events which could result in adverse effects to human health, the environment, and/or property. The preparation, transport, and flight testing of TMD interceptor and target missiles can pose a safety risk, particularly to mission-essential personnel who provide direct support to TMD operations. The fact that TMD operations are similar to other missile test programs at Eglin AFB serves to minimize safety risks, due to the availability of highly trained technical personnel, specially designed facilities, stringent health and safety regulations, delineated safety stand-off zones and established range protocols. Existing safety procedures would be modified to accommodate TMD operations.

The analysis of the risk probabilities of each missile test is conducted prior to acceptance of that flight test program by the range. The system failure mode analysis and attendant risk probability calculations for each failure mode are calculated. Each equipment failure or human error possibility is considered and incorporated into the risk assessment for each flight test. No test will be accepted by the AFDTC commander until he is satisfied that the risk analysis complies with Air Force and DOD safety policies.

Safety impacts are evaluated by determining which processes in the TMD operations have the greatest potential for causing damage or injury. Selected steps in the life-cycle of TMD operations would provide greater risk to human health, environment, and property, and therefore are evaluated as possible mishap scenarios. Such possible mishap scenarios include mishandling of missile components; vehicle accidents in transporting missile components and propellants; fuel spills; rocket motor explosions; toxic emissions; and debris impacts. The following discussion summarizes the breadth of potential mishap scenarios. Section 3.1.9.3 describes in detail the safety procedures followed by AFDTC personnel in planning and executing test programs.

Handling Mishaps

Mishaps could occur as a result of handling booster segments during transport loading and unloading, assembly at the MAB, and procedures on the launch pad. A dropped booster segment could potentially damage the propellant grain and initiate a fire, releasing hydrogen chloride gas which could pose a risk to workers, especially in confined spaces.

Strict handling procedures are used by preparation crews to reduce the risk of dropping a booster segment. Review of historic records shows that there have been no accidents involving mishandled interceptor or target systems which have resulted in explosion or fire (Flinn, 1997). In the event of such an accident at the MAB, all personnel would be evacuated immediately. If the accident were to occur outside the MAB, the

concentration of hydrogen chloride smoke would be less than the public exposure guidance criteria by the time it reached the ESQD.

Vehicle Accidents

There is an extremely remote possibility that a transport vehicle carrying booster segments could be involved in an accident. Such a mishap carries a small risk of damaging a booster segment and creating a fire or explosion. The worst case scenario would involve a booster with DOD class 1.1 explosives, such as the second stage of the Hera missile, because they are shipped with the destruct assembly attached. In the remote event of a severe accident, there is potential that a DOD class 1.1 missile component could detonate, initiating the destruct system and burning the propellant, releasing hydrogen chloride.

Detonation of missile booster components due to accidents are considered to be a remote possibility, due to the protection of rocket motor shipping containers, which are designed to be sufficient to protect rocket motors under the most severe impact conditions. Exhaust components from an accidental burn could release hydrogen chloride, which might be irritating to the eyes and skin of rescue personnel; however, no other significant health effects would be expected.

Liquid Fuels Spill

Liquid fuel propellants are pre-packaged. However, accidents could result in toxic or hazardous waste runoff or release of toxic gas. In the remote event that the hypergolic fuel and oxidizers are accidentally released concurrently, an intense fire would ensue. Personnel involved in operations using liquid propellants follow strict Air Force safety guidance for such operations under AFOSH 91-119, Draft Evacuation Plan (appendix I), and Emergency Response Plan (appendix J).

Lightning Strike

There is a remote potential that a missile could be struck by lightning prior to launch. In such an event, there would be a potential to initiate the FTS, ignite the propellant, damage the electronics, or puncture liquid propellant tanks. If lightning were to strike an SRM, the solid propellant could be ignited, generating smoke with a high concentration of hydrogen chloride. A strike of a liquid fuel target missile could cause release of UDMH and potentially ignite the UDMH fuel. UDMH is extremely flammable and burns in air with a hot flame. The UDMH would be consumed in the fire with minimal consequences to the personnel outside the launch area.

When lightning strikes are identified within a critical distance, usually 3.2 to 8 kilometers (2 to 5 miles), the missile preparation would be halted, the environmental shelter would be returned to protect the missile, and the launch area would be evacuated. Because of the potential for damage to the missile from a lightning strike, the missile would be thoroughly checked after an electrical storm to ensure that no damage had occurred.

Early Flight Termination

The potential for a launch pad or low altitude mishap is remote. Fire and/or debris from a launch pad accident, or an early termination, would not be likely to kill or injure mission-essential personnel located within the LHA because they are within shelters designed to withstand debris impact. Launch pad explosions could result from an obstruction of the exhaust nozzle of a rocket motor. As emergency equipment would be present at the launch pad, any fire that might result from an accident would be contained relatively quickly.

A rocket could explode, or be terminated, during early flight. In such an event, burning and unburned fuel and debris, would be disbursed over a portion of the LHA. Controlling fires in the LHA may require ground-disturbing activities. Identifiable unburned fuels or residual burned fuel would be disposed of following standard Eglin AFB waste management procedures. The LHA is designed to contain accidents during early flight termination, thus reducing potential exposure to the public. Within 45 seconds of launch, the missile would be 3.7 kilometers (2.3 miles) downrange, and would fall into the cleared open ocean, further reducing public risk.

If a missile fails to generate thrust in an Air Drop test, the missile will fall into the cleared LHA designated for the air drop test. Initiation of the FTS before the missile strikes the surface would minimize the possibility of an explosion on impact.

Late Flight Termination

Late flight termination of an interceptor or target missile could occur as a result of a failure of the rocket motor, or by initiation of the FTS. This would scatter debris along the flight path. The severity of the explosion and distribution of the debris from an accident would depend on the position of the missile along its trajectory. If the second stage fails to separate or fails to ignite, the second stage would fall with the first stage into the booster drop zone. Initiation of the FTS before the missile strikes the surface would minimize the possibility of an explosion on impact.

Numerous safety procedures are in place to minimize risk from late flight termination, including pre-notification of air and maritime traffic, safety clearance zones surrounding the flight path, booster drop zones, and broad ocean areas. These clearance safety procedures are discussed in more detail in section 3.1.9.3.

3.1.9.2 Region of Influence

The ROI for safety-related impacts is primarily the five identified clearance zones. These include the LHA around both the interceptor and target launch sites; the booster drop zone for the target, if required; the debris impact area; and the interceptor whole body impact should the interceptor miss the target.

Months prior to a test, the AFDTC Range Safety Officer determines the size and shape of the LHA. The LHA is designed to protect the public and private property from harm or damage due to a missile going off-course in the early seconds of flight. The Range Safety Officer uses a computer model that considers the areas that must be

protected around the launch site. The computer model uses many variables including size and make-up of the missile; potential worst-case turns by the missile throughout its flight; effects of winds; and the effects of using the missile's FTS to terminate the missile flight.

The booster drop zone is where the first stage booster of the missile is planned to land after a successful launch. This area is planned prior to the test and may differ for each test.

After an intercept, there will be debris formed from the collision of the interceptor and the target. This debris is primarily very small pieces of each missile. However, there could be larger pieces should the interceptor not strike the target in the optimal location. This debris could be hazardous to water and aircraft, so the debris impact area would have to cleared until the debris has settled.

Should the interceptor fail to hit the target, the interceptor would land in an area outside of the debris impact area. This area would also have to be cleared of watercraft and aircraft. The target would land within the cleared debris impact area.

Other areas for consideration of safety include potential mishaps from an accident involving transportation of the missile components; SRM and liquid-propellant motors handling and preparation; and safing of the missile on the launch pad prior to launch.

Transportation and handling of missile components, SRMs, and liquid-propellant motors are conducted in accordance with USDOT, DOD, and state regulations.

An ESQD is established around facilities where the missiles are being processed as long as there is fuel or explosives present.

3.1.9.3 Affected Environment

Flight test operations are routinely conducted at Eglin AFB for all manner of weapon systems, including air-to-air and air-to-ground missiles. Prior to each test flight, flight plans and launch profiles are developed and analyzed. Flight plans and launch profiles must be approved by the Range Safety Officer before the test can proceed. Hazard areas are identified and all unauthorized personnel are cleared from the hazard areas. All access to hazard areas is blocked using military security personnel and, if necessary, local police. Contingency evacuation plans are reviewed and revised as necessary.

When the flight test operations involve uncontrolled air space or public waters, notification is published in local newspapers and broadcast via local media. A NOTAM is issued to the FAA at least 1 week before the test and a NOTMAR is issued to the U.S. Coast Guard at least 1 week before the test, NOTAMs are official air safety directives which provide direction to pilots and FAA Air Traffic Controllers concerning non-routine hazards. NOTAMs published for flight test operations in the EGTR specify the coordinates and altitudes for affected airspace and times during which the requirements are in effect. During designated times, the delineated airspace is cleared as described in section 3.1.2 (Airspace Use). Before and during all testing operations, range radar assets scan the designated area to ensure that aircraft remain clear of the designated space. No test will

be initiated unless the designated area is clear of aircraft, and a test mission may be stopped should an aircraft enter the area.

The AFDTC has established a minimum destruct initiation capability (the time between a test system deviating from an acceptable flight path until the signal for flight termination is initiated) of 5 seconds. For specific weapon systems and flight profiles, a more stringent capability (3 seconds) can be achieved (Monteith, 1997). Once flight termination occurs, all powered flight ceases; however, the missile or the resulting debris would continue on a ballistic trajectory.

Many active sensor systems, including radio frequency communication systems and radar units, are operated by Eglin AFB for the EGTR. Electromagnetic Radiation (EMR) hazards produced by radio transmitters and radar emitters are considered non-occupational impacts. The frequencies, antenna configurations, and output powers used by the radio communication systems and radar units are unlikely to result in a significant hazard to personnel or members of the public.

Safety and health hazards associated with sensor equipment would be limited to the potential for exposure to EMR associated with operation of the radar van. The radar system would be used to provide launch site tracking of the target for use by Range Safety in assessing flight performance.

In order to prevent overexposures to EMR, the Air Force has published AFOSH Standard 48-9. This regulation adopts the standards for occupational and non-occupational exposures developed jointly by the Institute for Electrical and Electronics Engineering (IEEE) and the American National Standards Institute (ANSI) and published in IEEE/ANSI C95.1-1991. These standards specify the maximum EMR energy to which a person can be exposed (averaged over a 6-minute period), based on the frequency of the EMR emissions. As implemented by the Air Force, these standards constitute the highest exposures to which persons can be exposed. Any locations where exposure in excess of these standards can occur is required to be protected, either through engineering controls, or implementation of controlled areas.

3.1.9.4 Environmental Impacts and Mitigations

No-action Alternative

Santa Rosa Island or Cape San Blas

Under the no-action alternative, the proposed TMD test activities will not occur at Santa Rosa Island or Cape San Blas. Selection of this alternative will have no additional effect on occupational or public exposure to safety or health hazards.

Consequences of Normal TMD Activities

Normal TMD activities as described above and in section 2 were evaluated for their safety impacts in each of the respective resource areas. The health impacts of normal TMD activities are addressed below.

Health

Combustion of solid propellant during launch will release quantities of hydrogen chloride and aluminum oxide. Other constituents of the rocket exhaust include carbon monoxide, aluminum chloride, nitrogen oxides, and chlorine gas (see section 3.0 for estimated emission rates). None of these constituents has been demonstrated to cause, or are even suspected of causing cancer or reproductive and developmental effect in humans or animals (National Aeronautics and Space Administration, 1990).

The air quality dispersion modeling predicts that the point of maximum instantaneous air concentration of hydrogen chloride, and aluminum oxide would occur approximately 1.94 kilometers (1.21 miles) from the launch pad. Maximum hydrogen chloride, and aluminum oxide concentrations at the 1.94 kilometer (1.21 miles) distance was computed to be 0.728 mg/m^3. (National Aeronautics and Space Administration, 1990)

Health Effects of Hydrogen Chloride—Toxicological Considerations. Hydrogen chloride is highly water soluble and reacts with surface components of the upper respiratory tract. The hydrogen ion and chloride ion are natural constituents of near coastal atmospheres as well as all mammalian species. Two important chemical defenses against inhaled acidic compounds include endogenous (naturally occurring in the body) ammonia and airway surface liquid buffers (i.e., mucous). Naturally occurring ammonia present on the surface of the nasal tract and mouth may react and neutralize (i.e., have a scrubbing effect on) low levels of acidic compounds such as hydrogen chloride (Larson et al. 1982; Environmental Protection Agency, 1988b). (National Aeronautics and Space Administration, 1990)

An appropriate guideline to compare with TMD hydrogen chloride emissions is the short-term public emergency guidance levels (SPEGLs) developed by the National Research Council Committee on Toxicology specifically for short-term, intermittent community exposures occurring during Space Shuttle launches. To conservatively protect sensitive populations such as infants, children, the elderly, and people with respiratory diseases from the large quantities of hydrogen chloride emitted during Space Shuttle launches, the Committee on Toxicology recommended a 1-hour SPEGL of 1.5 mg/m^3. In other words, hydrogen chloride concentrations averaged over a 1-hour and 24-hour time period should not exceed 1.5 mg/m^3. The maximum predicted 1-hour and 24-hour hydrogen chloride air concentrations at 6.92 kilometers (4.3 miles) from the test stand are approximately 10 times lower than either of these guidelines and therefore are considered protective of the health and safety of workers as well as offsite populations. Again, average concentrations at locations closer than 6.76 kilometers (4.2 miles) will be lower than maximum at 6.76 kilometers (4.2 miles). (National Aeronautics and Space Administration, 1990)

TMD tests will be conducted infrequently (24 times per year) and are of short duration (24 seconds), resulting in predicted hydrogen chloride concentrations that are well below guidelines for maximum 1-hour and 24-hour exposures established by the National Research Council and OSHA. Therefore, no long-term health effect from hydrogen chloride emissions are anticipated. Since occasional exposures to levels of hydrogen chloride from TMD testing are sufficiently low to prevent adverse acute effects,

no adverse chronic effects are suspected. (National Aeronautics and Space Administration, 1990)

Aluminum oxide is considered an inert compound. After an exhaustive review of the toxicological literature, the EPA concluded that no evidence of acute (short-term) toxicity, reproductive effects or mutagenic effects of aluminum oxide have been reported in exposed workers or laboratory animals. (National Aeronautics and Space Administration, 1990)

There is no evidence of chronic (long-term) toxicity, carcinogenicity, reproductive effects, or mutagenic effects of aluminum oxide reported in workers or laboratory animals. Some studies have indicated minimal fibrogenic growth (development of fibers) in the lungs of long-term workers exposed to high concentrations of complex mixtures of aluminum dust, aluminum oxide and silica. (National Aeronautics and Space Administration, 1990)

Recognizing the toxicologically inert properties of aluminum oxide, EPA recently deleted nonfibrous aluminum oxide from its list of toxic chemicals. EPA also determined that nonfibrous aluminum oxide did not meet the criteria for causing acute and chronic human health effects, carcinogenicity, or environmental toxicity. EPA concluded that there was no evidence that nonfibrous aluminum oxide causes or "can be reasonably expected to cause" adverse health and/or environmental effects. Given the low aluminum oxide concentrations projected from TMD emissions and the generally inert toxic properties of aluminum oxide, exposure from TMD launches will not result in adverse long-term health effects. (National Aeronautics and Space Administration, 1990)

Potential exposures to hydrogen chloride and aluminum oxide in TMD emissions are not anticipated to result in adverse human health impacts. This conclusion is based on several key factors: (1) predicted hydrogen chloride concentrations are below ambient air quality criteria; (2) no significant health impacts from acidic aerosols are expected based on comparison with sulfuric aid aerosols toxicity; and (3) the predicted concentrations of aluminum oxide do not exceed the criteria for the particulate matter. (National Aeronautics and Space Administration, 1990) (See appendix K)

Interceptor

The only identified potential hazard for a nominal launch of a solid rocket motor is the inhalation of exhaust products released during the first few seconds of the launch operation. Nobody is allowed that close during a launch. The exhaust of liquid propellant rocket motors does not contain hazardous amounts of toxic products.

Target

The primary method for preventing the adverse safety and health effects associated with the plume of a solid rocket motor involves the physical isolation of the area immediately surrounding the launch site. This is accomplished through the clearance of unauthorized personnel from the LHA.

Consequences of TMD Mishaps

Following any launch mishap, an inquiry would be held to fully document and understand all system anomalies. No launch would be scheduled until the inquiry is completed.

The consequences of TMD mishaps on each respective resource area are addressed below. This section programmatically addresses all TMD test activities including both interceptor and target launches.

Air Quality

The CAA, section 112(r) requires the USEPA to promulgate an initial list of at least 100 substances ("regulated substances") that, in the event of an accidental release, are known to cause or may be reasonably expected to cause death, injury, or serious adverse effects to human health and the environment. The CAA also requires the USEPA to establish a threshold quantity for each chemical at the time of listing. Stationary sources that have more than a threshold quantity of a regulated substance are subject to accident prevention regulations promulgated under CAA section 112(r)(7), including the requirement to develop risk management plans. (Federal Register, 25 August 1997)

The Accidental Released thresholds and information for IRFNA and UDMH are as follows: IRFNA (CAS# 7697-37-2) is approximately 85 percent nitric acid. As such, it would be regulated as nitric acid (concentrations 80 percent or greater) (CAS# 7697-37-2) which has a threshold of 6,818 kilograms (15,000 pounds). UDMH (CAS# 57-14-7) has a threshold of 2,273 kilograms (5,000 pounds).

The Lance missile contains approximately 170 kilograms (375 pounds) UDMH and 511 kilograms (1,130 pounds) IRFNA in separate fuel cells. Therefore, the RMP Threshold will be exceeded if more than 13 missiles, or their equivalent in fuel, is stored in one location.

Mishaps which could result in the combustion of the majority of a solid-fuel missile's propellant on or near the launch pad would release large amounts of aluminum oxide, carbon monoxide, and hydrogen chloride to the immediate surroundings in a relatively short period of time. Following EPA guidance as outlined in section 3.1.1, initial screening was conducted to determine whether such a release would have the potential to exceed appropriate health-based guidance levels or the NAAQS. The screening was conducted using the EPA-approved TSCREEN PUFF model. The results of the screening indicated there may be potential exceedances of the hydrogen chloride health-based guidance concentration levels beyond the LHA. Therefore, again following EPA guidance, refined modeling was conducted to better determine the potential hydrogen chloride exposure levels.

The refined modeling was conducted using the Open Burn Open Detonation Dispersion Model (OBODM). OBODM was developed specifically to determine potential impacts of fuel destruction through burning. This makes it a suitable modeling tool to determine impacts due to the mishap scenario described above.

Since OBODM is a refined model, more explicit data was required to conduct the analysis than was required for use of the TSCREEN PUFF model. Each set of launch criteria resulted in a separate set of potential exposure concentrations. Due to the nature of the exhaust dispersion, concentrations at the LHA boundary may actually be lower than those which occur at a distance farther from the launch point (beyond the LHA). Section 3.1.1 has a more in-depth discussion of launch plume dispersion characteristics.

In order to present a conservative analysis, two general mishap release scenarios were modeled over a variety of meteorological conditions to determine the maximum potential concentrations and the distances at which these concentrations occur beyond the LHA. Concentrations within the LHA were not specifically addressed because the public would not have access to these locations during launch operations, and thus would not be exposed to the concentrations which could occur at these relatively close distances.

The two mishap scenarios modeled both concerned a launch of a Hera missile. The first scenario is that of a mishap in which the entire first-stage propellant was consumed; the second is a mishap in which both the first- and second-stage propellant was consumed. These two scenarios represent the greatest release of exhaust emissions which could occur for any combination of proposed launches. Table 3.1.9-1 indicates the maximum potential concentrations and the distances at which they could occur, as indicated by OBODM. These data indicate that concentrations of hydrogen chloride would not exceed the health-based guidance levels beyond the LHA under any modeled release scenario. Therefore, public exposure to hydrogen chloride would also not be anticipated to exceed the guidance levels for either normal launch conditions (as presented in section 3.1.1) or for potential mishap scenarios (as presented above).

Table 3.1.9-1: OBODM Results

Launch Mishap Scenario	Weight of Hydrogen Chloride[a] Emitted	Maximum Concentration of hydrogen chloride and distance at which it could occur	Guideline
Stage-1 Combustion	1,399 kilograms (3,078 pounds)	0.912 mg/m^3 at 2.1 kilometers (1.21 miles)	1.5 mg/m^3
Stage-1 and Stage-2 Combustion	1,730 kilograms (3,806 pounds)	1.047 mg/m^3 at 2.0 kilometers (1.2 miles)	1.5 mg/m^3

Note: Maximum concentrations and distances were obtained using the Open Burn Open Distribution Model

In the event of mishap, the Emergency Response Plan (appendix J) would be executed.

Airspace Use

Mishaps which could cause intrusion into airspace which has not been defined and reserved for the flight test could impact the use of that airspace. Only a late termination of the flight could cause an intrusion into unreserved airspace. The range safety officer would initiate the FTS in time to prevent the missile or any debris from leaving the test's reserved airspace.

Biological Resources

There is a possibility that the second stage could impact the water intact due to a mishap. Should this occur an underwater explosion is possible. The possibility of a second stage impacting the surface intact is extremely remote. The FTS could be initiated in the event of a deviation from the approved flight path, including a second stage failure to ignite. Once the FTS is initiated, the possibility of an explosion is reduced to near zero. The FTS is a redundant system with high reliability and a very low probability of failure to work when called upon. The chemical products of the explosion would be propellant, batteries, and pieces of the missile itself. The risk of direct or toxic impact to marine life would be extremely small. Explosions can temporarily interfere with communications, elicit a pronounced startle reaction with subsequent avoidance or flight behavior, temporarily or permanently reduce hearing sensitivity, or cause hemorrhaging and death in cetaceans.

The primary concerns for marine life exposed to underwater explosions are pollution by the chemical products of the explosion; physical harm to marine life by shock and acoustic waves (large overpressures); and harassment of the marine life by the explosive's acoustic field. Large overpressures can cause injury to marine life and a single high-pressure event is likely to cause harm or harassment (Cavanagh, 1997). Overpressures may occur from an accidental explosion of a missile during testing.

The secondary danger to any particular marine mammal, sea turtle, or migratory bird would be to be in the vicinity of the impact of an spent missile stage or intercept debris when it impacts the water. Debris that hits the surface of the water would subsequently sink. A piece of sinking debris would not have sufficient velocity to harm individual marine mammals or fish. Its behavior in the water will be similar to that in air, except slower. Pieces with a low coefficient of drag will sink quickly, and those with a high coefficient of drag will sink slowly. Eventually they will all settle on the bottom.

The GulfCET survey provides a density prediction for various species of cetacean for the entire Gulf of Mexico. Density distributions for specific areas within the Gulf of Mexico are not yet available. The density predictions are found in table 3.2.3-4. The probability of individual injury or mortality of a marine mammal or depends upon their density distribution within the Gulf of Mexico. Together, the distribution of debris for a single test event and the distribution of mammals means that there is an extremely remote probability of mortality for any single test event.

Cultural Resources

In the event of damage to historic properties which are determined eligible for listing on the NRHP occurring as a result of missile debris from a launch abort or mishap, an assessment would be conducted to determine the measures appropriate to mitigate the impacts.

Flight termination could result in debris striking the lighthouse and keeper's quarters at Cape San Blas. However, the probability of this occurring is extremely remote.

Geology and Soils

Deposition of aluminum oxide would occur at the launch facility in a similar manner to hydrogen chloride. Because of the relatively low weight and size of aluminum oxide particles, aluminum oxide is expected to disperse rapidly in the air. Deposition is expected to be minimal during nominal launches. Under normal conditions (alkaline to mildly acidic soils), aluminum oxide is a relatively stable compound and is considered insoluble. Highly acidic soils can result in increased solubility of many minerals, including aluminum. Because surface soils within the ROI are primarily classified as strongly to very strongly acidic, aluminum oxide deposition may result in an increase of soluble aluminum in the upper soil regions, particularly in regions exhibiting low soil pH. Substantial increases in soluble aluminum resulting from aluminum oxide deposition are not anticipated because the deposition of hydrogen chloride would result in minimal and temporary reductions in soil pH. The deposition of aluminum oxide would not result in a substantial change in soil fertility or produce concentrations which would be toxic to the growth of existing plants and microorganisms.

Hazardous Materials and Hazardous Waste

The Lance missile is pre-loaded with 150 kilograms (331 pounds) of UDMH (fuel) and 511 kilograms (1,127 pounds) of IRFNA (oxidizer). UDMH is a colorless liquid with an ammonia-like fish odor that is hypergolic with many oxidants (such as IRFNA) and is therefore used as a high-energy propellant for liquid-fueled missiles such as the Lance. UDMH is a flammable liquid and is considered a poison by USDOT. If UDMH becomes a waste, it must be managed according to Federal or state hazardous waste regulations.

UDMH is listed on USEPA's Extremely Hazardous Substances List. EPCRA reporting is required for a release over 4.54 kilograms (10 pounds). The EPCRA threshold planning quantity is 453.5 kilograms (1,000 pounds). The reportable quantity of UDMH under Section 311 of the Clean Water Act is 453 kilograms (1,000 pounds). An Accidental Release Prevention Plan is required for a threshold quantity over 6802.7 kilograms (15,000 pounds). When used in quantities of 453.6 kilograms (1,000 pounds) or more, UDMH is covered by PSM standards such as 29 CFR 19010.119 and AFOSH 91-119. UDMH is also listed in the USEPA TSCA Inventory and is a suspected carcinogen and mutagen. Cleanup methods for UDMH spills include activated carbon, alcohol foam, polyurethane foam, and polypropylene fibers. The maximum UDMH (fuel) present at any given time for TMD target launches would be 170 kilograms (375 pounds).

IRFNA is a yellow to red-brown, clear, strongly fuming, very corrosive liquid which evolves toxic nitric acid vapor and nitrogen dioxide gas. Hypergolic fuels quickly ignite on contact with IRFNA. If IRFNA becomes a waste, it must be managed according to Federal or state hazardous waste regulations. EPCRA reporting is required for a release over 454 kilograms (1,000 pounds) and a threshold planning quantity of 453.5 kilograms (1,000 pounds). The reportable quantity of nitric acid under Section 311 of the Clean Water Act is 453 kilograms (1,000 pounds). An Accidental Release Prevention Plan is required for a threshold quantity over 6,802.7 kilograms (15,000 pounds). Nitric acid (94.5 percent by weight or greater) is covered under PSM when used in quantities of 226.8 kilograms (500

pounds) or greater. The maximum IRFNA (oxidizer) present at any given time for TMD target launches would be 511 kilograms (1,126.76 pounds).

Operations involving liquid-fuel rockets, such as the proposed Lance missile, would include emergency response personnel. These personnel will be present so as to have immediate response capability to reduce environmental and safety impacts in the event of a spill or leak of either UDMH or IRFNA. The immediacy of response is a key component in reduce potential for impacts. Quick actions would minimize both the potential for contamination of water sources and evaporation into the atmosphere. If the Lance missile is used, a propellant draining kit and trained crew will be onsite to aid in the minimization of potential releases of both UDMH and IRFNA. Due to these immediately applicable safety measures, it is not anticipated that the public would be endangered in the event of a liquid propellant leak.

In the event of a launch mishap, the Emergency Response Plan (appendix J) would be executed.

Land and Water Use

Land and water areas potentially affected by a launch mishap are included in the LHA identified for each test or training activity. If a mishap were to occur, the period of clearance for land and water areas would be extended to assure that all safety procedures are implemented, and potentially hazardous debris or materials removed.

Noise

Mishaps which could result in the explosion of a rocket motor or passage of a piece of debris or missile at supersonic velocity could have a noise impact. The noise levels and overpressures that may result from the explosion of the solid rocket motor was estimated using the NAPS computer program. These levels are 140 dB at approximately 1,000 meters (3,280 feet) and 2.0 psf at approximately 3 kilometers (1.9 miles).

Minor damage to structures may occur at overpressure of 2.0 psf (Haber and Nakaki, 1989), and exposure to an impulsive noise with an SPL equal to or greater than 140 dBA may cause temporary or permanent hearing loss in people.

Due to the safety procedures followed both prior to and during a missile launch (see section 2.1.3.3.3), it is unlikely all the events necessary for these levels to occur outside the LHA would happen during any one mishap. Combining this with the fact that a mishap itself is very unlikely, leads to the conclusion that the probability of a 2.0 psf overpressure or an 140 dBA sound pressure level occurring outside the LHA is small.

Socioeconomics

Mishaps which could result the closure of roads or bridges could have an impact on socioeconomics, depending on the duration of the closure. A vehicle carrying hazardous material, such as solid rocket motors or liquid rocket propellants could be involved in an accident resulting in closure of a road or bridge. The accident may result in a fire which if it involves the solid rocket propellant, or the liquid rocket propellant could damage the

infrastructure. Should a mishap threaten the public safety, the Emergency Response Plan (appendix J) would be executed. Cleanup and timely reopening of the roadway would be a high priority within the plan.

Transportation

The missile components would be shipped to the launch site on a commercial carrier tractor-trailer, indistinguishable from any other commercial truck traffic on the highway. There is no identifiable convoy for transporting the missile components. The largest component, the Minuteman Stage II booster motor is 2.4 m (8.3 feet) long and has a diameter of 1.3 meters (4.3 feet), easily transported on a commercial trailer. The Minuteman Stage III booster motor is 1.5 meters (5 feet) long and 0.96 meters (2.9 feet) in diameter. The reentry vehicles range from 2.68 meters (8.8 feet) to 4.43 meters (14.5 feet) long. The reentry vehicles have no explosives in them. Each component would be shipped in protective containers. These shipments are in accordance with Federal, state, and local traffic control and highway safety regulations.

The Department of Defense has a 50-year history of transporting missiles and missile components by all transportation modes. Minuteman missile transport is the most relevant to the issues of target missile transportation. The target missiles proposed for TMD use are Minuteman stages II and III. The U.S. Air Force had transported the stages (booster motors) and full up missiles to and among the 1,000 missile silos in the Great Plains for the 30-year operational life of the Minuteman system. In that period, there has never been an explosion involving the truck transport of missile components, therefore, the probability of an accident resulting in an explosion is much lower than the probability of an vehicle accident.

The Minuteman Stage II booster motor is shipped with the FTS attached. The initiator of this FTS assembly is not part of the shipped motor. The FTS is a linear shaped charge designed to split the rocket motor case. The FTS would not detonate without an initiator. Should a vehicle accident damage the booster, it is more likely to burn than explode. The booster motors are shipped with both ends open, so any fire would not result in sufficient compression for an explosion or propulsion. The designation as a DOD Class 1.1 does not mean that the propellant is explosive. In fact, the propellant has less equivalent energy per mass than gasoline.

An accident that did ignite a SRM would result in a very hot fire, not an explosion. A SRM burning while not thrusting will burn less intensely. The smoke from such a fire would contain hydrogen chloride and aluminum oxides in hazardous concentrations. Fire fighters would have to wear protective gear while responding to the fire. The vehicle would display appropriate placards. Such a fire would very likely close the road for a period of hours while it was being controlled and cleaned up. There could be damage to the roadway or bridges if the accident occurred on a bridge. The vicinity of the fire would likely have to be evacuated until the fire was extinguished and the smoke cleared.

Utilities

There may be impacts on utility systems in the event of a launch mishap. Utility lines within the LHA are primarily military property.

Water Resources

Mishaps which could result in the burning of solid propellant could impact on surface water quality. An early termination of a Lance missile could result in liquid fuel contaminating the area around the launch site and the nearshore waters.

Previous studies have shown that even in the most conservative case of a missile failure where all of the emission products were concentrated in the Gulf of Mexico, environmental effects would be small and not persistent. An environmental impact analysis was done by NASA for launching sounding rockets from numerous locations including Eglin AFB into the Gulf of Mexico. That EIS included the Black Brant VC sounding rocket. The assessment concluded that effects to general water quality are expected to be not significant.

Even in the most conservative analysis involving the impact of a fully loaded missile in the sea environment, the volume involved is small and the effects are not persistent (in effect, the toxicant would disperse and degrade to values below the maximum allowable concentration within a very short time) (National Aeronautics and Space Administration, 1973). This is because the hydrogen chloride would be expected to disperse quickly and be diluted and neutralized by the natural buffering capacity of the sea, because aluminum oxide is essentially insoluble in water. The compound does not seem to have an appreciable toxicity for aquatic organisms. (National Aeronautics and Space Administration, 1973)

Cumulative Impacts

Construction of the TMD test facilities at Santa Rosa Island would take place on Eglin AFB property that was originally developed in 1959 for BOMARC missile testing over the Gulf of Mexico. In the 1980s, the complex was upgraded to test an electromagnetic rail-run for the Strategic Defense Initiative Organization. Current instrumentation sites and activities will continue for the foreseeable future. Additional activity currently proposed for the island is the Open Air Hardware in the Loop project which would involve construction of three towers, three control buildings, and associated support facilities. These activities are managed by the AFDTC Safety Office to minimize exposure to risk by military personnel or the public.

Construction of the TMD test facilities at Cape San Blas would take place on a site owned by Eglin AFB that was originally developed in 1959 for monitoring missile testing over the Gulf of Mexico. Airspace monitoring from instrumentation on Cape San Blas has been operational since that time and will continue for the foreseeable future. No other major projects are currently planned. These activities are managed by the AFDTC Safety Office to minimize exposure to risk by military personnel or the public.

No cumulative safety impacts have been identified.

Mitigations Considered

TMD activities would have no impacts on safety, because of the standard safety and health regulations and procedures in place. Therefore, no mitigations are proposed;

however, SOPs would include establishment of adequate sea evacuation areas and clearance of non-mission essential vessels, implementation of a worker safety training and inspection program, publication of Notice to Mariners and clearance of non-mission essential vessels, clearance of all non-mission essential aircraft from appropriate airspace, and prior notification of oil and gas companies at scheduled launch events.

In the event of a mishap, the appropriate Federal, state, and local authorities would be consulted to determine the proper procedures to recover biological and cultural resources.

Cooperative agreements with local law enforcement and fire departments would be made to provide the necessary resources to accommodate the new requirements.

3.1.10 SOCIOECONOMICS

The siting and operation of proposed launch sites on Santa Rosa Island and Cape San Blas may affect the regional economy of the Florida Panhandle. Program-related spending for labor and materials during site preparation and launch activities would generate small beneficial increases in income and employment for the area.

3.1.10.1 Resource Description and Evaluative Methods

The socioeconomic resource describes the social and economic characteristics of a community by isolating and analyzing several variables including population size, number of jobs, amount of income generated, and type and cost of housing. This section presents a socioeconomic overview of the region surrounding Eglin AFB. It will focus on tourism, the military, transient housing, and commercial fishing.

There are no known Federal, state, or local regulations that directly affect socioeconomics. Executive Order 12898 has the objective of ensuring that Federal agencies analyze environmental effects on minority and low-income communities. Appendix C addresses environmental justice in detail, identifying the proximity of minority and low-income populations to the alternative land launch sites. A number of regulatory compliance requirements discussed in other resource areas have an indirect effect on socioeconomics.

The analytical approach adopted for the socioeconomic resource begins by recognizing that the action can be broken down into a series of well defined activities. Each of these activities has the potential to generate three broad areas of socioeconomic impact. First, general economic impacts, as a result of the action, can be defined as personal economic gain or loss and/or economic gain or loss to the community as a whole. Second, there may an impact, as a result of the action, on the quality of life of individuals in the community, defined particularly as the economic impact on retirees and the economic impact of an altered ecology. Third, there may be impacts of displacement or exclusion on residents, tourists, and commercial fishermen.

This framework recognizes that the local economy of the Florida Panhandle, though relatively diverse, includes the key economic drivers of tourism, commercial fishing, the retiree population (including military retirees) and government (particularly in the form of defense installations). Impacts on any or all of these specific drivers are likely to lead to disproportionate impacts on the economy as a whole. Furthermore, the framework addresses the concerns raised during the scoping process.

3.1.10.2 Region of Influence

The proposed launch sites are located in the Florida Panhandle, near Fort Walton Beach and Port St. Joe. The ROI for transient housing is based on a 32-kilometer (20-mile) driving radius of the test site. The ROI consists of Okaloosa, Santa Rosa, and Walton counties which encompass Eglin AFB and Bay, Gulf, and Franklin counties which

surround Cape San Blas and in which socioeconomic impacts could be reasonably expected to occur. Figure 3.1.10-1 illustrates the extent of the ROI.

3.1.10.3 Affected Environment

Florida Panhandle

The six-county ROI is located in the tenth fastest growing state, in percentage terms, in the nation. Between 1990 and 1995, estimates indicated that Florida increased its population from a little under 13 million people to 14.1 million. In absolute terms, only Texas exceeded Florida in population growth.

The total population of the ROI in 1995 was 457,777 representing 3.2 percent of the population of Florida. Okaloosa County is the most densely populated of the six counties with its 162,707 people representing 35.5 percent of the population of the ROI.

All of the six counties within the ROI are projected to have percentage rates of employment growth greater than the national average during the next 15 years. Franklin, Gulf, Bay, and Walton counties fall below the state's rate of employment growth, while Okaloosa and Santa Rosa have higher than the state rates. In gross terms the six county ROI is projected to generate 67,600 jobs between 1995 and 2010. Commuting patterns within and around the ROI show that there is a net daily outflow of at least 26,000 commuters.

Average house purchase prices in the ROI in 1995 ranged from $76,338 in Gulf County to $84,075 in Okaloosa County. There are approximately 12,837 seasonal housing units located within a 30-minute driving time (32 kilometers [20 miles]) of Site A-15 that may be used for housing of temporary military personnel (Florida Department of Business and Professional Regulation, 1996). Most of these units are located in the coastal region in Niceville, Shalimar, Destin, Mary Esther, and Fort Walton Beach. Seasonal units are available for rent year-round. However, most are occupied in the summer.

Eglin AFB provides transient housing for military personnel and other DOD personnel on orders to its base. The Billeting Manager handles requests for lodging about 50,000 persons per year, including groups of 200 or 300 at a time when space is available. The Visiting Officers Quarters consists of 167 single occupancy rooms, and the Visiting Airmen Quarters on base consists of 152 rooms. These facilities are typically 90 percent occupied, with the peak period of demand during the months of February and November. In addition, at Duke Field there are barracks with 232 beds for reservists and other transient personnel. Personnel not housed on base can make arrangements with one of 14 local hotels that have a blanket purchase agreement to provide lodging for military personnel.

The Florida Panhandle is a popular summer destination for tourists from throughout the southeast and central United States, as well as Canadians and others from the north east wishing to escape the harsh northern winters. Many visitors, from Alabama and Georgia in particular, own second homes within the ROI. In 1993-94, the tourist

EXPLANATION

County Lines

Region of Influence for Socioeconomics

Scale 1:6,000,000

0 50 100 Miles

0 100 200 Kilometers

NORTH

Eastern Gulf of Mexico

Figure 3.1.10-1

development tax generated $5,353,000 for four of the six counties of the ROI (Franklin and Gulf counties do not collect tourist development tax). In 1994-95, this sum grew to $5,875,000 an increase of 9.8 percent. This compares to a growth of 11.7 percent in tourist development tax generated in Florida as a whole during the same period.

The Gulf of Mexico, bordered by exceptionally fine beaches and supported by a sophisticated service infrastructure, is the obvious attraction for the majority of visitors. The ROI includes 9 state parks and the national park of Gulf Islands Seashore which were visited by 4,991,168 people during 1994-95.

In 1995-96, the ROI included 7 licensed hotels with 850 rooms, 310 licensed motels with 14,560 rooms, and 734 food service establishments with a seating capacity of 104,000. It was estimated that, in 1994 and 1995, there were 15,700 people employed in eating and drinking places in the ROI, earning $11,000,000.

Santa Rosa Island

Site A-15 is 14.5 kilometers (9 miles) from Fort Walton Beach. They are located in western Okaloosa County, but for the purposes of this study, Santa Rosa, and Walton counties are also included in the ROI. The population residing within 8 kilometers (5 miles) is 3,585, 16 kilometers (10 miles) is 10,891, and 32.2 kilometers (20 miles) is 42,195 of Site A-15.

The economy of the three-county ROI is a mix of tourism, manufacturing, and government. Tourism was thought to have declined, due to the damage caused by Hurricane Opal, but 1996 bed-tax revenues appear to have kept pace with 1995. In that year the tourism industry in the three-county ROI employed 12,341 people. The main limitation to further substantial growth in the local tourism industry is perceived to be the lack of a regional convention center to attract higher spending conventioneers to the region (Pensacola Convention and Visitors Bureau, 1997).

Manufacturing employment has become increasingly important to the region, particularly in light of cutbacks in local military spending and employment, and the general desire for a more broad-based economy. Monsanto Corporation employs 2,500 people, and further growth is expected. Westinghouse Electric Corporation, on the other hand, announced that it will close its Pensacola facility in 1998 with a loss of 600 jobs.

Government employment is centered at Eglin AFB, Hurlburt Field, and the Naval Aviation Technical School, which relocated to Escambia County from Memphis, Tennessee.

Pensacola is the primary commercial fishing port on this section of the Panhandle coast. In 1995, about 2.80 million kilograms (6.154 million) of fish and shellfish were landed within the ROI.

Cape San Blas

Site D3-A is located 16 kilometers (10 miles) south of Port St. Joe and 67 kilometers (42 miles) southeast of Panama City, which are the main centers of population

within the three-county ROI of Bay, Gulf, and Franklin counties. The population residing within 8 kilometers (5 miles) is 244, 16 kilometers (10 miles) is 1,582, and 32.2 kilometers (20 miles) is 8,397 of Site D3-A.

The economy of the three-county ROI, with the exception of Bay County, is more rural and less developed than the ROI of Santa Rosa Island. Centered around Panama City, Bay County manufacturing employment has grown markedly as a result of Trane Co's new 9,290-square-meter (100,000-square-foot) facility. Arizona Chemical, Litt Industries, AeroQuip and Capital Bolt Inc. are also located in this part of the ROI. There is now some concern among local economic development professionals that the stock of development land is too low to attract further large manufacturing companies.

Franklin and Gulf counties traditionally depended on the economic mainstays of oystering and fishing, as well as the St. Joe paper mill. Port St. Joe, Panama City, and Apalachicola are the three commercial ports operating within the ROI. The paper mill, now owned by Florida Coast Paper Company and the largest employer in the area, suspended operations for several months in 1997, and laid off 598 employees due to a slump in demand for its products.

Increasing the amount of tourism is seen by local community leaders as an important way of diversifying the Franklin and Gulf county economies. Downtown Port St. Joe has recently been refurbished, and a new marina with 120 wet slips and 39 dry slips is planned in order to attract recreational boaters and fishing enthusiasts.

Military housing is available at Tyndall AFB, about 56.3 kilometers (35 miles) west of Cape San Blas. Tyndall's facility provides 650 rooms, of which 280 are Visiting Officer Quarters. About 80 to 90 percent of the time these rooms are booked for training missions at Tyndall AFB, and must be reserved well in advance. Personnel not housed on base can make arrangements with local hotels that have a blanket purchase agreement to provide lodging for military personnel.

There are approximately 1,004 seasonal housing units located within a 30 minute driving time (32 kilometers [20 miles]) of Site D-3A that may be used for housing temporary military personnel (table 3.1.10-1). Availability of these units may be limited during peak tourist season.

Table 3.1.10-1: Cape San Blas Transient Housing Supply

Location	Condominiums	Hotels	TOTAL
Apalachicola	0	232	232
Mexico Beach	0	417	417
Port St. Joe	0	355	355
TOTAL	0	1,004	1,004

Source: Florida Department of Business and Professional Regulation, 1996.

3.1.10.4 Environmental Impacts and Mitigations

3.1.10.4.1 Santa Rosa Island

TMD activities on Santa Rosa Island would have a minimal positive impact on the regional economy of the Florida Panhandle. Program-related spending for labor and materials during site preparation and launch activities would generate generally beneficial increases in income and employment for the area.

The short-term (up to 4 hours) clearance of land and water areas within the LHA would impact commercial activities such as fishing, shipping, and recreation. With a maximum of 110 military and contractor personnel required for a typical launch, there would be temporary impacts on housing demand and public services.

No-action Alternative

Under the no-action alternative, the proposed ground-based TMD test activities on Santa Rosa Island would not be implemented. Current operations at Eglin AFB, which includes Santa Rosa Island, would continue. Continued Eglin AFB use of Site A-15 would result in minor changes to local or regional socioeconomic trends.

Site Preparation Activities

Interceptor

No construction requirements have been identified for interceptor launches from Santa Rosa Island. Trailers containing launchers and radar equipment would be set up at the launch location 2 weeks prior to launch. Therefore, no socioeconomic impacts are expected.

Targets

Site preparation would involve labor and materials being brought to Site A-15 for a limited period. Table 3.1.10-2 illustrates the impact of site preparation activities. A multiplier of 1.75 has been applied in order to arrive at these figures. The 1.75 multiplier recognizes the secondary beneficial impacts of money spent in the local economy.

Site preparation will have a minor economic impact on the surrounding community. It will, nevertheless, result in personal economic gain for some individuals, including construction workers and retailers, and an economic gain for the community as a whole due to the transfer of money that would not otherwise have been in circulation in the economy surrounding Santa Rosa Island. Annual total personal income in Santa Rosa County, alone, was $1.6 billion in 1994, and annual gross sales for the same year amounted to a little over $1.1 billion. The local economy is sound and relatively diverse. It includes Fort Walton Beach, where total personal income in 1994 was just over $3 billion. Within this context, site preparation would contribute between $1 million and

Table 3.1.10-2: Personnel-related Impacts of Site A-15 Preparation Activities

Launch Preparation Personnel Implications			Population		Hotel/motel/condominium Accommodation, Okaloosa, Santa Rosa, Walton Counties		Economic Impact	
Month (28 days)	Average Number of Personnel	Person/days (Cumulative)	Within Sensitive Receptor Area	Within 8 kilometers (4.9 miles)	Hotels/Motels	Condominiums	Cumulative Direct Dollar Expenditure	Cumulative Total Dollar Expenditure (including multiplied effects)
1	10	200	4,170	5,485	3,821	9,016	$125,000.00	$218,750.00
2	10	400	4,170	5,485	3,821	9,016	$250,000.00	$473,500.00
3	10	600	4,170	5,485	3,821	9,016	$375,000.00	$656,250.00
4	10	800	4,170	5,485	3,821	9,016	$500,000.00	$875,000.00
5	10	1,000	4,170	5,485	3,821	9,016	$625,000.00	$1,093,750.00
6	10	1,200	4,170	5,485	3,821	9,016	$750,000.00	$1,312,500.00
7	10	1,400	4,170	5,485	3,821	9,016	$875,000.00	$1,531,250.00
8	10	1,600	4,170	5,485	3,821	9,016	$1,000,000.00	$1,750,000.00
Total (32 weeks)	10	1,600	930	5,485	3,821	9,016	$1,000,000.00	$1,750,000.00

$1.75 million to the local economy. The increase in money circulating throughout the local economy, as a result of site preparation, would have a small but positive impact on some local residents. Quality of life impacts, for the individual, are highly subjective and often complex. Such impacts may be negative but can also be positive. In this instance, an individual's perception of a degradation (or improvement) in the quality of his or her life is assumed to be associated with changes to their surrounding economic environment.

None of the preparation activities would exclude local residents or visitors to the four-county area from any public beaches or the Gulf of Mexico waters adjacent to the test site. Site preparation would be routine and likely to involve a small number of local construction contractors over an 8-month period.

Flight Test Activities

Two types of flight test activity could be carried out on Santa Rosa Island—target launches or interceptor launches, or a combination of both. First, up to 24 target launches per year could be initiated from Site A-15. Second, up to 48 interceptor missiles could be launched.

A program of 24 target launches per annum would mean that an average of 90 personnel would be attending the Santa Rosa Island sites during the course of the year, as different launch teams overlapped. This program would generate $2,473,800 of direct expenditure in the local economy in the form of per diem expenses.

The program to launch 48 interceptors in a year assumes that two missiles per test event could be fired from Site A-15. This activity will require 110 personnel to be present throughout the 14-day build-up to each of the 24 test events. The program would generate $3,511,200 of direct expenditure in the local economy in the form of per diem expenses.

In the event that all of the personnel included in each of the flight test activities require lodging, their impact on the total number of hotel rooms and condominiums will be less than 1 percent. In order to arrive at these figures, it was assumed that each person attending the test would have an average daily expense budget of $103 per day and that the multiplier is 1.75.

The ready availability of alternative locations for fishing charters should ensure that flight test activities have virtually no economic impact on their activities. Santa Rosa Island is part of an extensive, relatively uniform coastline, in terms of the extent and quality of water and facilities.

Given the capacity of the area to absorb a large number of resident and tourist boating trips, and the availability of alternative natural resources in the form of state parks, it is unlikely that the implementation of the LHA for test events would have any significant economic impact.

Flight testing would clear certain individuals and groups within the community from the water areas within the LHA. Some of that activity would be displaced to other locations. The land and water use resource discusses the physical boundaries of the clearance area (section 3.1.7.4). The economic impacts are discussed below.

For the purposes of this analysis, it is assumed that three main groups would be cleared from the waters in the LHA as a result of flight testing. These groups are residents (including military and civilian retirees), tourists (including leisure boaters), and commercial fishermen.

At present, access by residents and tourists to the land that includes Site A-15 is closed. Although residents and tourists may be cleared from the waters in the LHA for a limited period of time while flight testing is underway, they are able to visit by water other beaches and stretches of coastline in the vicinity.

The availability of similar nearby fishing grounds to which commercial fishing vessels could be displaced suggests that there would be no substantial economic effect as a result of clearance. There is no evidence that the LHA includes any unique species unattainable from the non-exclusionary zones nearby.

Environmental Justice

Two census tracts having disproportionately high low-income or minority populations in Okaloosa County are adjacent to the proposed launch site on Santa Rosa Island. As a result, environmental justice concerns may arise. An evaluation of potential environmental justice impacts is presented in appendix C.

Cumulative Impacts

Construction of the TMD test facilities at Santa Rosa Island would take place within Eglin AFB property that was originally developed in 1959 for BOMARC missile testing over the Gulf of Mexico. In the 1980s, the complex was upgraded to test an electromagnetic rail-run for the Strategic Defense Initiative Organization. Current instrumentation sites and activities will continue for the foreseeable future. The only additional activity currently proposed for the island is the Open Air Hardware in the Loop project which would involve construction of three towers, three control buildings, and associated support facilities.

Construction of TMD test facilities at Santa Rosa Island will have little cumulative socioeconomic impact because of the very limited amount of employment and financial input involved, compared to other construction projects in the area.

The accelerating change in the relatively diverse local economy, independent of this action, suggests that the cumulative impact of test flight personnel will have a diminishing marginal effect on income and employment.

Mitigations Considered

Possible mitigations would include:

- Provide and distribute advance notification of closure dates and durations to the local public, DEM, FMP, Coast Guard, and marinas.

3.1.10.4.2 Cape San Blas

The siting and operation of proposed launch sites on Cape San Blas would have a minimal positive impact on the regional economy of the Florida Panhandle. Program-related spending for labor and materials during site preparation and launch activities would generate generally beneficial increases in income and employment for the area.

The short-term (up to 4 hours) clearance of land and water areas within the LHA would impact commercial activities such as fishing, shipping and recreation. With a maximum of 110 military and contractor personnel required for a typical launch, there would be temporary impacts on housing demand and public services.

No-action Alternative

Under the no-action alternative, the proposed ground-based TMD test activities on Cape San Blas would not be implemented. Current operations at Eglin AFB and Tyndall AFB would continue at their current or planned levels. Continuing Eglin AFB operations would result in minor changes to local or regional socioeconomic trends.

Site Preparation Activities

Interceptor

No construction requirements have been identified for interceptor launches from Santa Rosa Island. Trailers containing launchers and radar equipment would be set up at the launch location 2 weeks prior to launch. Therefore, no socioeconomic impacts are expected.

Target

Site preparation would involve labor and materials being used at Site D-3A for a limited period. Table 3.1.10-3 illustrates the economic impact of site preparation. A multiplier of 1.75 has been applied in order to arrive at these figures.

The expenditures generated by construction activity at Site D-3A would result in personal economic gain for some individuals, including construction workers and local retailers, and an economic gain for the community as a whole due to the transfer of money that would not otherwise be in circulation in the three-county economy that comprises Bay, Gulf, and Franklin counties. Gulf County had gross sales of almost $153 million in 1994 and a total personal income of $187.5 million in the same year. The nearest substantial metropolitan area to Site D-3A is Panama City, which, in 1994, had a total personal income of just under $2.5 billion. Within this context, site preparation would contribute between $1 million and $1.75 million to this local economy.

The increase in money circulating throughout the local economy, as a result of site preparation, would have a small, but nevertheless positive, impact on the quality of life of some local residents.

Table 3.1.10-3: Personnel-related Impacts of Site D-3 Site Preparation Activities

Launch Preparation Personnel Implications			Hotel/Motel/Condominium Accommodation, Apalachicola, Mexico Beach, Port St. Joe		Economic Impact	
Month (28 days)	Average Number of Personnel	Person/days (cumulative)	Hotel/motels Beds	Condominiums	Cumulative Direct Dollar Expenditure	Cumulative Total Dollar Expenditure (including multiplied effects)
1	10	200	1,002	0	$125,000.00	$218,750.00
2	10	400	1,002	0	$250,000.00	$437,500.00
3	10	600	1,002	0	$375,000.00	$656,250.00
4	10	800	1,002	0	$500,000.00	$875,000.00
5	10	1,000	1,002	0	$625,000.00	$1,093,750.00
6	10	1,200	1,002	0	$750,000.00	$1,312,500.00
7	10	1,400	1,002	0	$875,000.00	$1,531,250.00
8	10	1,600	1,002	0	$1,000,000.00	$1,750,000.00
Total (32 weeks)	10	1,600	1,002	0	$1,000,000.00	$1,750,000.00

Quality of life impacts for the individual are highly subjective and often complex. Such impacts may be negative but can also be positive. An individual's perception of a degradation (or improvement) in the quality of his or her life is assumed to be associated with changes to their surrounding economic and natural environment and freedom of access to particular areas, such as the Panhandle beaches or their surrounding waters.

None of the preparation activities would exclude local residents or visitors to the area from the public beaches and Gulf of Mexico waters adjacent to the test site. Site preparation would be routine and likely to involve less than 20 local construction contractors at any one time over an 8–month period.

Flight Test Activities

Two types of flight test activity could be carried out Cape San Blas—target launches or interceptor launches, or a combination of both. First, up to 24 target launches per year could be initiated from D-3A. Second, up to 48 interceptor missiles could be launched. Each program is analyzed below.

A program of 24 target launches per year would mean that as many as 90 personnel would be attending the Cape San Blas sites during the course of the year, as different launch teams overlapped. This program would generate $2,473,800 of direct expenditure in the local economy in the form of per diem expenses.

A program of 48 interceptor launches per year assumes that two missiles per test event could be fired from Site D-3A. This activity will require as many as 110 personnel to be present throughout the 14-day build-up to each of the 24 test events. The program would generate $3,511,200 of direct expenditure in the local economy.

The influx of personnel associated with the action would absorb about 10 percent of the total hotel capacity. In peak tourist seasons, this may lead to personnel taking rooms that would otherwise have been taken by tourists. The Florida Visitors Profile Report for Bay County (Florida Tourism Industry Marketing Corporation, 1997) shows average daily visitor expenditure to be less than $103 per day, implying that tourists would spend less than launch personnel.

The commercial impact of flight testing on public beaches in the area is likely to be minimal. Cape San Blas has very little commercial activity along its peninsula. The flight testing would limit access to Cape San Blas up to 4 hours as many as 24 times a year.

The marginal increase in money circulating throughout the local economy, as a result of flight testing, would have a positive impact on the quality of life of some local residents, mainly those engaged in the tourism industry.

Given the capacity of the area to absorb a large number of resident and tourist boating trips, and the alternative natural amenities nearby, it is unlikely that flight test exclusion from areas adjacent to Site D-3A would have any substantial economic impact.

For the purposes of this analysis, it is assumed that three main groups would be excluded from water areas around Site D-3A as a result of flight testing. These groups are residents (including military and civilian retirees), tourists (including leisure boaters), and commercial fishermen.

Although residents and tourists may be cleared from the beaches and water surrounding Site D-3A for a limited period of time while flight testing is underway, they would be able to visit other beaches and stretches of coastline in the vicinity. In addition to the beaches and waters of surrounding Cape San Blas, the area includes several state parks which also provide areas of outstanding natural beauty and an alternative destination for visitors and residents seeking quiet and solitude.

The availability of similar nearby fishing grounds to which commercial fishing vessels could be displaced suggests that there would be no substantial economic effect as a result of the LHA. There is no evidence that the LHA includes any unique species unattainable from the areas outside the LHA.

Environmental Justice

Since no census tracts having disproportionately high low-income or minority populations are adjacent to the launch site on Cape San Blas, environmental justice issues would not arise. An evaluation of potential environmental justice concerns is presented in appendix C.

Cumulative Impacts

Construction of the TMD test facilities at Cape San Blas would take place within Eglin AFB property that was originally developed in 1959 for monitoring missile testing over the Gulf of Mexico. No other major projects are currently planned. Residential and

commercial development on St. Joseph Peninsula has proceeded more slowly than for Gulf County as a whole.

The construction program of TMD test facilities at Cape San Blas is relatively modest in terms of employment and revenue generated. The local economy, however, will benefit from the employment of construction workers, adding to the recent upturn found in other local industrial sectors.

Flight test activities will generate a demand for local lodging. The surrounding counties have an expressed strategy to increase tourism in the area. The influx of test personnel throughout the year will help reduce the seasonal impacts associated with the growing tourist industry and will help to underpin the regional tourism strategy. No other projects have been identified at this location for the foreseeable future which, when combined with the proposed action, would result in cumulative impacts.

Mitigations Considered

Possible mitigations would include:

- Provide and distribute advance notification of closure dates and durations to the local public, DEM, FMP, Coast Guard, and marinas.

3.1.11 TRANSPORTATION

Site preparation and flight test activities would generate a small increase in Annual Average Daily Traffic (AADT) on Santa Rosa Island and Cape San Blas. AADT on affected roadways on Santa Rosa Island would increase by less than 1 percent; these road segments are projected to be at or beyond their design capacity without the program-related traffic.

On Cape San Blas, project-related traffic for flight test activities would represent a 40 percent increase in AADT, however, all affected roadways are well below their design capacity. Each flight test would require the temporary closure of County Road 30E up to 4 hours per test event.

3.1.11.1 Resource Description and Evaluative Methods

The purpose of the transportation resource section is to address the road and water transport system and its use within a ROI defined for each of the proposed launch alternatives. Two categories are encompassed under the term transportation:

- The system of public streets and highways within the ROI and their use by vehicles
- The waterways of the Intracoastal Waterway and the Gulf of Mexico

Discussion of marine shipping in the Intracoastal Waterway and in shipping channels in the open Gulf of Mexico is contained in transportation resource section 3.2.11.

The principal issue to be addressed related to highways is the potential for increased traffic. Baseline traffic volumes, highway capacities, levels of service, and remaining highway capacities for current conditions are compared to forecast traffic volumes, including planned highway improvements and the related increase in highway capacity. Estimates of the increase in traffic related to the proposed action, were compared to the remaining capacity, including the following considerations:

- Proportional increase in annual average daily traffic (AADT) on public streets and highways that results from the proposed action. This is based on a comparison of forecast average annual daily traffic with and without the proposed action. The sources of data for forecast traffic volumes are the Metropolitan Planning Office, Florida Department of Transportation (FDOT), or local Comprehensive Plans.
- Proportional reduction in the remaining capacity of public streets and highways in the ROI that results from the proposed action. The source of data for forecast traffic volumes are the Metropolitan Planning Office (MPO), FDOT, or local Long Range Transportation Plans. Highway capacities are based on the FDOT LS tables, local studies, or MPO planning documents, as available.

- There are no plans to use a truck "convoy" for transportation of missile components or instrumentation trucks.

- Number of motorists that are delayed or detoured because of highway closure for launch events and proportion of motorists on roads in the LHA that are delayed or detoured as a result of highway closure during launch events

3.1.11.2 Region of Influence

The ROIs for transportation are defined as follows:

- Public streets and highways are in the ROI if they are the direct routes used for access in and egress from the launch sites and instrumentation sites, for launch-related personnel, missile components, and instrumentation equipment, and other related traffic.

- Sections of the Intracoastal Waterway System in the ROI are sections between Pensacola and Key West that fall within any of the potential exclusion zones formed by the launch hazard area, falling boosters, or falling debris from any of the proposed action alternatives. This subject is discussed further in section 3.2.11.

- The ROI for marine cargo and commercial shipping activities crossing the open Gulf of Mexico are discussed in section 3.2.11.

Santa Rosa Island

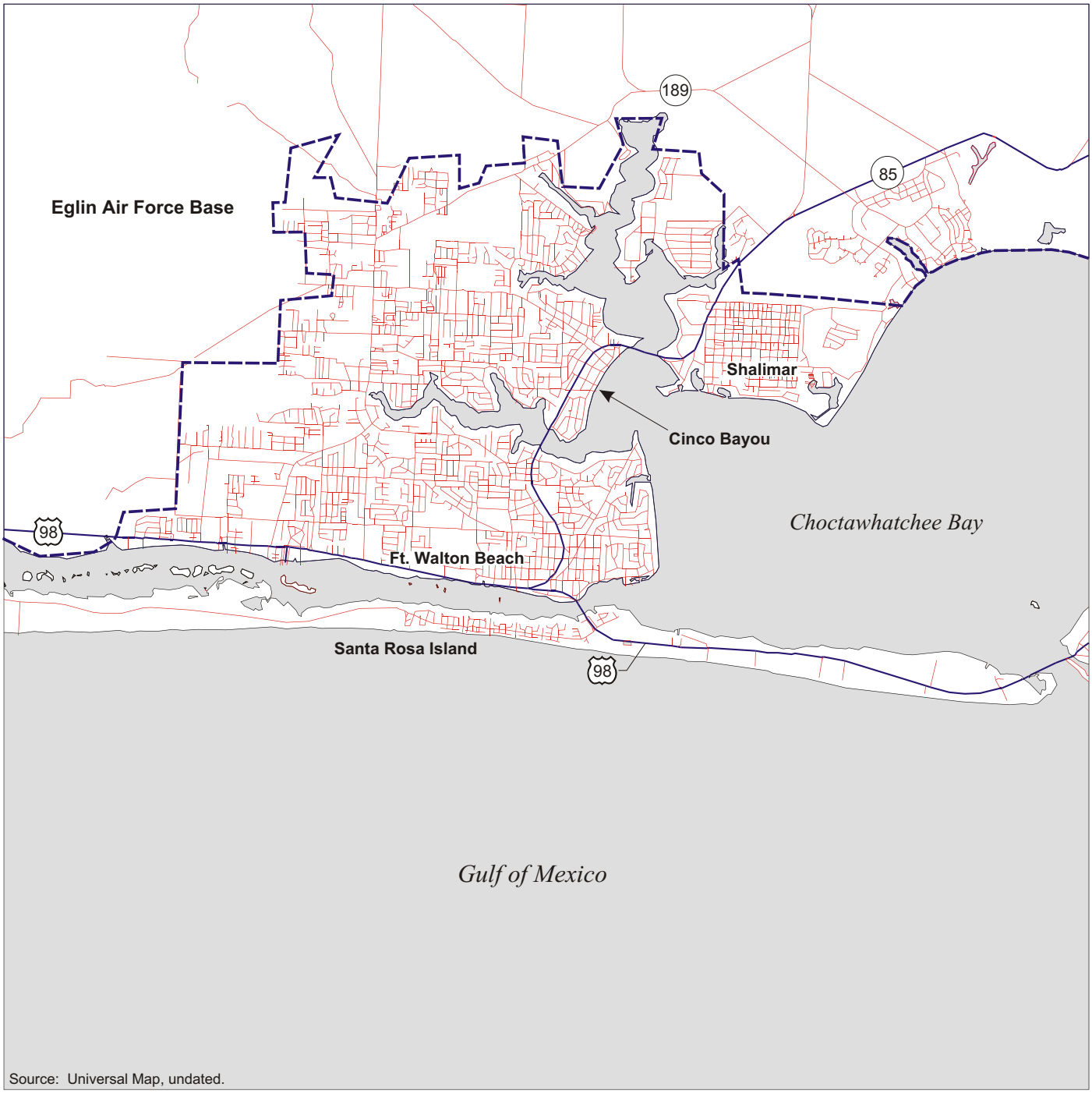
The ROI for highway transportation inside the Eglin AFB on Santa Rosa Island includes the main road inside the base from the gate, going west to the entrance to Site A-15, where the launch pad would be located (figure 3.1.11-1). At Site A-15 paved service roads would connect the launch pad, MAB, launch equipment building, and LOTs.

The ROI for highway transportation outside the base extends east along Santa Rosa Boulevard from the base entrance gate, north across the Santa Rosa Sound, and then along U.S. 98 in both directions. On the east end of U.S. 98, the ROI extends to the East Pass Bridge near Destin, and to the west it extends to the Santa Rosa Okaloosa County line.

Cape San Blas

Site D-3A is located at Cape San Blas on the St. Joseph Peninsula approximately 67 kilometers (42 miles) southeast of Panama City, Florida.

The ROI extends outside the base for 16 kilometers (10 miles) in all directions from Site D-3A. This area includes State Roads 30E, and 30A and U.S. 98 that interconnect Cape San Blas, Port St. Joe, and Apalachicola (figure 3.1.11-2).



Source: Universal Map, undated.

EXPLANATION

- Roads
- Eglin AFB Boundary
- State Highways
- U.S. Highways

Scale 1:100,000

0 1 2 Miles

0 1.5 3 Kilometers

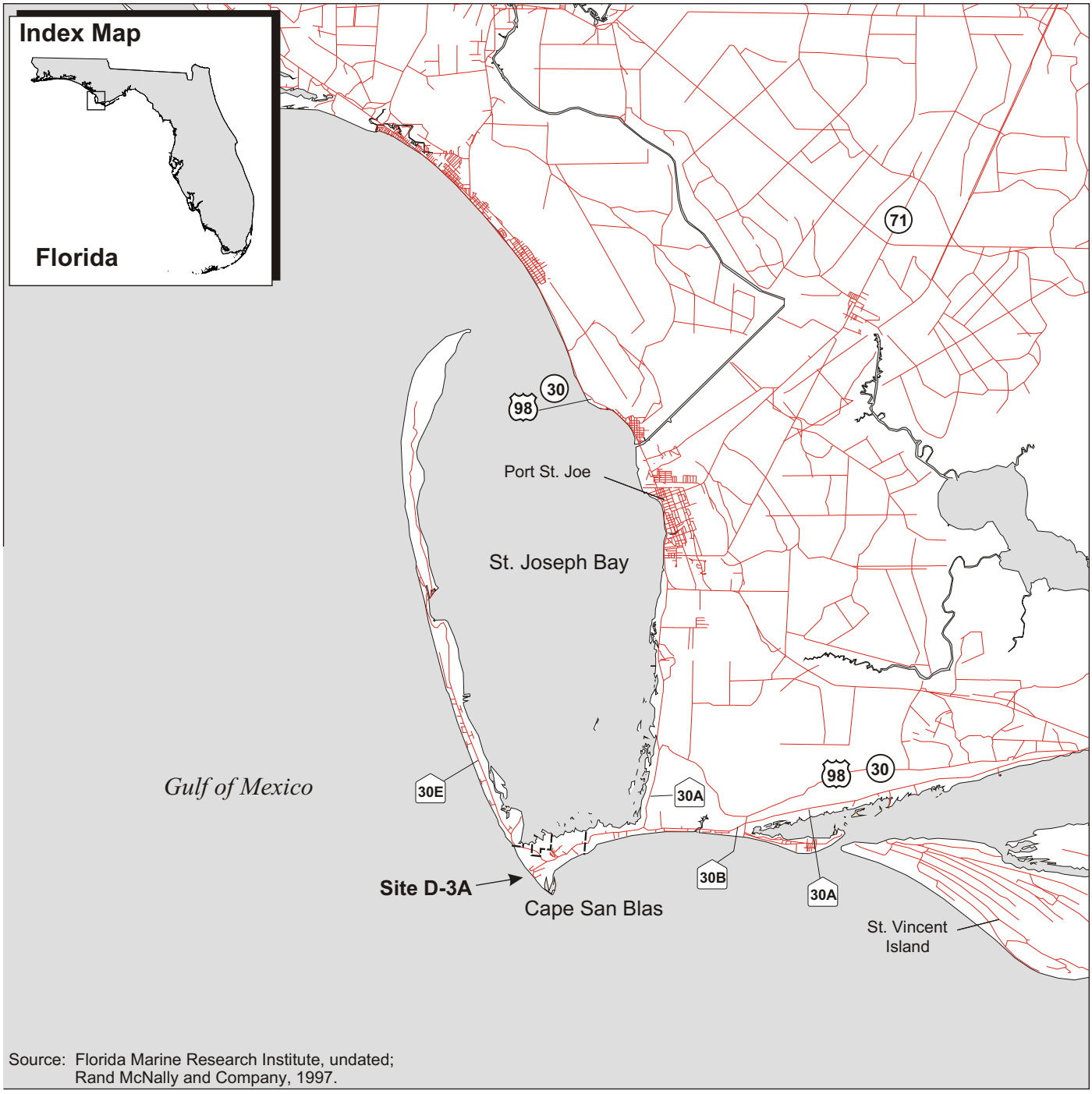
NORTH

sri-100k-3trans001a

Region of Influence for Transportation

Santa Rosa Island, Florida

Figure 3.1.11-1



Source: Florida Marine Research Institute, undated;
Rand McNally and Company, 1997.

EXPLANATION

- Roads
- Government Property
- County Roads
- State Highways
- U.S. Highways

Scale 1:250,000
0 2 4 Miles
0 3 6 Kilometers

NORTH

Region of Influence for Transportation

Cape San Blas, Florida

Figure 3.1.11-2

csb-250k-3trans001

3.1.11.3 Affected Environment

3.1.11.3.1 Santa Rosa Island

Sites A-15 and A-10 are located on Santa Rosa Island on property owned by Eglin AFB that is physically separate from the main base area. Santa Rosa Island is at the reservation's southwest boundary, lying directly on the coast (figure 3.1.11-1). Santa Rosa Island is a barrier island that extends approximately 72 kilometers (45 miles) from Choctawhatchee Bay to the east and Pensacola Bay to the west, forming Santa Rosa Sound.

Within the Santa Rosa Island ROI, there are four major highway routes: Santa Rosa Boulevard; U.S. 98/State Road 30; State Road 85; and State Road 189 (Beal Highway)

Santa Rosa Boulevard is a paved, two-lane collector road through Eglin AFB test sites. Santa Rosa Boulevard turns north across a four-lane bridge (Brooks Bridge) spanning the Santa Rosa Sound.

U.S. 98/State Road 30 is located along the Gulf of Mexico, and connects Fort Walton Beach with Panama City and Apalachicola to the east and Pensacola to the west. U.S. 98 is a four-lane, state-maintained principal arterial from Pensacola to west of the U.S. 331/State Road 83 intersection, where it becomes a two-lane arterial. The beach areas along U.S. 98 have a long, narrow road network with heavy traffic congestion associated with strip commercial land uses supporting tourist-oriented activity. Table 3.1.11-1 shows recent traffic count and level of service (LOS) data available for this route.

Table 3.1.11-1: U.S. 98 on Santa Rosa Island East of Brooks' Bridge to Highway 30F in Destin

Segment	Approximate Kilometers (miles)	1995 ADT	Lanes	1995 LOS	Capacity LOS D	Remaining Capacity
Florida Pl. to Beasley State Pk.	3.2 (2.0)	48,567	4, divided	F	35,700	0
Beasley State Pk. to East Pass Bridge	5.3 (3.3)	37,500	4, divided	F	35,700	0

Source: Fort Walton Beach Metropolitan Planning Organization, 1996.

In 1996, the average daily traffic on U.S. 98 within the ROI ranges from 33,200 vehicles per day between Florida Place and Mary Esther Boulevard to a high of 48,567 vehicles per day between and Florida Place and Beasley Park. Table 3.1.11-2 shows recent traffic count and LOS data available for this route.

Table 3.1.11-2: U.S. 98 West to Santa Rosa County Line

Segment	Approximate Kilometers (miles)	1995 ADT	Lanes	1995 LOS	Capacity LOS D	Remaining Capacity
Florida Place to Mary Esther Blvd.	3.0	33,200	4	C	35,700	2,500
Mary Esther Blvd. To Hurlburt Field	2.7	37,667	4, divided	F	33,300*	0
Hurlburt Field to Santa Rosa Co. Line	5.8	35,250	4, divided	F	33,300*	0

*Capacity at LOS C
Source: Ft. Walton Beach Metropolitan Planning Organization, 1996.

This stretch of U.S. 98 is currently operating at an LOS ranging from C to F with no remaining capacity except near Mary Esther. Unacceptably low LOSs (below LOS C) existed on approximately 22.2 kilometers (13.8 miles) of the 27 kilometers (16.8 miles) of U.S. 98 within the ROI. Heavy trucks account for 899 vehicles per day, or 2.8 percent of total traffic on U.S. 98 in Fort Walton Beach in 1996 (Florida Department of Transportation, 1996).

State Road 85 is a four-lane principal arterial where it begins at U.S. 98 just west of the Brooks Bridge, and becomes a six-lane divided highway as it crosses Racetrack Road (State Road 188) until Twelfth Avenue, where it narrows to four lanes, divided. State Road 85 connects the North Gate of Eglin AFB with Fort Walton Beach. Then State Road 85 skirts the Eglin AFB main base and crosses State Road 189 continuing through Niceville.

Table 3.1.11-3 shows recent traffic count and LOS data available for this route. In 1995, AADT on State Road 85 ranged from 8,000 vehicles per day between U.S. 98 and First Street, with an LOS of C, to a high of 48,000 vehicles per day between Racetrack Road and Twelfth Avenue, where the LOS was E. Low LOSs (below LOS D) existed on approximately 2.4 kilometers (1.5 miles) of the 10.5 kilometers (6.5 miles) within the ROI.

Table 3.1.11-3: SR 85 from U.S. 98 to SR 189 on Eglin AFB

Segment	Approximate Kilometers (miles)	1995 ADT	Lanes	1996 LOS	Capacity LOS D	Remaining Trips
U.S. 98 to 1st Street	0.5 (0.3)	8,000	4	C	29,545	21,545
1st Street to Racetrack Road	4.5 (2.8)	38,567	6, divided	D	47,500	8,933
Racetrack Road to 12th Ave.	2.4 (1.5)	48,000	6, divided	E	47,500	0
12th Ave. to State Road 189	3.1 (1.9)	35,500	4, divided	D	35,700	200

Source: Ft. Walton Beach Metropolitan Planning Organization, 1996.

State Road 189 (Beal Parkway) serves as a four-lane minor arterial along the northwest side of Fort Walton Beach, continuing northeastward to the West Gate of Eglin AFB. Table 3.1.11-4 shows recent traffic count and LOS data available for this route.

Table 3.1.11-4: State Road 189 (Beal Parkway) from U.S. 98 to SR 85

Segment	Approximate Kilometers (miles)	1995 ADT	Lanes	1996 LOS	Capacity LOS D	Remaining Trips
U.S. 98 to Yacht Club Dr.	6.4 (4)	16,400	4, divided	B	33,915	17,515
Yacht Club Dr. to Mary Esther Blvd.	2.4 (1.5)	25,250	4, divided	B	35,700	10,450
Mary Esther Blvd. to Racetrack Rd.	2.4 (1.5)	40,750	4, divided	F	31,100	0
Racetrack Rd. to Mooney Rd.	3.4 (2.1)	29,375	4, divided	C	35,700	6,325
Mooney Rd. to State Road 85	4.8 (3.6)	25,900	4, divided	B	35,700	9,800

Source: Ft. Walton Beach Metropolitan Planning Organization, 1996.

In 1995, AADT on State Road 189 ranged from 16,400 vehicles per day between U.S. 98 and Yacht Club Drive (LOS B) to a high of 40,750 vehicles per day between Mary Esther Boulevard and Racetrack Road, where the LOS was F. Low LOSs (below LOS D) existed on approximately 2.4 kilometers (1.5 miles) of the 20.4 kilometers (12.7 miles) within the ROI.

The following improvements to highways in the ROI are scheduled for construction in the next 10 years, according to the Fort Walton Beach Metropolitan Planning Organization's Project Priorities, FY 1997/1998 through FY 2001/2002:

- MPO Areawide Traffic Signal Synchronization System–study and implement a computer based traffic signal control system with priority to be given to U.S. 98 in Destin, Fort Walton Beach, and Mary Esther.

Other major projects are proposed by 2015, but not scheduled for construction at this time:

- U.S. 98 at Santa Rosa Boulevard–construct a grade separated interchange
- U.S. 98–provide improvements in the U.S. 98 corridor from Santa Rosa County line to East Pass Bridge–method to be determined through Florida Department of Transportation coordination with cities of Fort Walton Beach and Mary Esther.

3.1.11.3.2 Cape San Blas

The ROI includes three major highway routes: State Roads 30A and 30E from the St. Joseph Peninsula State Park entrance gate to the Franklin County line, State Road 30A north of 30E to its intersection with U.S. 98, and U.S. 98 from its intersection with State Road 30A in Port St. Joe to the Franklin County line.

Access to Site D-3A is from County Road 30E that traverses the length of Cape San Blas. The north end of County Road 30E terminates at the St. Joseph Peninsula State Park, located about 9.7 kilometers (6 miles) north of the entrance to Site D-3A. From the military gate, County Road 30E turns east and joins State Road 30A. County Road 30E and State Road 30A are county maintained two-lane collector routes with a paved width of about 5.5 to 6 meters (18 to 20 feet). State Road 30A goes about 11.3 kilometers (7 miles) north from County Road 30E to connect with U.S. 98 towards Port St. Joe.

U.S. 98 is a four-lane arterial road maintained by the State of Florida.

Table 3.1.11-5 shows average annual daily traffic counts from FDOT's District 3 Office in Chipley, Florida, along with an assessment of the LOS and remaining capacity for each segment. All segments are operating at acceptable LOSs (LOS C or better), with adequate remaining capacity for further growth. According to FDOT, heavy trucks on U.S. 98 east of State Road 30A accounted for 199 vehicles per day or 8.6 percent of total vehicular traffic in 1996 (Florida Department of Transportation, 1996).

Table 3.1.11-5: Traffic Data for Cape San Blas ROI - State Road 30E/30A and U.S. 98

Segment FDOT Count Station Number	Approximate Kilometers (miles)	1996 ADT	Lanes	1996 LOS	Capacity LOS C	Remaining Trips
# 122 - 30E west of State Road 30A	23.3 (14.5)	1,100	2	B	9,200	8,100
# 70 - 30A to U.S. 98 in Port St. Joe	4.8 (3.5)	1,650	2	A	10,600	6,950
# 1501 - U.S. 98 - Port St. Joe	2.4 (1.5)	3,200	4	A	22,400	19,200
# 113 - U.S. 98 to SR 30A	1.8 (1.1)	1,900	4	B	10,600	8,700
# 114 - U.S. 98 east of 30A	13.0 (8.1)	2,200	4	A	22,400	20,200
# 102 - from SR 30E to Franklin Co.	9.7 (6.0)	1,000	2	A	10,600	9,600

Source; Florida Department of Transportation, 1995, 1996; Ft. Walton Beach Metropolitan Planning Organization, 1996.

Average daily traffic on County Road 30E at station #122, east of the entrance to Site D-3A, was approximately 1,100 vehicles per day in 1996. This traffic includes traffic from residents of Cape San Blas as well as visitors to the state park. Consequently, traffic

varies seasonally. The peak month of park visitation is July, and the low month is December (table 3.1.11-6).

Table 3.1.11-6: Monthly Visitation at St. Joseph Peninsula State Park, Cape San Blas

Month	1993	1994	1995
January	3,021	1,824	3,358
February	4,329	3,397	5,085
March	8,641	9,081	9,936
April	10,978	7,593	13,548
May	9,495	8,700	10,078
June	11,978	10,179	12,487
July	18,859	12,321	20,331
August	10,803	9,643	9,265
September	5,075	5,781	6,170
October	4,914	4,582	357
November	3,575	4,161	0
December	2,678	2,731	2,357
TOTAL	94,346	79,993	92,990

Source: University of Florida, Bureau of Economic and Business Research, College of Business Administration, 1996.

3.1.11.4 Environmental Impacts and Mitigations

3.1.11.4.1 Santa Rosa Island

AADT on affected roadways on Santa Rosa Island would increase by less than 1 percent. These road segments are projected to be at or beyond their design capacity without the program-related traffic.

No-action Alternative

Under the no-action alternative, the proposed ground-based TMD activities would not be implemented. Continued Eglin AFB use of Site A-15 may effect land or water transportation. The current transportation patterns and growth would continue.

Site Preparation Activities

Interceptor

No construction requirements have been identified for interceptor launches from Santa Rosa Island. Trailers containing launchers and radar equipment would be set up at the launch location 2 weeks prior to launch. No more than 10 vehicles would be involved in site preparation for an interceptor launch. This would cause a negligible increase in daily traffic.

Target

Site A-10 would serve as the site for optics, radar, and RDAS instrumentation for target launches from Site A-15. Other than minimal installation of RDAS mounting poles on road right of way, no construction is needed to prepare Site A-10 for its planned use as a location for mobile instrumentation test. Therefore, there would be no transportation effects from site preparation activities.

Site A-15 would be a target launch site. Construction activity is expected to require 6 personnel for a period of 8 months, expanding to 15 personnel during the middle of the construction period. This will likely increase daily vehicle traffic on U.S. 98, Santa Rosa Boulevard, by a total of 16 to 67 vehicle trips, assuming 5 trips per person and an auto occupancy rate of 1.5 persons per vehicle for a period of up to 8 months. This increase in traffic is very small in proportion to current daily traffic volumes and would have little effect on the levels of service or maintenance of vicinity roads. There would be no road closures, therefore no traffic disruption.

The transport and handling of missiles and missile components related to the proposed action is discussed in section 3.1.9.4. When necessary to transport missiles and missile components over public highways, it would be done in accordance with Federal safety regulations of the USDOT concerning transportation of hazardous materials.

The Minuteman Stage II booster motor is shipped with the FTS attached. The initiator of this FTS assembly is not part of the shipped motor. The FTS is a linear shaped charge designed to split the rocket motor case. The FTS would not detonate without an initiator. Should a vehicle accident damage the booster, it is more likely to burn than explode. The booster motors are shipped with both ends open, so any fire would not result in sufficient compression for an explosion or propulsion. The designation as a DOD Class 1.1 does not mean that the propellant is explosive. In fact, the propellant has less equivalent energy per mass than gasoline.

Flight Test Activities

Interceptor and Target

Site A-15 is also proposed as a launch site for interceptor missiles. Although there may be minor construction and modification of facilities and infrastructure to support interceptor missile launches, maximum use would be made of existing infrastructure and facilities. Interceptor missile launches are not expected to require the temporary closure of any public roads on Santa Rosa Island.

There would be a maximum of 24 test events per year from Site A-15. Each test event could require a maximum of 110 personnel with varied lengths of assignment to the site. With an average personnel count of approximately 14,000 in 1993 (Air Force Magazine, 1994), the additional program personnel would represent less than 1 percent of the personnel typically working at Eglin AFB. This is well within the normal fluctuation in traffic resulting in personnel shifts at Eglin AFB as other programs come and go and as activity builds up and winds down. Overall infrastructure in the area is adequate for the current and proposed levels of test activity at Eglin AFB. The proposed action alternative

would require only minor modification to existing facilities at Eglin AFB and within test areas of Santa Rosa Island. The program would use existing transportation facilities and is not expected to require additional road construction.

Table 3.1.11-7 presents the daily fluctuation in personnel and the associated number of trips generated each day during a typical 34-day target missile launch test cycle. The vehicle trip generation rate per person is based on the weekday rate per employee for Military Bases, Land Use 501 (Institute of Transportation Engineers, 1991).

The mean traffic effect during the entire launch cycle would be 150 daily trips. The minimum would be only 42 daily trips. The maximum traffic level of 376 daily trips would only take place for 1 day per launch event.

Table 3.1.11-8 presents the amount of project traffic expected during a launch event on a maximum activity day, assuming an interceptor missile launch with 110 personnel assigned to Santa Rosa Island. These trips would be distributed by direction in proportion to the spatial distribution of 460 transient housing units in the ROI, as discussed in section 3.1.7. Approximately 30 percent, or 138 trips, would be to and from the east on U.S. 98 towards Destin. Approximately 15 percent, or 70 trips would be to and from the west on U.S. 98, toward Mary Esther, Navarre, and Pensacola. Approximately 55 percent, or 138 trips, would be to and from the north on State Road 85 toward Ft. Walton Beach, Shalimar, and Niceville.

The resulting traffic increase would be very small, ranging from 0.1 percent to 0.5 percent of the total annual average daily traffic expected on the major highways in the ROI in 2005. Of the segments shown, all would be beyond their design capacity.

Impositions of the LHA would require halting of boat and barge traffic in the Gulf Intracoastal Waterway for periods of up to 4 hours per test event. See section 3.2.11.4 for further discussion.

Cumulative Impacts

Current instrumentation sites and activities will continue for the foreseeable future. Additional activity currently proposed for the island is the Open Air Hardware in the Loop project which would involve construction of three towers, three control buildings, and associated support facilities. This project would contribute to the traffic in the vicinity.

The members of the community are familiar with the recurring impacts of Eglin AFB's military activity on the local transportation system, including the use of public streets to convey military personnel and equipment. It is not anticipated that this program would differ in any obvious ways from numerous similar Air Force test operations that have been based at Eglin in the past.

However, due to the sustained presence of program personnel, there may be cumulative effects arising from this program due to its local economic activity (as a result of construction, lodging, retail and associated indirect consumer expenditures) in the ROI.

Table 3.1.11-7: Daily Personnel and Traffic Generation for Typical Test Event

Day	Personnel	Vehicle Trips at 4.18 per person/day
1	10	42
2	10	42
3	10	42
4	10	42
5	10	42
6	10	42
7	10	42
8	20	84
9	20	84
10	20	84
11	20	84
12	20	84
13	20	84
14	20	84
15	35	146
16	35	146
17	35	146
18	35	146
19	35	146
20	35	146
21	35	146
22	75	314
23	75	314
24	75	314
25	75	314
26	75	314
27	75	314
28	75	314
29	90	376
30	20	84
31	20	84
32	10	42
33	10	42
34	10	42
Maximum	90	376
Minimum	10	42
Mean	33.5	140
Total Person–days per test event = 1,140		
Total vehicle trips per test event = 4,640		

Table 3.1.11-8: Forecast Traffic Data for Santa Rosa Island ROI (Interceptor Launch)

Roadway Segment	2005 Capacity (1)	2005 ADT (2)	Remaining Capacity (3)	Project Traffic (4)	% of 2005 ADT (5)	% of Remaining Capacity (6)
U.S. 98 west, Mary Esther Blvd. to Hurlburt Field	33,300 (LOS C)	50,047 (LOS F)	0	70	0.1%	NA(7)
U.S. 98, between State Road 85 and Brooks Bridge	35,700 (LOS D)	65,357 (LOS F)	0	322	0.5%	NA(7)
U.S. 98 Brooks Bridge to Beasley State Park	35,700 (LOS D)	65,357 (LOS F)	0	138	0.2%	NA(7)

Source: Fort Walton Beach Metropolitan Planning Organization, 1996.
1. Capacity based on FDOT LOS Manual Generalized Tables using LOS prescribed in MPO Roadway Level of Service Analysis
2. Projected Volume based on MPO Roadway Level of Service Analysis
3. Difference of column 1 minus column 2
4. Project traffic of 460 trips distributed based on transient housing supply
5. Column 4 divided by column 2
6. Column 4 divided by column 3, where column 3 is greater than 0

The additional traffic resulting from the indirect and cumulative economic activity is expected to increase average annual and peak hour traffic in the ROI by less than 1 percent of the future levels of traffic otherwise forecast on state and Federal routes serving the ROI.

Mitigations Considered

By ensuring compliance with DOT hazardous materials transportation regulations, additional mitigations are not required. SOPs would include coordination of emergency response plans and emergency access procedures with appropriate State and local authorities.

The small increase in traffic due to TMD activities would contribute marginally to the exceedance of road capacities in the ROI. Traffic management strategies may be proposed to minimize program impact on these roadways, such as utilization of low density traffic hours for construction traffic and missile components, minimization of duration of LHA road closures, and publication of closure dates and duration.

3.1.11.4.2 Cape San Blas

AADT on affected roadways would increase as much as 40 percent. These road segments are well below their design capacity. This increase would account for less than 6 percent of the remaining road capacity. Each flight test would require the temporary closure of County Road 30E up to 4 hours per test event.

No-action Alternative

If the proposed action does not take place, there would be no additional traffic volumes anticipated on base roads inside the military base at Site D-3A. Annual average daily traffic on State Road 30E, 30A, and U.S. 98 is not expected to increase based on the historical record over the last 10 years. For instance, average annual traffic volume on U.S. 98 at station 114 east of State Road 30A was 2,486 vehicles per day in 1986 and 2,200 vehicles per day in 1995. Traffic volume at station 122 on County Road 30E on Cape San Blas was 801 vehicles per day in 1986 and 1,100 vehicles per day in 1996. This was despite the fact that Gulf County has issued an average of 18 residential building permits per year over the last 3 years. Compared to the 489 dwelling units on Cape San Blas in 1994, this represents a 4 percent annual increase in housing units. However, it is possible that some of these permits were issued for replacement units following destruction by hurricanes such as Hurricane Opal.

Traffic volumes in the future are expected to remain at levels substantially below the capacity of a rural two-lane road (10,600 vehicles per day). Overall, traffic volume on the state highways in the Cape San Blas area are operating at average annual daily volumes which are 10 to 15 percent of their design capacity. Consequently, the FDOT has planned no capacity improvements for these roadways.

Site Preparation Activities

Interceptor

No construction requirements have been identified for interceptor launches from Cape San Blas. Trailers containing launchers and radar equipment would be set up at the launch location 2 weeks prior to launch. No more than 10 vehicles would be involved in site preparation for an interceptor launch. This would cause a negligible increase in daily traffic.

Target

Site D-3A would be a missile launch site. Site preparation activities related to the proposed launch of target missiles from Site D-3A consist of a small amount of site clearing and grading, drainage, utility, and road improvements, along with construction of the launch pad, environmental shelter, MAB, LOT, launch equipment building, and other minor facilities as required. Altogether, this construction activity is expected to increase vehicle traffic on County Road 30E by approximately 16 to 50 vehicles per day for a period of up to 8 months. This would increase traffic on County Road 30E by 4.5 percent and would not diminish the level of service on any state highway (table 3.1.11-9).

Table 3.1.11-9: Forecast Traffic Data for Cape San Blas ROI

Roadway Segment	2005 Capacity (1)	2005 ADT (2)	% Capacity	Remaining Capacity (3)	Project Traffic (4)	% of 2005 ADT (5)	% of Remaining Capacity (6)
#122 - 30E west of 30A	9,200 (LOS C)	1,100 (LOS B)	12.0	8,100	460	41.8%	5.7%
#70 - 30A to U.S. 98 in Port St. Joe	10,600 (LOS C)	1,650 (LOS A)	15.6	6,950	354	21.4%	5.1%
#1501 - U.S. 98 in Port St. Joe	22,400 (LOS C)	3,200 (LOS A)	14.37	19,200	354	11.1%	1.8%
#114 - U.S. 98 east of 30A	22,400 (LOS C)	2,200 (LOS A)	9.8	20,200	0	0	NA
#102 - 30A east from 30E to Franklin County	10,600 (LOS C)	1,000 (LOS A)	9.4	9,600	106	10.6%	1.1%

1. Capacity based on FDOT LOS Manual Generalized Tables.
2. Projected Volume based on historical trend of no growth in traffic
3. Difference of column 1 minus column 2
4. Project traffic distributed based on transient housing supply
5. Column 4 divided by column 2
6. Column 4 divided by column 3, where column 3 is greater than 0

Flight Test Activities

Interceptor and Target

Site D-3A would be a target or interceptor launch site. There would be a maximum of 24 target launch events per program year operated from Site D-3A. Each target launch event could require as many as 90 personnel with varied lengths of assignment to the site over a period of 34 days. The maximum number of personnel on site at one time is anticipated to be 90 for a period of 1 day per launch. For interceptor launches, each launch event could require as many as 110 personnel for up to 2 weeks.

Table 3.1.11-7 presents the daily fluctuation in personnel and the associated number of trips generated each day during a typical 34 day target missile launch test cycle. The vehicle trip generation rate of 4.18 one-way trips per person is based on the weekday rate per employee for Military Bases, Land Use 501 (Institute of Transportation Engineers, 1991). The mean traffic effect during the entire launch cycle would be 140 daily trips. The minimum would be 42 daily trips. The maximum traffic level of 460 daily trips would only take place for 1 day per launch event.

Table 3.1.11-7 also presents the amount of project traffic expected during a launch event on a maximum activity day, assuming an interceptor missile launch with 110 personnel assigned to Cape San Blas. The maximum effect on the transportation system associated with an interceptor launch event is estimated to be approximately 460 additional vehicle trips per day. These trips would be distributed by direction in proportion to the spatial distribution of transient housing in the ROI, as discussed in section 3.1.7. Approximately 77 percent, or 354 trips per day, would be to and from the northeast on State Roads 30E and 30A toward Port St. Joe and Mexico Beach; 23 percent, or 106 trips, would be to and from the east on 30A toward Apalachicola. No additional traffic is anticipated on U.S. 98.

The analysis above shows that the additional traffic from the proposed action alternative represents approximately 10 to 40 percent of the projected average daily traffic on the maximum days of activity. On an annual average, project traffic would account for 5 to 19 percent of forecast traffic on these major highways. Even during the days of highest traffic generation, the remaining capacity would be reduced by only 6 percent, causing a negligible impact on LOS. The additional traffic may have a negligible effect on the maintenance of roads and bridges in the ROI because of the low level of current traffic volumes.

In addition to local traffic from personnel driving in and out of Cape San Blas, the proposed action requires occasional truck traffic to and from the MAB when missile components are delivered to the site. Approximately four tractor-trailer truck trips per month would be added to State Road 71 between U.S. 98 in Port St. Joe and I-10. On an average day, this additional traffic would be less than 1/10 percent of total vehicle traffic and approximately 1 percent of heavy truck traffic on State Road 71 (Florida Department of Transportation, 1996.

During test events County Road 30E would be closed to traffic approaching the LHA from either direction for a period up to an hour. Persons inside the LHA would leave before the road is closed. Emergency vehicles would be allowed to pass with minimum delay.

Closing County Road 30E would have the effect of interrupting eastbound traffic on County Road 30E from the residential area on Cape San Blas as well as traffic from St. Joseph Peninsula State Park. With 94,346 visitors to St. Joseph Peninsula State Park in 1993, a 4-hour closure of County Road 30E leading to the park would delay as many as 89 persons on an average day in the busiest month, and as few as 13 individuals on an average day in December, the month with the least visitors. (U.S. Army Space and Strategic Defense Command, 1994a)

Basing the calculation on 1996 hourly traffic counts on County Road 30E from the FDOT yields slightly higher numbers of delayed vehicles—about 82 eastbound vehicles and 54 westbound vehicles for a 4-hour delay. FDOT weekly volume factor data indicates that roadway traffic in Gulf County peaks in Spring and Summer and is the lowest during Winter.

Cumulative Impacts

No other major projects are currently planned. Residential and commercial development on St. Joseph Peninsula has proceeded more slowly than for Gulf County as a whole.

The members of the community are familiar with the recurring impacts of Air Force activity on the local transportation system, including the use of public streets to convey military personnel and equipment. It is not anticipated that this program would differ in any obvious ways from numerous similar Air Force test operations at Cape San Blas. Advance notification of test activities and scheduled road closures would reduce traffic impacts.

Mitigations Considered

By ensuring compliance with DOT hazardous materials transportation regulations, additional mitigations are not required. However, SOPs would include preparation and coordination of emergency response plans and emergency access procedures with appropriate State and local authorities.

Notification of closure of County Road 30E would be accomplished by notifying the local media. Road closures would be coordinated with local law enforcement agencies.

Traffic management strategies, utilization of low density traffic hours for construction traffic and missile components, minimization of the duration of LHA road closures, publication of closure dates and durations, and installation of adequate signage and turn around space may be proposed to minimize program impact.

3.1.12 UTILITIES

Additional utility demands at proposed TMD testing and training sites on Santa Rosa Island and Cape San Blas would not exceed existing capacities of local public utility systems. TMD test operations may affect potable water, wastewater treatment, electricity, solid waste management and stormwater management.

3.1.12.1 Resource Description and Evaluative Methods

Potable Water

Potable water supply includes sources of water for human consumption within the ROI. Suppliers of potable water are either individual wells or water utility companies that extract water from underground aquifers. A potable water supply system normally consists of a water supply source, a treatment plant, and a distribution and storage network.

The measures for the portion of the utility resource area related to site alternatives at Eglin AFB and the Florida Keys are as follows:

- Affected Environment: The measurement being used is gallons of water per year to express the annual local potable water demand of the host community.
- Proposed Action: Annual local potable water demand resulting from the proposed action
- Impacts of the Proposed Action: Proportionate increase in annual local potable water demand resulting from the proposed activities

Wastewater Treatment

The proposed sites that require sanitation facilities are supported by septic tanks. Because onsite disposal systems do not have a measuring devise such a meter, an assumption will be made that the amount of potable water entering a structure via a metered line is equal to the amount of wastewater generated.

The measures for the portion of the utility resource area related to site alternatives at Eglin AFB and the Florida Keys are as follows:

- Affected Environment: Annual local wastewater treatment demand in the host community
- Proposed Action: Annual local wastewater treatment demand resulting from the proposed action
- Impacts of the Proposed Action: Proportionate increase in annual local wastewater treatment demand resulting from the proposed activities

Solid Waste Management

Solid waste management refers to the collection and disposal of municipal waste products and construction and demolition materials within the ROI.

The measures for the portion of the utility resource area related to site alternatives at Eglin AFB and the Florida Keys are as follows:

- Affected Environment: Annual cubic feet of solid waste generated by host community
- Proposed Action: Annual cubic feet of solid waste generated by proposed action
- Impacts of the Proposed Action: Proportionate increase in annual cubic feet of local solid waste resulting from the proposed activities

Stormwater Management

Stormwater management refers to comprehensive strategies for dealing with stormwater quantity and quality issues. The stormwater drainage system may consist of natural features, man-made features, or a combination of both.

The measures for the portion of the utility resource area related to site alternatives at Eglin AFB and the Florida Keys are as follows:

- Affected Environment: Total disturbed area at host installation stated in acres
- Proposed Action: Increase in disturbed area resulting from construction of launch-related facilities
- Impacts of the Proposed Action: Proportionate increase in disturbed area at host installation resulting from construction of launch-related facilities

Electricity

Electricity to the region is distributed via overhead transmission lines. The primary sources of electricity are generating plants located throughout the southeast.

The measures for the portion of the utility resource area related to site alternatives at Eglin AFB and the Florida Keys are as follows:

- Affected Environment: Annual local electric service capacity of the host community
- Proposed Action: Annual local electric service demand resulting from the proposed action and its alternatives
- Impacts of the Proposed Action: Proportion of remaining capacity required by the proposed activities

The personnel loading is shown in table 3.1.12-1.

Table 3.1.12-1: Personnel Impacts of Flight Testing

		One Event	12 Events per Year			24 Events per Year		
Maximum Personnel per Test	Maximum Number of Days per Test	Cumulative Person/ Days	Cumulative Person/ Days	Maximum Onsite per Day	Minimum During Full Program	Cumulative Person/ Days	Maximum Onsite per Day (Full Program)	Minimum During Full Program*
110	14	1,540	18,480	110	110	36,960	110	110

*In the case of the 24-event flight test program, there is an overlap of events leading to increased personnel levels as the program passes its 15th day.

3.1.12.2 Region of Influence

ROIs for utilities include a primary ROI and a secondary ROI. The primary ROI includes the service areas of the agencies that provide the utility service. In the case that a utility service required for the proposed action is provided directly by the host military installation, the primary ROI is the military base or the sector of service within the base. If the utility service is provided by an off-base agency, the ROI is the entire city or county that provides the service. The secondary ROI covers a 32-kilometer (20-mile) radius used to define the area within a 30-minute drive of the proposed test area in which project personnel are likely to find transient lodging.

The secondary ROI for Santa Rosa Island includes Destin, Fort Walton Beach, Mary Esther, Niceville, and Shalimar.

The communities included within the secondary ROI for Cape San Blas include Apalachicola, Mexico Beach, and Port St. Joe.

3.1.12.3 Affected Environment

3.1.12.3.1 Santa Rosa Island

Potable Water

There are two significant aquifers at Eglin AFB and the surrounding area: the surficial aquifer, also known as the Sand and Gravel Aquifer, and the Floridan Aquifer. The Floridan Aquifer is the main potable water source for Eglin AFB and surrounding municipalities. The Sand and Gravel Aquifer is a generally unconfined, near-surface unit segregated from the underlying limestone Floridan Aquifer by the comparatively low permeability Pensacola Clay confining bed. Excessive use of the Floridan Aquifer has caused an increased risk of saltwater intrusion. This overdraft condition has caused the abandonment of some wells on Santa Rosa Island. Refer to section 3.1.14.3.1 for additional discussion of Floridan and Sand and Gravel Aquifers.

Okaloosa County has five principal water supply utilities, all of which utilize the Upper Limestone of the Floridan Aquifer. One of the utilities is Destin Water Users, Inc. Its system capacity is approximately 28.4 million liters (7.5 million gallons) per day (Florida State University, Department of Urban and Regional Planning, 1996). A second

utility is the Okaloosa Water and Sewer Department. This system has a capacity of 40.0 million liters (10.5 million gallons) per day (Florida State University, Department of Urban and Regional Planning, 1996). The Fort Walton Beach Water and Sewer Department, a third system, has a public water supply capacity of 31.0 million liters (8.2 million gallons) per day (1988). The city also supplies water service to the Town of Cinco Bayou and the Eglin Heights Subdivision area, but approximately 96 percent of the system demand is generated from the city (City of Fort Walton Beach, 1990). A fourth water supply system is the City of Mary Esther's utility company. Its system capacity is approximately 11.0 million liters (2.9 million gallons) per day The fifth water supply system in Okaloosa County is the Seashore Village Water System, Inc. Its system has a capacity of 7.2 million liters (1.9 million gallons) per day (Florida State University, Department of Urban and Regional Planning, 1996, 1988). The total capacity for the five utilities 118.1 million liters (31.2 million gallons) per day or 43.2 billion liters (11.4 billion gallons) per year.

The biggest challenge facing the water system in Okaloosa County is availability and quality of the water. The existing water treatment capacity in Fort Walton Beach, the county's most populous city, is adequate for today's needs as well as for some time into the future. The Fort Walton Beach city wells are taking water out of the Floridan Aquifer. Currently, the water level in the aquifer is decreasing at the rate of 3.0 meters (10 feet) per year (City of Fort Walton Beach, 1990).

While the southern portion of Santa Rosa County continues to draw potable water from the Floridan Aquifer, this aquifer is so saline along the coast that the county is researching other alternatives in order to meet expected growth pressures.

The area south of Eglin AFB in Santa Rosa, Okaloosa, and Walton counties, including an area in Walton County south of State Route 20 to the Bay County line, has been designated as a Water Resource Caution Area. A Water Resource Caution Area is established when fresh water resources are expected to experience significant or widespread reduction in water levels, salt water intrusion, mineralization, upcoming of lower water quality water, man-induced contamination, or other degradation. (Florida State University, Department of Urban and Regional Planning, 1996).

Santa Rosa Island relies on individual wells for its water supply. There are 24 wells on Santa Rosa Island, all installed in the Floridan Aquifer. Twenty-one wells are used for potable water. Some Eglin AFB facilities on Santa Rosa Island including Site A-15 use bottled water as their potable water source (U.S. Department of the Air Force, 1995). There is a 946,350-liter (250,000-gallon) water tank on the island that is used for firefighting and latrine purposes (Howard, 1993). Ten of the wells have standard water use permits. The wells for Sites A-15, A-18, and A-17A are a part of well permit #842719. The well at Site A-18 was abandoned in 1986. The remaining wells at Sites A-15 and A-17A were granted for 34,475.5 liters (9,900 gallons) per day with a maximum of 51,860 liters (13,700 gallons) per day. (Northwest Florida Water Management District, 1997) There are no individual limits for these wells. The average daily use for the well at Site A-15 (well #81) from January to December of 1996 was 32,980 liters (8,700 gallons). Annual usage is approximately 12.4 million liters (3,285,000 gallons). (Robeen, 1997)

Wastewater Treatment

The Navarre Beach wastewater treatment facility is located on Santa Rosa Island. This facility incorporates a 3.4 million liters (900,000 million gallons) per day oxidation ditch activated sludge system with tertiary filters. Effluent is discharged into Santa Rosa Sound while sludge products are transported to the Central Landfill in Bagdad. Daily flow for this facility in the year 2000 is estimated to be 2.5 million liters (0.675 million gallons) per day, leaving a surplus capacity of 0.848 million liters (0.224 million gallons) per day. According to the Santa Rosa Comprehensive Plan, an expansion proposal had been discussed but not finalized by the completion time of the plan. This would increase the capacity of the facility to approximately 7.6 million liters (2 million gallons) per day. If passed, the improvements would be paid for by the Navarre Beach Capital Improvements fund. This fund's sources are user fees imposed on water and sewer customers and rents from county owned property leased to private interests. (Florida State University, Department of Urban and Regional Planning, 1996).

The City of Fort Walton Beach owns and operates it own wastewater treatment plant and disposal system. The facility serves the city and the Town of Cinco Bayou. This system has a design flow of 17 million liters (4.5 million gallons) per day and served a 1986 population of 23,200 with an average per capita flow of 427.8 liters (113 gallons) per day. This facility is operating within secondary treatment standards. Treated wastewater is spread on land adjacent to the plant, which is leased from Eglin AFB.

The test areas on Santa Rosa Island are supported by septic tanks. Septic tanks at test areas and test sites with a high utilization rate are pumped annually or as required. Septic tanks at test areas and test sites that are infrequently manned are pumped only when required.

Stormwater Management

Santa Rosa Island does not have a planned stormwater management system. Stormwater from impervious surface areas percolates into the soil.

Regionally, the Northwest Florida Water Management Division (NWFWMD) regulates the discharge of stormwater runoff to surface waters. Locally, local governments are responsible for stormwater management through their comprehensive plans, land development regulations, and issuance of development permits.

Solid Waste Management

Okaloosa County generated 1.74 million kilograms (191,303 tons) of solid waste in fiscal year 1994. Approximately 1.24 million kilograms (136,777 tons) was deposited in the Spring Hill landfill in Jackson County. (Florida Department of Environmental Protection, 1995)

Eglin AFB solid waste is handled by Base Civil Engineering. Class I solid waste from Eglin AFB, which includes Hurlburt Field, auxiliary fields, ranges and test areas, and base housing areas, is removed from the base by a contractor to the Okaloosa County Transfer Station in Forth Walton Beach for temporary storage before being transferred to

the Spring Hill Landfill in Jackson County. In 1994, approximately 7.6 million kilograms (8,400 tons) or 9,248 cubic meters of Class I waste were removed from Eglin AFB (U.S. Department of the Air Force, 1995).

Eglin AFB operates a construction and demolition landfill in an abandoned borrow pit near Field 4 in the south central section of the base. The landfill receives construction and demolition debris and landscaping waste generated by Eglin AFB. Eglin AFB also disposes of construction and demolition wastes at the Point Center Landfill near Crestview. In 1994, Eglin AFB generated approximately 1.5 million kilograms (1,661 tons) of construction and demolition debris and landscaping waste (U.S. Department of the Air Force, 1995).

Electricity

The Gulf Power Company serves all of Santa Rosa County and much of Okaloosa County including Okaloosa and Santa Rosa Islands. CHELCO serves a portion of Okaloosa County and a portion of Walton County.

3.1.12.3.2 Cape San Blas

Potable Water

The NWFWMD manages water supplies in Gulf County. Five community water systems provide potable water to residents of Gulf County. Several non-community water systems and private wells also provide water. The military installations at Cape San Blas are served by Lighthouse Utilities.

There are five Floridan aquifer wells on the Eglin AFB property at Cape San Blas all of which were damaged by Hurricane Opal. Four of the five wells have been capped and the remaining deep water well (non-potable) remains for emergency purposes.

Annual water consumption at Site D-3 is approximately 813,000 liters (214,000 gallons). (Witfield, 1997) Lighthouse Utilities water distribution system also serves campground facilities, residential units, and trailer park units on Cape San Blas. The main supply line serving this area parallels County Road 30E. The number of service connections is approximately 600. Average monthly flow for a 12-month period in 1989-90 was 10,587,983 liters (2,797,058 gallons). The annual flow is approximately 127.1 million liters (33.6 million gallons). The resulting flow rate was 352,931.8 liters (93,235 gallons) per day or an existing LOS of 344.5 liters (91 gallons) per capita per day.

The baseline capacity figures as determined by the NWFWMD for the service area of Lighthouse Utility for potable water are 454,248 liter (120,000 gallons) per day average with a maximum of 1,268,109 liters (335,000 gallons) per day. (Northwest Florida Water Management District, 1996)

Wastewater Treatment

There are four wastewater treatment facilities in Gulf County. The Barrier Dunes Wastewater Treatment Plant, has a capacity of 189,270 liters (50,000 gallons) per day.

The Gulf Air Wastewater Treatment Plant just east of Beacon Hill has a capacity of 264,978 liters (70,000 gallons) per day. The cities of Port St. Joe and Wewahitchka each own and operate wastewater treatment facilities that provide service to residents. The nearest sanitary sewer facility in proximity to Site D-3 is the Barrier Dunes Sanitary Sewer System. This is a privately owned system. The facility is a permitted for 89,270 liters (50,000 gallons) per day extended aeration wastewater treatment plant (WWTP) that provides for nitrification, de-nitrification, and recovered water disposal to a percolation pond system. The existing annual flow average is 36,275.5 liters (9,583 gallons) per day. (Gulf County, 1990) Commercial septic tanks are prevalent, with the average in Gulf County estimated to be 5,678.1 liters (1,500 gallons).

The remaining portions of the county are served by septic tanks. Cape San Blas maintains a septic tank for Site D-3 and utilizes portable facilities for all other test areas. According to the Soil Conservation Service (SCS), soil types in Gulf County are classified as having moderate to very severe limitations for use as septic tank absorption fields. St. Joseph Spit, Cape San Blas, and Indian Peninsula are located in the Salt Water Marsh/Coastal Beach and Dune Association. (Gulf County, 1990)

Stormwater Management

The State of Florida has designated the NWFWMD to regulate surface waters within the district that includes all of Gulf County. The region's surface waters are affected by stormwater runoff that flows overland following the topography of the area. Natural drainage systems are defined by the topography of an area. The largest feature of a natural drainage system is the drainage basin, or watershed. The boundary of the basin is called the basin divide. This is a line where the natural elevation directs runoff from the basin toward a receiving water body. The county, at this time, does not have a county-wide drainage plan. The receiving water body is the Gulf of Mexico.

Cape San Blas does not have a planned stormwater management system. Stormwater from impervious surface areas sheet flow to pervious areas where the water either percolates into the soil or runs to the nearest body of water.

Solid Waste Management

Gulf County provides solid waste disposal services to residents of Gulf County. Currently, Gulf County generates a total of 12.7 million kilograms (14,000 tons) of solid waste, or 15,414 cubic meters (Florida Department of Environmental Protection, 1995). The county utilizes two compaction/transfer stations where waste is gathered. One station is located outside Port St. Joe and the northern facility is located in Wetappo. Waste is transported from the compaction/transfer stations to the Bay County Resource Recovery Plant. A construction and demolition debris site is located adjacent to the Wetappo compaction/transfer station. Solid waste generated at Site D-3 is deposited in a 3.1-cubic-meter (4-cubic-yard) dumpster that is picked up weekly by Argus Services, Inc. The solid waste is taken to the Bay County Incinerator in Panama City. Capacity of the incinerator is 462,669 kilograms (510 tons) per day or 204,950 cubic meters annually. (Florida Department of Environmental Protection, Bureau of Solid and Hazardous Waste, 1995)

Electricity

Florida Power supplies electricity to Site D-3. Seven different meters serve the military installation. In 1994, Florida Power provided approximately 184,802 MW hours of electrical service to 534 residential, commercial, and DOD customers in the Cape San Blas area. Medlate, 1997) Site D-3A is served by 480-kVA, 3-phase, 100-ampere electrical service.

3.1.12.4 Environmental Impacts and Mitigations

3.1.12.4.1 Santa Rosa Island

Additional utility demands at proposed TMD testing and training sites on Santa Rosa Island may affect local public utility systems. Program-related requirements for potable water, wastewater treatment, electricity, solid waste management and stormwater management could be provided by available capacity in local public utility systems.

Sites A-15 and A-10 on Santa Rosa Island are the proposed sites of intercept missile launches, instrumentation, target preparation, and target missile launches. Proposed target missile launches would have the greatest potential impact on utilities. Therefore, the consequences listed below are for the target missile launch alternative. Site A-15 is the proposed location of the missile assembly and missile launch. Site A-10 is proposed to be used for instrumentation.

No-action Alternative

Potable Water. If the proposed action does not take place, Eglin AFB would maintain its existing level of potable water consumption. Current average per day usage for Site A-15 is 32,900 liters (8,704 gallons) (U.S. Department of the Air Force, Eglin Air Force Base, 1997).

Wastewater Treatment. If the proposed action does not take place, Eglin AFB would maintain its existing level of wastewater treatment demand. Total wastewater demand is difficult to determine because septic tanks are not metered. Therefore, the potable water demand will be used as the wastewater treatment demand. The forecast level of activity at Site A-15 would continue at the current level on the base. Daily demand at Site A-15 is 32,900 liters (8,704 gallons). See table 3.1.12-2.

Methods used for the disposal of treated wastewater will be governed by Federal, state, and local laws pertaining to the amounts of wastewater, capacity of treatment plants, and the pedological constraints on the location of septic systems.

Solid Waste Management. If the proposed action does not take place, Okaloosa County would maintain its existing level of municipal solid waste. The forecast level of activity for Site A-15 would continue to increase to the degree planned by the base. The amount of waste for Site A-15 is 0.86 cubic meters (30.7 cubic feet) daily.

Table 3.1.12-2: Annual Potable Water and Wastewater Treatment Demand

Potable Water and Wastewater Treatment Demand	Annual Amounts in liters (gallons)	Liters (Gallons) per Day	Change
Site A-15	12.026 million (3.177 million)	32,948 (8,704)	
Flight Test (24 test events per year)	2.457 million (1.970 million)	22,194 (5,863)	62.0%
Indirect (Personnel Lodging)	5.353 million (1.414 million)	14,665 (3,874)	0.02%
County (Okaloosa)	29.291 billion (7.738 billion)	80.25 million (21.2 million)	
2005 Increase	6.023 million (1.591 million)	16.5 million (4.359) million	
County 2005	35.313 billion (9.329 billion)	96.75 million (25.56 million)	

The existing level of solid waste for Okaloosa County is 529 cubic meters (18,896 cubic feet) per day. The increase in Okaloosa County population over a 10-year period, 1995 to 2005, is projected to be 30,700 persons. Multiplied by the adjusted per capita solid waste usage of 0.0028 cubic meters (1 cubic feet) per day would equal 1,055 cubic meters (2,984 cubic feet) per day, or a 19.6 percent increase in solid waste.

Electricity. If the proposed action does not take place, Eglin AFB would maintain its existing level of electrical demand.

Site Preparation Activities

Construction and Demolition Waste. Construction of a target missile assembly building, target launch operations trailer shelter, launch equipment building, target launch pad, road improvements, parking and turnaround area, buried electrical lines and water lines would generate approximately 425 cubic meters (15,000 cubic feet) of waste.

Stormwater Management. The increase in stormwater flows from the subject site is assumed to be proportionate to the increased impervious surface and disturbed areas as a result of construction of the required facilities on the site. Based on the estimated increased disturbed area estimate of 0.04 hectare (0.1 acre) presented in section 2.2.2.2.1, the increased stormwater runoff from the Santa Rosa site resulting from site disturbance for the TMD program is expected to be less than 1 percent more than runoff that exists without the TMD program.

Flight Test Activities

Interceptor and Target

No construction requirements have been identified for interceptor launches from Santa Rosa Island. Trailers containing launchers and radar equipment would be set up at the launch location 2 weeks prior to launch. Since site preparation activities would not require new construction no increase in impervious surface is expected. Therefore, no impacts from stormwater runoff would occur as a result of site preparation activities.

Potable Water. Domestic water usage represents the water consumed by the launch personnel in the region of influence. A consumption factor or 340.7 liters (90 gallons) per day per person was used. This figure was selected from the U.S. Geological Service (USGS), Water Resources Division, *Estimated Commercial and Industrial Water Use by Employment, 1995, Okaloosa County*. (The 340.7 liters [90 gallons] per day represents the adjusted per capita consumption from public utilities.) The 340.7 liters (90 gallons) per person per day is assumed to be divided so that 60 percent or 201.8 liters (53.3 gallons) is consumed onsite and 138.9 liters (36.7 gallons) is consumed at transient housing in the host community. This figure is conservative because it is likely that most TMD mobile units in the field will use bottled water.

As shown in table 3.1.12-2, the flight test activities will require a maximum of about 7.457 million liters (1.97 million gallons) of water at Site A-15 for 24 test events per year. This usage is 62 percent higher than the current level of potable water consumption at Site A-15. Added to current usage, this amount could exceed the water consumption permit level of 51,860 liters (13,700 gallons) per day. However, this would be an overestimate of potable water requirements to the extent that TMD units generally use bottled water.

However, current usage rates fluctuate considerably. Over a four year period total water usage at Site A-15 has decreased from about 23.8 million liters (6.3 million gallons) in 1993 to about 12.1 million liters (3.2 million gallons) in 1996. This fluctuation reflects particular mission activities at Site A-15. These include water intensive uses such as fire training, that might be curtailed or relocated. It is likely that the use of Site A-15 for TMD testing would mean less use of Site A-15 for other missions and thereby would allow the total usage of potable water to remain within current permit levels.

Additional potable water and wastewater usage will occur offsite as a result of TMD personnel using transient housing in the community, primarily in Okaloosa County. As a consequence, potable water demand in Okaloosa County would be expected to increase by approximately 5.13 million liters (1.36 million gallons) per year. This increase amount to less than .02 percent increase in the anticipated water demand in Okaloosa County in the year 2005.

Wastewater Treatment. Assuming wastewater treatment requirements will be proportional to the volume of potable water consumption, the flight test activities will generate a maximum of about 7.457 million liters (1.97 million gallons) of wastewater at Site A-15 for 24 test events per year. This usage is 62 percent higher than the current level of wastewater treatment required at Site A-15. However, this would be an

overestimate of wastewater treatment requirements to the extent that TMD mobile units stationed in the field may utilize portable toilets.

Additional wastewater will be generated offsite as a result of TMD personnel using transient housing in the community, primarily in Okaloosa County. As a consequence, wastewater disposal requirements in the host community, primarily Okaloosa County, would be expected to increase by approximately 5.13 million liters (1.36 million gallons) per year. This increase amounts to less than 0.02 percent increase in the anticipated wastewater disposal volume generated in Okaloosa County in the year 2005. It is not know how much of this treatment demand would be routed to public wastewater treatment systems.

Solid Waste Management. As shown in table 3.1.12-3, a maximum of 1,075 cubic meters (37,948 cubic feet) of municipal solid waste would be generated annually in 24 interceptor launch events. This figure is based on 36,940 person-days at 0.29 cubic meters (10.36 cubic feet) or 2.4 kilograms (5.29 pounds) per person per day. Combined with the existing on base amount of 9,248 cubic meters (326,454 cubic feet) would equal 10,324 cubic meters (364,437 cubic feet), an 11.6 percent increase. This amounts to 2 percent of the total waste flow disposed of at the Springhill landfill (53,025 cubic meters [1.893 million cubic feet] per year).

Table 3.1.12-3: Municipal Solid Waste—Okaloosa County

Eglin AFB Site A-15	Annual Cubic Meters (Cubic Feet)	Percent Change due to TMD Activities
Existing Level at Eglin AFB	9,248 (326,454)	
TMD Flight Test Events	1,075 (37,948)	11.6%
Community (Okaloosa County)	173,754 (6,133,516)	
Population Increase 2005	38,242 (1,350,500)	
Community 2005	211,996 (7,483,469)	0.57%

Electricity. Based on the equipment and building electrical specifications for a target launch the program would need less than 156 kilowatts of electricity for flight test activities. Many of the structures needed for a target launch are existing on site. The existing capacity is difficult to determine confidently because the site is served by a regional utility which is able to alter its supply via networks which link many electrical generators.

Cumulative Impacts

Construction of the TMD test facilities at Santa Rosa Island would take place in an area owned by Eglin AFB that was originally developed in 1959 for BOMARC missile testing over the Gulf of Mexico. In the 1980s, the complex was upgraded to test an electromagnetic rail-run for the Strategic Defense Initiative Organization. Current instrumentation sites and activities will continue for the foreseeable future. The only additional activity currently proposed for the island is the Open Air Hardware in the Loop

project which would involve construction of three towers, three control buildings, and associated support facilities. The scale of increased demand on utilities is not yet known.

The TMD program is anticipated to contribute $7 million per year in direct and indirect impacts on the local economy at Okaloosa and Santa Rosa Counties, or Gulf County due to local program expenditures. It is possible that this economic stimulus would generate some additional employment and associated demand for permanent housing in the host communities. There may also be impacts on expenditures in retail trade and services that would lead to the construction of additional commercial space in host communities. Should these impacts occur, there may result additional demand for utility services, that would not be expected to increase total county-level demand by more than one percent.

Mitigations Considered

Due to an existing overdraft condition, drinking water wells on Santa Rosa Island have a restricted normal and maximum per day yield. Contractual provisions could be incorporated to minimize utilities consumption by construction practices. Bottled water supplied could be used to fulfill peak program requirements for drinking water to avoid exceedance of well capacity. Use of bottled water and portable toilets would reduce demand for on site water and sanitation facilities.

3.1.12.4.2 Cape San Blas

Additional utility demands at proposed TMD testing and training sites on Cape San Blas may affect local public utility systems. Program-related requirements for potable water, wastewater treatment, electricity, solid waste management and stormwater management would not exceed available capacity in local public utility systems.

No-action Alternative

Potable Water. If the proposed action does not take place, Site D-3A on Cape San Blas would maintain its existing level of potable water consumption. The total annual usage was 813,018 liters (214,800 gallons).

The existing water consumption for Gulf County is 1.77 billion liters (467.2 million gallons) per year. The increase in population over a 10-year period for Gulf County, 1995 to 2005, is projected to be 2,400 persons. Multiplied by the overall per capita water usage of 481 liters (127 gallons) per day would require a total of 2.19 billion liters (578.8 million gallons), a 23.8 percent increase in potable water by the year 2005.

Wastewater Treatment. If the proposed action does not take place, Site D-3 would maintain its existing level of wastewater treatment demand. Total wastewater demand is difficult to determine because there are no meters on septic tanks. Therefore, the potable water demand will be used as the wastewater treatment demand. Daily usage for the military installation is 2,226 liters (588 gallons).

The existing wastewater generated in Gulf County is estimated to be equivalent to potable water consumption—4,845,000 liters (1,280,000 gallons) per day. The increase in population for Gulf County over a 10-year period 1995 to 2005, is projected to be 2,400 persons. Multiplied by the overall per capita water usage of 481 liters (127 gallons) per day would equal 1,153,668 liters (304,800 gallons) per day increase, 23.8 percent, in wastewater treatment by the year 2005.

Municipal Solid Waste. If the proposed action does not occur, the current level of activity for Site D-3 would continue. Approximately 160 cubic meters (5,616 cubic feet) of waste is generated annually by the installation.

Gulf County's population growth would cause an increase in the existing requirements for solid waste disposal. The existing level of solid waste generated in Gulf County is 15,400 cubic meters (543,620 cubic feet) per year. The increase in population over a 10-year period 1995 to 2005, is projected to be 2,400 persons. Multiplied by the adjusted per capita of 0.0028 cubic meters (0.1 cubic feet) per day would increase the county's total solid waste flow to about 17,300 cubic meters (611,135 cubic feet) per year.

Electricity. The electrical line which serves the installation and 550 other customers on the Cape has a daily average demand of 2,680 kW. The maximum demand of this line is 9,000 kW. If the proposed action does not take place the electricity required on base is not expected to change from existing conditions.

Site Preparation Activities

Interceptor

No construction requirements have been identified for interceptor launches from Cape San Blas. Trailers containing launchers and radar equipment would be set up at the launch location 2 weeks prior to launch. Since site preparation activities would not require new construction, no increase in impervious surface is expected. Therefore no impacts from stormwater runoff would occur as a result of site preparation or activities.

Target

Construction and Demolition Waste. The construction of an igloo, target MAB, target LOT shelter, launch equipment building, target launch pad, road improvements, parking and turnaround area, and buried electrical lines and water lines would generate 447 cubic meters (15,804 cubic feet) of waste.

Stormwater Management. The increase in stormwater flows from the subject site is assumed to be proportionate to the increased impervious surface and disturbed areas as a result of construction of the required facilities on the site. Based on the estimated increased disturbed area estimate of 1.87 hectares (4.63 acres), the increased stormwater runoff from the Cape San Blas D-3 site resulting from site disturbance for the TMD program is expected to be approximately 0.60 percent above levels that exist without the TMD program.

Flight Test Activities

Interceptor and Target

Potable Water Demand. Potable water demand associated with Flight Test Activities are expected to average 340.7 liters (90 gallons) per person per day based on USGS, Water Resources Division, *Estimated Commercial and Industrial Water Use by Employment, 1995*. For purposes of this analysis, this total water demand is divided into water consumed on the base and water consumed in the transient lodging facilities in the community with the ROI.

As shown in table 3.1.12-4, the TMD flight test activities for 24 test events per year will require a maximum of about 7.46 million liters (1.97 million gallons) of water annually at Site D-3A. This usage is nine times the current level of potable water consumption at Site D-3A. However, now that the base is being served by Lighthouse Utilities, the proper comparison is with community consumption served by Lighthouse Utilities.

Table 3.1.12-4: Annual Potable Water and Wastewater Treatment Demand at Cape San Blas

Potable Water and Wastewater Treatment Demand	Annual Amounts in liters (gallons)	Change due to TMD
Site D-3A	813,018 (214,800)	
Flight Test (24 test events per year)	7.457 million (1.970 million)	
Indirect (Personnel Lodging)	5.134 million (1.356 million)	
Total TMD Requirements	12.591 million (3.326 million)	
Current Lighthouse Utilities	1.77 million (467.2 million)	
2005 Gulf County	2.19 billion (578.8 million)	0.58%

Additional potable water and wastewater usage of approximately will occur offsite as a result of TMD personnel using transient housing in the community, primarily in Gulf County. As a consequence, potable water demand for Gulf County would be expected to increase by approximately 5.13 million liters (1.36 million gallons) per year. This increase amounts to a little more than one-half percent increase in the anticipated water demand for potable water demand in Gulf County in the year 2005.

Wastewater Treatment Demand. The amount of potable water is used to estimate the wastewater treatment demand. An additional 7.457 million liters (1.97 million gallons) of wastewater treatment per year would be needed to serve the project at the launch site. This represents a nine fold increase from the existing wastewater treatment needs on base.

The increased wastewater treatment demand on the base would be commensurate with the water increase—about 7.457 million liters (1.970 million gallons), assuming a maximum of 24 tests events per year at Cape San Blas. Compared to current demand,

this would represent a nine-fold increase in wastewater disposal needed on the base. This is a conservative estimate because it is likely that some TMD mobile units stationed in the field will use portable toilets. Nonetheless, it is likely that additional onsite wastewater treatment and disposal facility would be needed on the base to handle wastewater disposal requirements of the proposed action.

In the community, another 5.134 million liters (1.356 million gallons) of wastewater would be generated annually at transient lodging facilities. This amount would represent a 0.5 percent increase in current wastewater disposal needs in Gulf County by the year 2005.

Municipal Solid Waste. As shown in table 3.1.12-5, 1,075 cubic meters (37,948 cubic feet) of municipal solid waste would be generated by the project annually, assuming 24 test events per year. The waste generated by the project would constitute approximately 6 percent over the projected annual amount generated in the community in the year 2005.

Table 3.1.12-5: Municipal Solid Waste—Cape San Blas

Site D-3A	Annual Amount in Cubic Meters (Cubic Feet)	Percent Change due to TMD Activities
Flight Test	1,075 (37,948)	
Community (Gulf County)	15,400 (543,620)	7%
Increase 2005	1,913 (67,515)	
Community 2005	17,313 (611,135)	6.2%

Electricity. Based on the equipment and building electrical specifications for a target launch the program would need less than 156 kilowatts of electric service for flight test activities. Many of the structures needed for a target launch are existing facilities which have electric service. This is within the current capacity of the electric distribution system.

Cumulative Impacts

No other major projects are currently planned. Residential and commercial development on St. Joe Peninsula has proceeded more slowly than for Gulf County as a whole.

Possible cumulative impact of the program is the cumulative effect of increased economic activity on land use and utility demand in the ROI. Over the program period the proposed action could generate increased demand for housing and businesses in the area. Spending by military personnel may generate increased demand for commercial services that would result in an indirect demand for additional employees to staff these commercial services. These employees, if new to the area, may in turn require additional housing and would thereby increase housing demand. This may have an indirect impact on the use of utilities in the ROI.

Mitigations Considered

The use of bottled water and portable toilets would reduce the demand for local water withdrawal and septic waste disposal onsite.

3.1.13 VISUAL AESTHETICS

Site preparation and flight test activities may affect the visual environment of Santa Rosa Island and Cape San Blas.

3.1.13.1 Resource Description and Evaluative Methods

The visual and aesthetics resource area pertains to the aesthetic appreciation of character-defining features of the landscape which are modified as a result of the proposed action. Visual resources include vistas from land or water which are valuable because they are in scarce supply, are characteristic of the area, and contribute to the quality of life and culture which is characteristic of the affected area.

The methodology is derived from guidance prepared by the U.S. Forest Service (U.S. Department of Agriculture, Forest Service, 1995). The process involved evaluating the aesthetic impacts of a proposed action on a scene or landscape. The visual and aesthetic resource is described in terms of the relative loss of scenic integrity through alteration of the character-defining or dominant features of the landscape resulting from the proposed action and its alternatives, taking into account the pre-existing level of human alteration to the natural landscape and the exposure level and community sensitivity of representative viewsheds.

The proposed action includes several activities which may cause modifications to the existing visual and aesthetic resources of the affected area:

- Removal of natural vegetation for construction of facilities, roads, and utilities
- Appearance of launch pad, MAB, LOT, missiles, and large equipment against a natural backdrop
- Reflections or glare from buildings or equipment

While each of these actions may occur individually, the measurement of visual and aesthetic impacts requires a complete approach that considers the overall affect of the entire process.

The question of relative effect involves an assessment of the scenic integrity of the landscape, including the elements to be added by the proposed action. Scenic integrity indicates the wholeness of the landscape character. It depends on the degree to which the visual contrast of the proposed modifications are an acceptable alteration of the existing landscape that can be effectively absorbed without causing alteration of valued landscape character. The assessment takes into account:

- Ratings of scenic attractiveness and community concern levels of the site, as presented in table 3.1.13-1

- Degree of visual contrast in form, line, color, and texture
- Visibility likely from the viewing distance

Table 3.1.13-1: Criteria for Rating Scenic Integrity

Criteria for Scenic Integrity	High	Moderate	Low	Very Low
Dominant Feature	Landscape Character	Landscape Character	Human Alterations	Human Alterations
Degree of Alteration	None evident	Evident, but not Dominant	Dominant	Extremely Dominant
Intactness of Landscape Character	Landscape Character Largely Intact	Slightly Altered and Character Expression Moderate	Altered and Low Expression of Character	Extremely Altered

Source: U.S. Department of Agriculture, Forest Service, 1995.

Scenic integrity indicates the degree of intactness will be rated in four levels: high, moderate, low, and very low, as follows:

- High—landscapes where the valued landscape character appears intact, and deviations or alterations repeat the form, line, color, texture, and pattern common to the landscape character so completely and at such scale that they are not evident
- Moderate—landscapes where the valued landscape character appears slightly altered, but noticeable alterations remain visually subordinate to the landscape character being viewed
- Low—landscapes where deviations begin to dominate the valued landscape character, but they borrow valued attributes such as size, shape, edge effect, and pattern of the natural vegetation or architecture outside the landscape being viewed. Deviations have their own sense of order and are not incompatible with the valued character of the scene.
- Very Low—landscapes where the valued landscape character being viewed appears extremely altered. Deviations are extremely dominant and borrow little if any form, line, color, texture, pattern or scale from the landscape character.

Table 3.1.13-1 summarizes how scenic integrity is rated in terms of the three-fold test of dominance, degree of deviation, and intactness of landscape character.

Visual simulations were prepared for each vantage point at each launch location. These simulations were prepared by projecting computer perspectives using the computerized GIS site plans and using known vertical reference measurements. These simulations were superimposed on the same photographs. The new photographs display what would be visible of a 15-meter tall (50 foot tall) Hera missile in the proposed launch site.

In some cases this simulation revealed that the original photograph did not have the right vantage point to see the missile. This was noted on the appropriate photographs.

3.1.13.2 Region of Influence

The ROI for visual and aesthetic resources for the sites includes the range of vantage points on land and water from which residents and tourists may view facilities and activities related to the proposed action.

3.1.13.3 Affected Environment

3.1.13.3.1 Santa Rosa Island

The dominant, character-defining visual and aesthetic resources of Santa Rosa Island were assessed from field trips, photography, and research. They include the coastal barrier island environment of emerald green water, unobstructed horizon, sparkling white sugar-sand beaches, dramatic dunes with sea oats, maritime forested areas of pine flatwoods, hammocks, and related habitat consisting of scrub oaks, slash pine, sand pines, and understory of goldenrod, rosemary, and sawgrass. (Myers and Ewel, 1990).

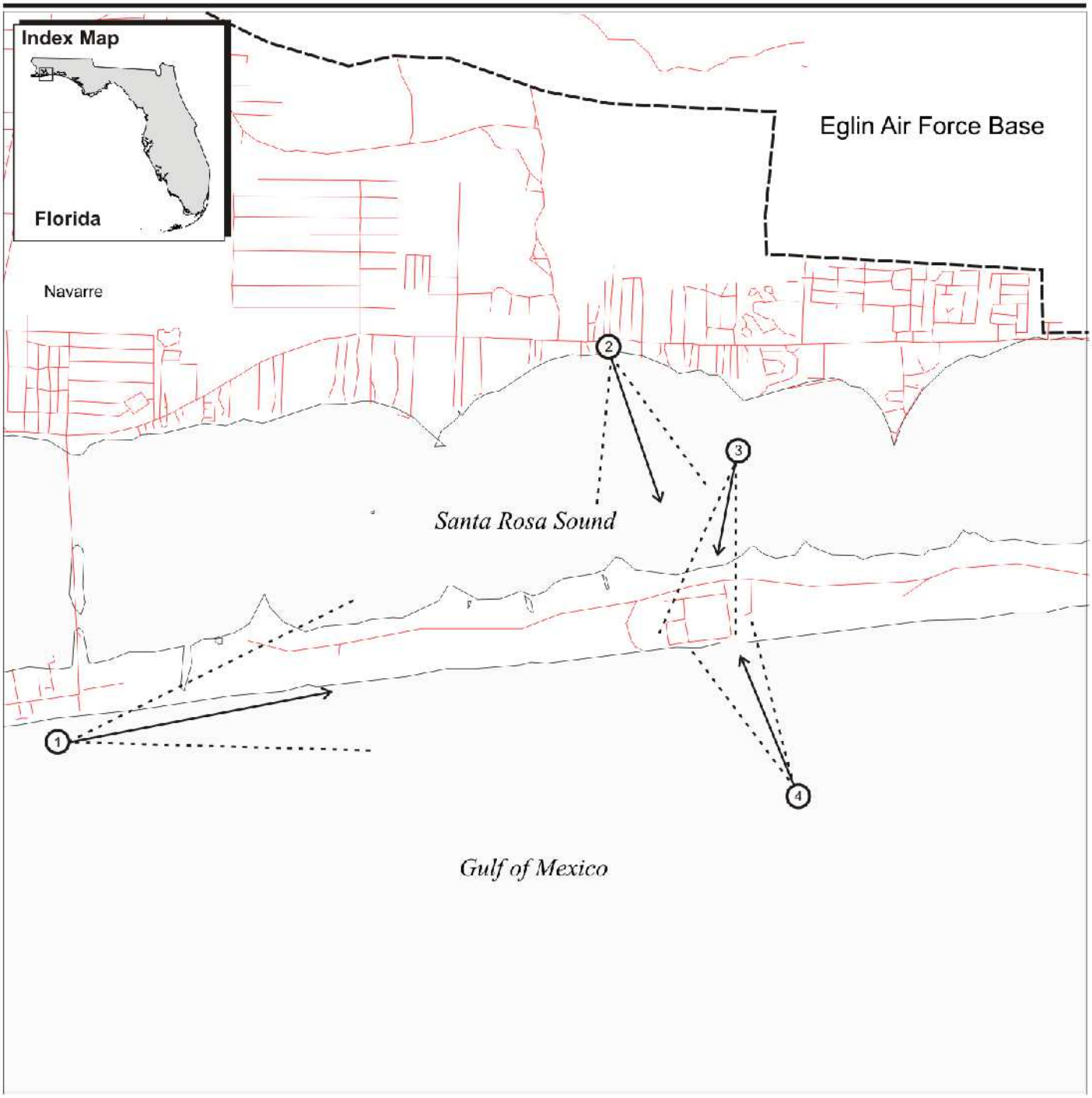
Eglin AFB is actively restoring thousands of acres of pine flatwood forest on uplands that were once timbered as part of the Choctawhatchee National Forest. It has won national awards for its conservation program on the base. However, the base has little control of coastal beach habitat, as it is land-locked except for a small stretch of beach access from its holding on Santa Rosa Island.

The remaining portions of Santa Rosa Island in Fort Walton Beach and Navarre Beach, either side of Site A-15, have experienced a boom of tourist-related development since Hurricane Opal that severely reduces its former scenic attractiveness. Likewise, the mainland coast along U.S. 98 opposite Santa Rosa Island, including communities from Navarre to Mary Esther, is also undergoing a boom of residential development. This growth tends to eliminate informal public access to the beach, while at the same time opening expanses of the beach to greater levels of private use through subdivisions of resort homes, hotels, restaurants, and condominiums.

These natural and human-made landscape features were observed from a series of vantage points within the viewshed of Santa Rosa Island and Site A-15, both from land and water. These vantage points are mapped in figure 3.1.13-1 through 3.1.13-6.

Table 3.2.13-2 rates the scenic attractiveness of each of these views using a method derived from the application of the Visual Resource Management System of the Forest Service.

Figure 3.1.13-1: Recent Development on Santa Rosa Island



EXPLANATION

- Roads
- Eglin AFB Boundary
- (1) Vantage Point
- Cone of Vision

Scale 1:50,000

0 .5 1 Miles

0 .75 1.5 Kilometers

NORTH

Vantage Points for Observing Site A-15

Santa Rosa Island, Florida

Figure 3.1.13-2

Figure 3.1.13-3: Vantage Point #1: Navarre Beach Public Pier

Figure 3.1.13-4: Vantage Point #2: Magnolia Beach Campground

Figure 3.1.13-5: Vantage Point #3: Intracoastal Waterway - Santa Rosa Sound

Figure 3.1.13-6: Vantage Point #4: Gulf of Mexico, Looking North

Table 3.1.13-2: Rating of Views of Site A-15

	Vantage Point	Dominant Landscape Feature	Scenic Attractiveness	Concern Level
1	Navarre Beach public pier	Gulf, white sand beach, horizon	Distinctive	High
2	Magnolia Beach Campground	Gulf, white sand beach, horizon, scrub pine, sawgrass	Common	Medium
3	Intracoastal Waterway – Santa Rosa Sound	Gulf, white sand beach, horizon, scrub pine	Minimal	High
4	View north from Gulf of Mexico	Gulf, white sand beach	Minimal	Low

Vantage point #1 has the highest combined scenic attractiveness and concern level, and it has a very limited oblique view of Site A-15. Views from vantage points #2 and #3, extend across the Santa Rosa Sound looking directly into Site A-15. Vantage points #1, #2, and #3 have medium to high concern level because of the volume of private and commercial marine traffic in the Intracoastal Waterway. The reduced scenic attractiveness of vantage points #2, #3, and #4 is due to the dominance of man-made alterations of the natural landscape and landforms. The characteristic natural landscape is dominated by the long, horizontal lines of the beach and unobstructed horizon. However, views of Site A-15 are altered by the very dominant vertical forms of the water tower and antennas, and the view of the beach and horizon is compromised by the industrial nature of the existing architecture of buildings on the existing test site.

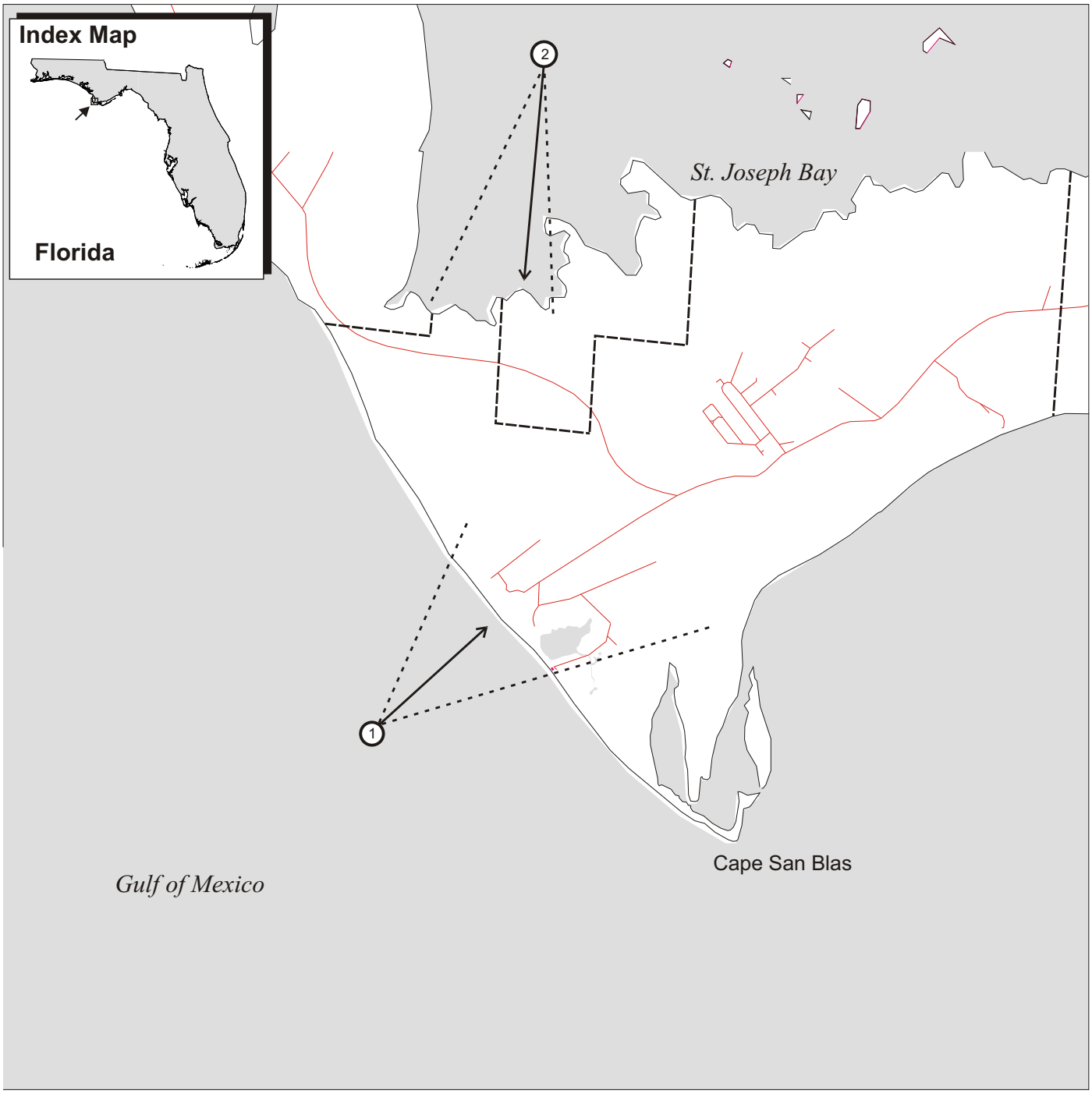
3.1.13.3.2 Cape San Blas

The dominant, character-defining visual and aesthetic elements of landscape at Cape San Blas were assessed from field trips, photography, and research. They include the mixture of quiet beaches and verdant estuaries and salt marsh of juncus and spartina grass, and tall flatland hammocks of slash pine and scrub oak. The Aquatic Preserve in the St. Joseph's Bay and wetlands of the St. Vincent Wildlife Preserve are popular places for shelling, scalloping, boating and fishing, spawning grounds for sea turtles, and habitat for bald eagles and a variety of shore and nesting birds (Myers and Ewel, 1990). Cape San Blas is also well-known for its historic features of the Cape San Blas lighthouse and keeper's quarters. See figure 3.1.13-7.

For the purposes of this assessment, the natural and human-made landscape surrounding Site D-3A at Cape San Blas were observed from land and water. These viewshed locations are mapped in figures 3.1.13-8 and 3.1.13-9.

The views from the five vantage points are illustrated in figures 3.1.13-10 through 3.1.13-14. Table 3.1.13-3 evaluates the scenic attractiveness of each of these views using a method derived from the Visual Resource Management System of the Forest Service.

Figure 3.1.13-7: Cape San Blas Historic Lighthouse and Keeper's Quarters



EXPLANATION

- Roads
- (1) Vantage Point
- Cone of Vision

Waterborne Vantage Points for Visual Assessment

Scale 1:24,000

0 1,000 2,000 Feet

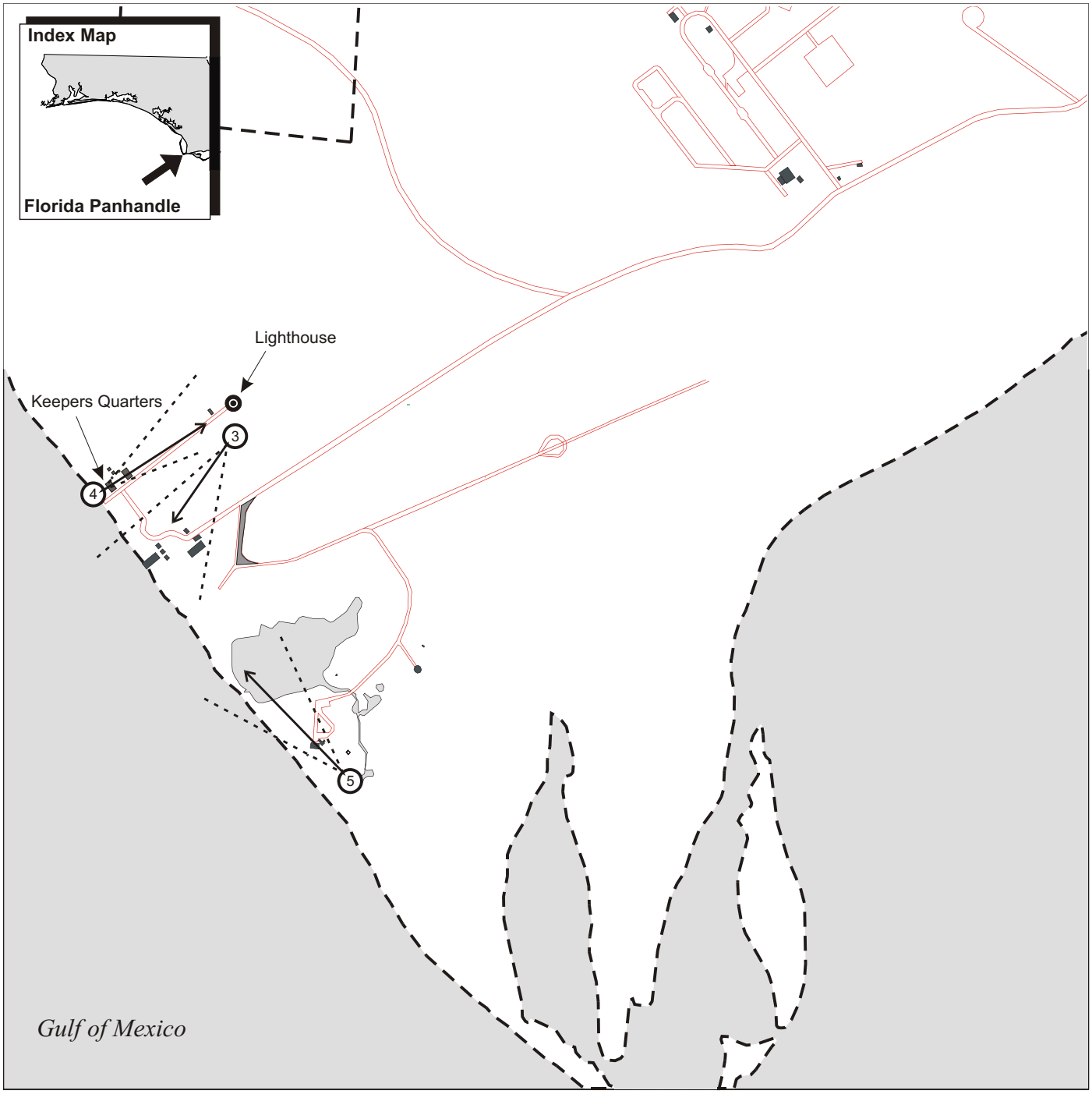
0 250 500 Meters

NORTH

Cape San Blas, Florida

Figure 3.1.13-8

Csb-24k-3vis001



EXPLANATION

- Lighthouse
- Government Property
- 3 Vantage Point
- Cone of Vision

Shore Vantage Points for Visual Assessment

NORTH

Scale 1:9,600

0 400 800 Feet

0 125 250 Meters

Cape San Blas, Florida

Figure 3.1.13-9

Csb-9600-3cult002

Figure 3.1.13-10: Vantage Point #1: Gulf of Mexico Towards Light House

Figure 3.1.13-11: Vantage Point #2: St. Joseph's Bay Towards Cape San Blas

Figure 3.1.13-12: Vantage Point #3: Cape San Blas Lighthouse Looking Towards Beach

Figure 3.1.13-13: Vantage Point #4: Keeper's Quarters Looking Towards Lighthouse

Figure 3.1.13-14: Vantage Point #5: Existing Launch Pad Along Beach

Table 3.1.13-3: Rating of Views of Cape San Blas

Vantage Point		Dominant Landscape Features	Scenic Attractiveness	Concern Level
1	Gulf of Mexico toward lighthouse	White sand beach, slash pine hammocks, light house, keeper's quarters	Common	Low
2	St. Joseph's Bay toward Cape San Blas	Pine hammocks	Common	Medium
3	Cape San Blas Light house looking toward beach	Hammocks, white sand beach	Common	High
4	Keeper's Quarters looking toward light house	Hammocks, keeper's quarters, lighthouse	Common	High
5	Existing launch pad along beach	White sand beach, pine hammocks	Minimal	Low

At vantage point #1 the scenic attractiveness of the historic setting of the lighthouse and keeper's quarters has been lessened by the intrusion of the military barracks and antenna that are part of the existing Air Force facilities at Site D-3A. The Gulf of Mexico provides one of the few vantage points from which the historic light house and keeper's quarters as well as the proposed launch site can be seen. Its exposure and concern level are relatively low as there is not a great deal of boat traffic at this location in the Gulf of Mexico because of navigational difficulties in this area.

At vantage point #2 there is no view of the military facilities beyond the tree line, and a relatively attractive scenic view of the St. Joseph's Bay and Richardson's Hammock is degraded by the watch tower and long dock. This area is frequented by fishers when high tides permit them to come into this inlet area.

Vantage point #3 provides a vista of the beach with scattered slash pine and palm trees in the middle ground. However, the background scene is altered by the barracks, antenna, and storage buildings built for military use. This area is relatively sensitive because it is part of the interpretative context for the historic lighthouse.

Vantage point #4 includes several attractive landscape features, including the lighthouse, keeper's quarters and a pine hammock, with minor intrusion by military storage buildings and a cyclone fence line. Note that the light house has been relocated from its original position, and the keeper's quarters are in poor condition because of storm damage, beach erosion, and lack of maintenance.

Vantage point #5 illustrates the view from the existing launch pad that is located on the other side of the road and tree line that separate the launch site from the historic setting of the lighthouse and keeper's quarters. It is a relatively common view of pine flatwoods and beach, degraded by the presence of the existing launch pad and environmental shelter.

3.1.13.4 Environmental Impacts and Mitigations

3.1.13.4.1 Santa Rosa Island

TMD activities may affect the visual environment of Santa Rosa Island. During flight test operations at either site, the Hera target missile would be erected and visible for a short period prior to launch. The launch itself would be visible for a period of a few minutes.

No-action Alternative

If the proposed action alternative is not implemented at Santa Rosa Island, current operations activities of Eglin AFB would continue at Santa Rosa Island. Changes in the visual character of the existing site will depend on other, unknown activities that may otherwise be conducted on the site.

Site Preparation Activities

Interceptor

No construction requirements have been identified for interceptor launches from Santa Rosa Island. Trailers containing launchers and radar equipment would be set up at the launch location 2 weeks prior to launch. This activity would be limited in duration to 2 weeks and would have no permanent effect on the visual and aesthetic environment. No facilities are proposed, and the mobile equipment is no larger than normal military vehicles. These operational vehicles are camouflaged to further minimize their visual impact.

Target

Figures 2.1.2-3 through 2.1.2-5 illustrate the major structures and portable instrumentation that would be constructed at a typical launch site of the target missile.

Figure 3.1.3-13 shows the previously disturbed areas and the proposed construction disturbance at Site A-15. Most of the construction would take place on previously disturbed or unvegetated areas on the south Gulf of Mexico side of Santa Rosa Island where they would be partly screened from noise and view from Santa Rosa Sound and the beaches and residential areas on the mainland. The construction activities are expected to last approximately 8 months, and to consist of intermittent use of medium-sized earthmoving equipment, cranes, trucks, and scaffolding by a crew of 5 to 15 workers. Maximum use would be made of existing facilities in order to reduce construction activity to a minimum.

During site preparation, the disruption to the visual and aesthetic environment would be temporary and would consist of low-levels of noise, smoke, and dust as well as the view of equipment on the site during daylight hours. Only a limited amount of this activity would be visible from the Santa Rosa Sound and residential areas on the mainland,

because most of the activity would take place on the south side of the island, facing the Gulf of Mexico.

Because of the temporary duration of construction impacts and the low level of public visibility, site preparation activities may affect visual and aesthetic resources of Santa Rosa Island.

Flight Test Activities

The effect of the program on the visual and aesthetic environment would be a function of the visibility of the structures and the temporary visibility of the launch and assembly vehicles.

Interceptor

There would be no permanent facilities proposed for interceptor launches. The interceptor missile is smaller and accelerates faster than the target missile, so should cause less visual impact upon launch.

Target

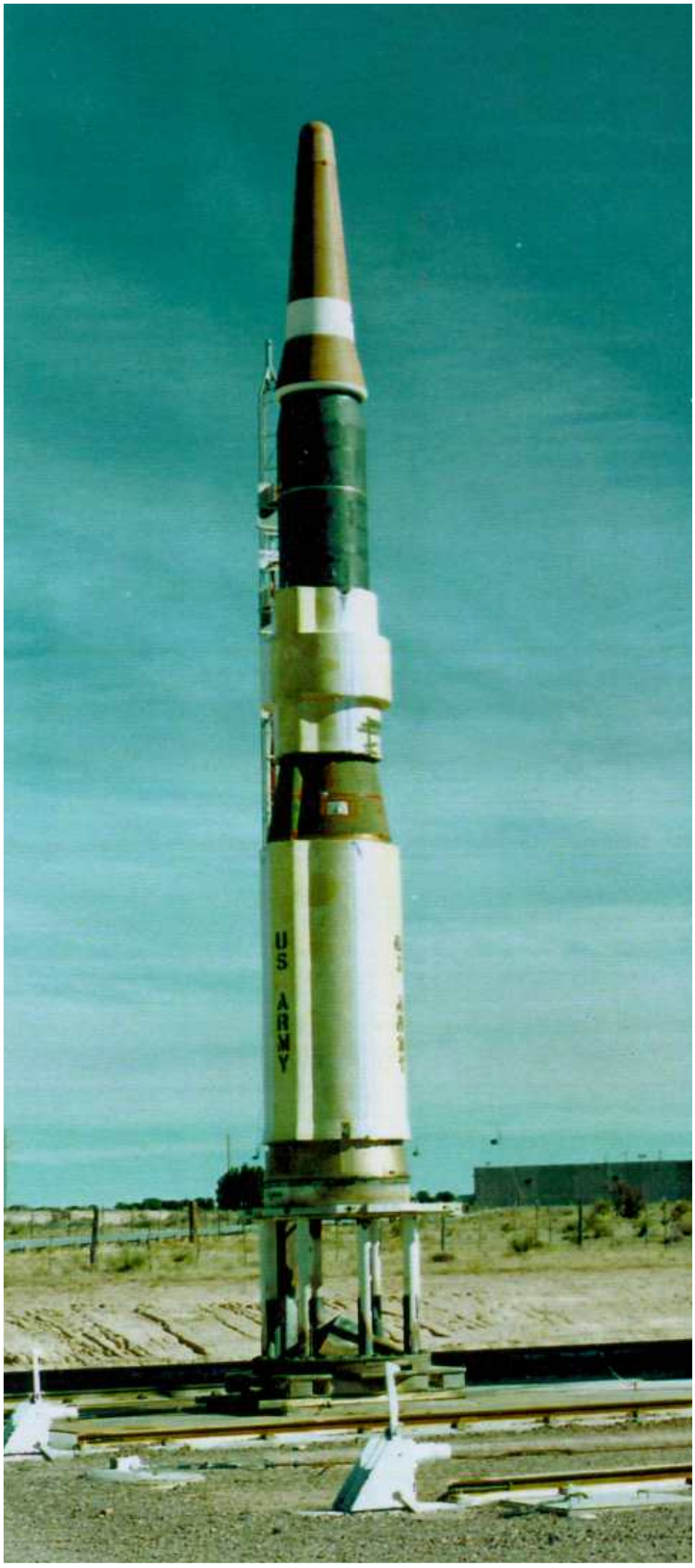
The location of the proposed TMD launch structures and facilities on the Santa Rosa Island site is shown in figure 3.1.3-13.

Figure 3.1.13-15 shows the proposed target missile in its upright position, ready for launch. Typically the missile would be out of view. Except for a brief period immediately prior to launch, the missile would be housed out of sight either in storage areas offsite or cradled horizontally in the environmental shelter. The typical launch vehicle is the Hera, which stands approximately 13.6 meters high (44.5 feet high), above a 1.8-meter high (6-foot) steel launch stool. The diameter of the Hera missile is approximately 1.3 meters (4.3 feet). The total height of the erect missile, as shown in the illustration, would be approximately 15.24 meters (50 feet) above the launch pad. The missile would surface would be of a neutral or white, non-reflective color.

The assessment of the effects of the launch activities from the vantage points must recognize that the proposed facilities represent significant modifications to the dominant features of the natural landscape viewed from many of the representative vantage points. The dominant natural features include the views of the water, the undulating land forms of white sand beaches and dunes in the foreground, long views of the distant horizon in the background, and stands of slash pines in the middleground. The location of the relatively tall and bulky industrial buildings proposed at the launch site and the tall vertical element of the erected launch missile present potentially dominant alterations of this natural landscape if appearing in the middleground or foreground of the landscape scene.

Table 3.1.13-4 summarizes the assessment of scenic integrity for each vantage point selected in the Santa Rosa Island viewshed as a result of the proposed action. It mirrors the assessment of the rating applied to the no-action alternative because it has

Figure 3.1.13-15: Hera Target Missile



comparable sized, shaped, and colored forms with similar landscape characteristics. For instance, the existing landscape already has dominant human alterations when seen from locations which place the vertical forms, such as the water tower, and the large industrial type buildings in the middleground. In other cases, such as vantage point #1, the viewing distance is great enough that additional numbers of human alterations would not be noticeable in the background.

Table 3.1.13-4: Rating of Scenic Integrity of Santa Rosa Island Site for Proposed Action

Vantage Point	Criteria for Scenic Integrity			
	Dominant Feature	Degree of Alteration	Intactness of Landscape Character	Scenic Integrity Rating
1. View from Navarre Beach public pier	Landscape Character	Not Evident	Landscape Character Largely Intact	High
2. View from Magnolia Beach Campground	Landscape Character	Evident, but not Dominant	Slightly Altered and Character Expression Moderate	Moderate
3. View from Intracoastal Waterway	Human Alterations	Dominant	Altered and Low Expression of Character	Low
4. View north from Gulf of Mexico	Human Alterations	Dominant	Altered and Low Expression of Character	Extremely Low

Source: U.S. Department of Agriculture, Forest Service, 1995.

Figures 3.1.13-16 through 3.1.13-19 display the results of imposing the Hera missile on the same views of Santa Rosa Island shown previously. The Hera missile is within the view of figures 3.1.13-16 through 3.1.13-18, but not visibly apparent. In figure 3.1.13-19 the missile launch site was found to be out of the view of the photograph to the left.

Cumulative Impacts

The construction and operation of the TMD program would take place in an area which has historically been used for military operations and occupied by structures that are of a similar aesthetic appearance and nature to those proposed by the TMD program. It is unlikely that the addition of the proposed structures will pose a cumulative impact to the established alterations of the landscape and visual character of Santa Rosa Island.

In addition to the TMD program, the Air Force is considering using Santa Rosa Island for a project known as OA-HITL. This program would involve construction of three towers, three control buildings, and associated equipment and instrumentation. The 91.4-meter (300-foot) tower associated with this program would be visible for a considerable distance, including Pensacola, Navarre Beach, and Fort Walton Beach. The OA-HITL project may contribute to cumulative impacts on visual aesthetics in the ROI.

Figure 3.1.13-16: Vantage Point #1: Navarre Beach Public Pier

Figure 3.1.13-17: Vantage Point #2: Magnolia Beach Campground

Figure 3.1.13-18: Vantage Point #3: Intracoastal Waterway - Santa Rosa Sound

Figure 3.1.13-19: Vantage Point #4: Gulf of Mexico, Looking North

Mitigations Considered

Possible mitigations would include:

- Design facilities to be compatible with local military architecture.
- Design facilities to minimize reflective surfaces and bright colors.

3.1.13.4.2 Cape San Blas

TMD activities may affect the visual environment of Cape San Blas. During flight test operations, the Hera target missile would be erected and visible for a short period prior to launch. The launch itself would be visible for a period of a few minutes. The exhaust trail would be visible for a few minutes after the launch.

No-action Alternative

If the proposed action alternative is not implemented at Cape San Blas, current operations activities of Eglin AFB would continue there. Changes in the visual character of the existing site will depend on other, unrelated activities that may otherwise be conducted on the site.

Site Preparation Activities

Interceptor

No construction requirements have been identified for interceptor launches from Santa Rosa Island. Trailers containing launchers and radar equipment would be set up at the launch location 2 weeks prior to launch. This activity would be limited in duration to 2 weeks and would have no permanent effect on the visual and aesthetic environment.

Target

Figure 2.1.2-3 illustrates the three major structures that would be constructed at a typical launch site of the target missile. Although there are existing launch pads at Cape San Blas, all three building types would be new construction. Not shown is a one-story launch equipment building of about 23.8 square meters (256 square feet), to be constructed of reinforced concrete and located next to the launch pad.

Most of the construction would take place on previously disturbed or unvegetated areas on the southeast side of Site D-3A. It would be partly screened from noise and view from the west side of the site (lighthouse and the keeper's quarters) by an existing stand of trees. Construction would not be visible from the State Park or residential areas on the cape. The construction activities would be expected to last approximately 8 months, and to consist of intermittent use of medium-sized earthmoving equipment, cranes, trucks, and scaffolding.

During site preparation, the disruption to the visual and aesthetic environment would be temporary and would consist of low-levels of noise, smoke, and dust as well as the view of equipment on the site during daylight hours. Only a limited amount of this activity would be visible from the highway, beach, and residential areas on the mainland, because most of the activity would take place on the east side of the base, facing the Gulf of Mexico.

Because of the temporary duration of construction impacts and the low level of public visibility, site preparation activities may affect visual and aesthetic resources of Cape San Blas.

Flight Test Activities

Interceptor and Target

The permanent effect of the program on the visual and aesthetic characteristics would be a function of the visibility of the structures illustrated in figure 2.1.2-3 and the temporary visibility of the launch and assembly vehicles.

The location of the proposed TMD launch structures and facilities on the Cape San Blas site is shown in figure 2.2.1-2.

Figure 3.1.13-15 shows the proposed target missile in its upright position, ready for launch. Typically the missile would be out of view. Except for a brief period immediately prior to launch, the missile would be housed out of sight either in storage areas offsite or cradled horizontally in the environmental shelter.

The assessment of the effects of the launch activities from the vantage points shown in figures 3.1.13-8 and 3.1.13-9 must recognize that the proposed facilities represent significant modifications to the dominant features of the natural landscape viewed from many of the representative vantage points. The dominant natural features include the views of the water, the salt marsh, beaches and dunes in the foreground, long views of the distant horizon in the background, and stands of slash pines in the middleground. The intrusion of the relatively tall and bulky industrial buildings proposed at the launch site, and the tall vertical element of the erected launch missile present potentially dominant alterations of this natural landscape if appearing in the middleground or foreground of the landscape scene.

The existing landscape already has dominant human alterations when seen from locations which place the vertical forms, such as the light house, and the large industrial type buildings in the middleground (table 3.1.13-5), In other cases, such as vantage point #2, the viewing distance is great enough that additional numbers of human alterations would be less noticeable. From vantage points #3 and #4, the launch site would be screened from the cone of vision by existing vegetation. The scenic integrity of vantage point #1 was degraded from low to very low because from vantage point #1, the existing landscape buffer between the east and west parts of the site would not stand between the viewer and the site, as is the case in the other locations.

Figures 3.1.13-20 through 3.1.13-21 display the results of imposing the Hera missile on the same views of Cape San Blas shown previously. In both figures 3.1.13-20 and 3.1.13-21 the missile launch site was found to be out of view of the photographs.

Table 3.1.13-5: Rating of Scenic Integrity of Cape San Blas Site D-3A for Proposed Action Alternative

	Vantage Point	Dominant Feature	Degree of Alteration	Intactness of Landscape Character	Scenic Integrity Rating
1.	Gulf of Mexico toward lighthouse	Human Alterations	Extremely Dominant	Extremely Altered	Very Low
2.	St. Joseph's Bay toward Cape San Blas	Landscape Character	Evident, but not Dominant	Slightly Altered and Character Expression Moderate	Moderate
3.	Cape San Blas light house looking toward beach	Landscape Character	Evident, but not Dominant	Slightly Altered and Character Expression Moderate	Moderate
4.	Keeper's quarters toward light house	Human Alterations	Dominant	Altered and Low Expression of Character	Low
5.	Existing launch pad along beach	Human Alterations	Dominant	Altered and Low Expression of Character	Extremely Low

Cumulative Impacts

The construction and operation of the TMD program will take place in an area which has historically been used for military operations and occupied by structures that are of a similar aesthetic appearance and nature to those proposed by the TMD program. It is unlikely that the addition of the proposed structures will pose a cumulative impact to the established alterations of the landscape and visual character of Cape San Blas.

Mitigations Considered

Possible mitigations would include:

- Design facilities to be compatible with local military architecture.
- Design facilities to minimize reflective surfaces and bright colors.

Figure 3.1.13-20: Vantage Point #1: Gulf of Mexico Towards Light House

Figure 3.1.13-21: Vantage Point #2: St. Joseph's Bay Towards Cape San Blas

3.1.14 WATER RESOURCES

Site preparation activities may affect water quality. Flight test hydrogen chloride emissions could be deposited in surface waters resulting in temporary increase of water acidity.

3.1.14.1 Resource Description and Evaluative Methods

This section evaluates the existing water resource conditions pertaining to each of the proposed sites. Water resources include surface water, groundwater, marine water resources, and flood hazard areas.

The analytical approach for water resources involved assessing the degree to which the proposed TMD actions, such as construction activities and target and interceptor launches, could impact the quality of surface water, groundwater, coastal marine, or Gulf of Mexico waters within the various ROIs. Impacts that could result from proposed construction activities include increased turbidity and contamination of surface waters. Impacts could also result from launch-related activities such as changes in water chemistry due to deposition of launch emissions, chemical simulants, and missile debris.

Criteria for assessing the potential impacts to water resources are based on the sensitivity of the resource area that would be affected relative to its occurrence at the project sites and in the region of debris impact and the duration of the impact. In addition, see section 3.1.3 for a discussion of wetland impacts and section 3.1.12 for a discussion of impacts to water-related utilities.

The Federal Water Control Amendments of 1972, commonly known as the Clean Water Act (CWA), established a national strategy to restore and maintain the chemical, physical, and biological integrity of the nation's water. Under the CWA, the USEPA is the principal permitting and enforcement agency. The CWA functions primarily by requiring permits for activities that result in the discharge of water pollutants from both point sources (i.e., discharge pipes, ditches, etc.) and non-point sources (i.e., agricultural lands, construction sites, and dredge and fill operations).

The 1987 amendments to the CWA required the U.S. EPA to establish a National Pollutant Discharge Elimination System (NPDES) permit program for storm water discharges associated with industrial activities. The regulation has four different NPDES application processes: an individual permit application, a multi-sector general permit application, and two general permit applications. Industrial operations that result in the discharge of storm water pollutants are permitted under an individual, multi-sector, or general industrial permit. A general construction permit application is required for construction activities that result in the disturbance of 2 hectares (5 acres) or more in area and requires the preparation of a storm water pollution prevention plan. Construction activities at Santa Rosa Island would result in the disturbance of less than 0.8 hectares (2 acres) of land and would not be subject to Federal NPDES permitting requirements.

Stormwater management activities within the State of Florida are also governed by section 62-25 of the Florida Administrative Code (FAC) and the Florida ERP program. The ERP program applies to alterations of the landscape, including the creation or alteration of wetlands and other surface waters, and alterations of uplands that affect flooding and all stormwater management activities. Under the ERP program, the permit application serves as a joint application to initiate review by the FDEP and the USACE. The FDEP utilizes the ERP application for the concurrent review of State of Florida stormwater management requirements, application for use of state-owned submerged lands, and for ensuring compliance with state water quality standards. Construction activities at Santa Rosa Island will be required to comply with the State of Florida stormwater management requirements, as identified in section 62-25 FAC.

As mentioned above, the ERP also serves as an application to the USACE for federal dredge and fill permitting review in accordance with Section 404 of the CWA. Section 404 of the CWA established the Federal program that regulates activities in the nation's wetlands. Specifically, Section 404 of the CWA established a program to regulate the discharge of dredged and fill material into waters of the United States, including wetlands. Construction activities at Santa Rosa Island will not result in an impact to wetlands. Refer to section 3.1.3.3.1 for a discussion of wetland resources at Santa Rosa Island.

3.1.14.2 Region of Influence

The ROI for water resources can be divided into three categories: surface water, groundwater, and marine water. The ROI for surface water resources at the proposed launch sites (Sites A-15 and D-3A) includes the LHA for launch failures. Additional areas defined as areas of potential deposition from missile exhaust emission products are also included in the ROI. The ROI for groundwater is similar to the ROI for surface waters and includes the groundwater between the site where infiltration occurs and the aquifer from this point along the groundwater flow to the ocean. The marine water resource ROI includes the ocean area within the launch hazard area, the flight path corridor, and the debris impact areas.

3.1.14.3 Affected Environment

3.1.14.3.1 Santa Rosa Island

Surface Water

There are no well-defined drainage channels on Santa Rosa Island due to high permeability of the beach and dune sand deposits. There are several small surface-water bodies on the island within the ROI including a small pond adjacent to the east boundary of Site A-15.

Groundwater

Two significant aquifers occur beneath Eglin AFB and the surrounding area: the surficial aquifer, also known as the Sand and Gravel Aquifer, and the Floridan Aquifer. The Sand and Gravel Aquifer is a generally unconfined, near-surface unit segregated from

the underlying limestone Floridan Aquifer by the comparatively low-permeability Pensacola Clay confining bed. (U.S. Army Space and Strategic Defense Command, 1994a)

The Sand and Gravel Aquifer consists of the Citronelle Formation and marine terrace deposits, which thicken to the southwest, reaching a maximum thickness of 365 meters (1,200 feet) at Mobile Bay, Alabama. The Sand and Gravel Aquifer has been identified as an important source of water for Escambia, Okaloosa, and Santa Rosa counties. In the vicinity of Fort Walton Beach, the aquifer consists of several distinct sandy units, the lowest of which is the main producing zone. In general, the quality of the Sand and Gravel Aquifer is good, very soft and relatively unmineralized. Raw water from the aquifer has a pH ranging from 3.0 to 10.2, although it is usually acidic, with average pH of 4.9 in the upper zone and 7.2 in the lower (production) zone. Because of its porous nature and near-surface location, the Sand and Gravel Aquifer is vulnerable to contamination from surface pollutants. Several IRP sites within the ROI have been reported as having various amounts of petroleum hydrocarbons, pesticides, heavy metals, and a wide variety of other compounds associated with the groundwater (Air Force Development Test Center, 1997c). The sand and gravel aquifer, although not used as a drinking water source in the ROI is classified as a G-2 potential drinking water aquifer by the state of Florida (Bjorkland, 1997).

The Floridan Aquifer, which occurs beneath most of the State of Florida, consists of a thick sequence of interbedded limestones and dolomites overlain by the Pensacola Clay confining bed. In general, raw water from the Florida Aquifer has a pH ranging from 7.0 to 7.5. In the vicinity of Eglin AFB, Fort Walton Beach, and Destin in southern Okaloosa County, excessive declines in potentiometric surface elevation of the Floridan Aquifer have occurred due to increased groundwater pumping. This overdraft condition increases the risk of saltwater intrusion into the aquifer, and has caused the abandonment of some wells on Santa Rosa Island (U.S. Army Space and Strategic Defense Command, 1994a).

The upper limestone of the Floridan Aquifer is the principal source of water used at Eglin AFB and surrounding communities. The Floridan Aquifer is protected from the downward migration of pollutants by the Pensacola Clay, which is both a confining layer for the Floridan Aquifer and an impermeable layer for overlying waters in the Sand and Gravel Aquifer. This effectively limits the downward migration of waters that might carry contaminants from the surface (U.S. Army Space and Strategic Defense Command, 1994a). Within the Santa Rosa Island ROI, the Floridan Aquifer occurs at a depth of approximately 200 meters (650 feet) (U.S. Army Space and Strategic Defense Command, 1994a).

Coastal Marine Water

In the FDEP classification system, the Gulf of Mexico, located on the southern shore of Santa Rosa Island, is classified as Class III waters (recreation, fish and wildlife management) and Santa Rosa Sound, located on the northern shore of Santa Rosa Island, is classified as Class III waters as described by the Clean Water Act. Class III waters are intended to maintain a level of water quality suitable for recreation and the production of fish and wildlife communities.

Water quality of Santa Rosa Sound and Choctawhatchee Bay are significantly influenced by coastal Gulf of Mexico waters. Water quality in Choctawhatchee Bay and Santa Rosa Sound has historically been evaluated as "good" (Florida Department of Environmental Protection, 1994).

Special Flood Hazard Areas

Santa Rosa Island is located within an area identified by the Federal Emergency Management Agency (FEMA) as a Special Flood Hazard Areas (SFHA). SFHAs are defined as areas with a one percent or greater chance of equaling or exceeding the established 100-year flood levels in any given year. SFHAs are subdivided into flood hazard zones according to specific criteria. The flood hazard zones commonly associated with Santa Rosa Island are defined as follows (Federal Emergency Management Agency, 1997):

- Zone VE: SFHAs along coasts subject to inundation by the 100-year flood with the additional hazards associated with storm waves.
- Zone AE: SFHAs subject to inundation by the 100-year flood determined in a Flood Insurance Study by detailed methods. Base flood elevations are shown within these zones. Mandatory flood insurance purchase requirements apply.
- Zone X: Areas identified in the community flood insurance study as areas of moderate or minimal hazard from the principal source of flood in the area. However, buildings in these zones could be flooded by severe, concentrated rainfall coupled with inadequate local drainage systems.
- Zone C: Areas of minimal flooding

The proposed project site on Santa Rosa is located within an area of moderate or minimal hazard of flooding (Zone X).

3.1.14.3.2 Cape San Blas

Surface Water

There are no well-defined drainage channels on Cape San Blas due, in part, to the high permeability of the beach and dune sand deposits. Small ponds are located just north and south of the proposed launch site.

Groundwater

In general, groundwater resources within the vicinity of Cape San Blas consist of the surficial Sand and Gravel Aquifer, located approximately 12 meters (40 feet) below ground level, and the Floridan Aquifer, located approximately 120 to 140 meters (400 to 450 feet) below ground level. Water from both aquifers is generally considered to be non-potable (Pratt, 1997).

The Sand and Gravel aquifer consists primarily of siliciclastic sediments, which are part of the Citronelle and Miccosukee Formations (also referred to as Coarse Clastics) and undifferentiated sediments of the Pleistocene and Holocene epochs. Sediments found

within the surficial aquifer are described as unconsolidated (uncemented) quartz sands intermixed with varying amounts of clay. Sediments within the Floridan Aquifer consist primarily of permeable carbonate rock with minor occurrences of siliciclastic sediments (Florida Department of Natural Resources, Division of Resource Management, 1992).

Coastal Marine Water

Cape San Blas and adjacent portions of the St. Joseph Peninsula are bounded by St. Joseph Bay to the north and east of the peninsula, and by the Gulf of Mexico to the west and south. In the vicinity of Cape San Blas, both the Gulf of Mexico and St. Joseph Bay are classified as Class III waters, and St. Joseph Bay is further classified as an Aquatic Preserve according to Chapter 17-3 of the Florida Administrative Code. St. Joseph's Bay is unique in that it is the only sizable, embayed body of water in the eastern portion of the near-shore gulf coast not markedly influenced by the inflow of fresh water. The bay has a mean depth of 6.4 meters (21 feet), and a maximum depth of about 10.7 meters (35 feet) near the northern tip of the spit (Florida Department of Natural Resources, Division of Resource Management, 1992).

Water quality of St. Joseph's Bay is categorized as "good" by the FDEP (Florida Department of Environmental Protection, Division of Administrative and Technical Services, 1994). Average pH of bay waters has been reported to be over 8.0 and average pH of Gulf of Mexico waters in the vicinity of Mexico Beach is approximately 8.7 (U.S. Army Space and Strategic Defense Command, 1994a). Salinity concentrations within the bay are essentially the same as the Gulf of Mexico.

Special Flood Hazard Areas

The proposed project site on Cape San Blas includes VE, AE, and C zones. Base flood elevations at the site range from 1.8 to 2.7 meters (6 to 9 feet) (Federal Emergency Management Agency, 1992).

3.1.14.4 Environmental Impacts and Mitigations

3.1.14.4.1 Santa Rosa Island

During TMD testing and training activities, hydrogen chloride could be deposited on surface waters resulting in temporary increase of water acidity.

No-action Alternative

Under the no-action alternative, the proposed ground-based TMD test activities on Santa Rosa Island would not be implemented. Current operations at Eglin AFB involving Santa Rosa Island would continue at current and planned levels. Continuing use of Site A-15 would result in negligible effects on surface and ground water resources. Continuing overdraft of groundwater would be adverse. Refer to section 3.1.12.4.1 for additional discussion of impacts due to water consumption.

Site Preparation Activities

Interceptor

There would be no site preparation for interceptor launches other than during mobile equipment onto the site and set-up and calibration. Launch crews are trained to minimize spills and other environmental impacts.

Target

Site preparation activities at Site A-15 on Santa Rosa Island would require limited ground disturbance since existing concrete pads and buildings would be used for the launch pad, and MAB. Some road work may be necessary to facilitate access. Existing facilities at Eglin AFB main base would also be used for the optics and radar and would not require any site preparation.

Flight Test Activities

Interceptor

Interceptor launches involve mobile equipment onto the site and set-up and calibration. Launch crews are trained to minimize spills and other environmental impacts.

An interceptor missile emits approximately 1/8th as much as a target missile and accelerates through the atmosphere mixing height much more quickly than the target missile. The resulting emissions and therefore deposition are much less than that of a target missile. With this much less deposition of hydrogen chloride, there is no perceptible change in water acidity in the vicinity of the launch.

Target

Potential impacts to marine water quality are associated primarily with the hydrogen chloride in the exhaust of solid rocket motors that may be released into the water environment. No releases to the water environment are associated with normal preparation for launch and maintenance activities.

Implementation of the proposed action could result in deposition of combustion emission products into surface waters within the ROI. Combustion emissions are composed primarily of hydrogen chloride, aluminum oxide, and water. In general, the effects associated with hydrogen chloride deposition are primarily related to short-term increased water activity, whereas, effects associated with the deposition of aluminum oxide are related to mineral uptake by plants.

The environmental impact of pH involves synergistic effects on water-dependent biological resources. High acidity can result in an increased solubility of some substances; In such instances, the acidity level may contribute to high concentrations of these substances.

Although hydrogen chloride is very soluble in water, it does not deposit readily onto dry aerosols or other dry surfaces when the relative humidity is below 100 percent.

Because the atmosphere under launch conditions when there is no rain for 2 hours after the event would have a relative humidity lower than 100 percent, direct dry deposition of hydrogen chloride gas onto the ground and vegetation would not be significant. Similarly, the deposition of aluminum oxide would be very low. Thus, no impacts to surface water are anticipated for nominal launches during dry weather.

If it were to rain shortly after a missile launch, the hydrogen chloride present in the exhaust plume would be dissolved in the rain droplets, which would result in a temporary reduction in rainfall pH. Depending on the buffering capacity of the receiving water, rainfall may result in an increase in surface water acidity. Surface water acidity ranging from approximately pH 4.0 to 6.0 is generally believed to result in stress to marine life and possibly death (National Aeronautics and Space Administration, 1990). The degree and duration of any increased acidity in surface waters would depend on several variables, including surface water volume and alkalinity, as well as the amount and pH level of rainfall.

The pH of shallow marine waters near Santa Rosa Island is approximately 8.0. Marine waters in the vicinity of Santa Rosa Island range from a low of 7.2 in eastern Pensacola Bay to a high of 8.2 in central Pensacola Bay. Average alkalinity measurements range from a low of 93 mg/L calcium carbonate in the central Pensacola Bay to a high of 97 mg/L calcium carbonate near the mouth of Pensacola Bay (Florida Department of Environmental Protection, 1994).

Project-related changes in pH of shallow marine waters near Santa Rosa Island were estimated for the purposes of impact analysis. Calculations were conservative in that 100 percent of the hydrogen chloride present in the exhaust plume was assumed to be dissolved in rain droplets (as opposed to approximately 20 percent under normal conditions). Existing surface water pH and alkalinity levels were assumed to be 7.2 and 93 mg/L calcium carbonate, respectively. Under these circumstances, rainwater falling on nearby surface waters would result in a slight decrease in pH from 7.2 to approximately 7.1 within the upper 15 centimeters (6 inches) of the water surface and would quickly dissipate with additional rainfall and mixing of the surface waters.

Potable groundwater resources located within the Santa Rosa Island ROI primarily occur within the Floridan Aquifer. However, lenses of fresh, shallow groundwater are present in the Sand and Gravel Aquifer above the confining layer of the Floridan Aquifer. Measurable groundwater contamination as a result of launch activities is highly unlikely because of the standard spill prevention, containment, and transportation safety plans that are implemented for any launch program.

The Floridan Aquifer is protected from the downward migration of pollutants. The Pensacola Clay is both a confining layer for the Florida Aquifer and an impermeable layer for any overlying waters in the Sand and Gravel Aquifer. This effectively limits the downward migration of waters that might carry contaminants from the surface (U.S. Army Space and Strategic Defense Command, 1994a). As a result, there is virtually no potential for contamination of the Floridan Aquifer as a result of the proposed activities.

Cumulative Impacts

The proposed reconstruction of instrumentation on Santa Rosa Island may contribute to the overdraft of the Floridan Aquifer. The reconstruction proposal is not mature enough to allow prediction of water demands. The incremental increase in water consumption due to TMD activities including the use of bottled water would allow the total usage of potable water to remain within current permit levels.

Based on the number of launches proposed at this location, the deposition of exhaust products from solid and liquid fuel addressed in section 3.1.1 (Air Quality), would be rapidly removed, diluted, or buffered to a neutral pH. No other activities, programs, or projects have been identified that, together with the proposed TMD activities, would have affect geology and soils at this location.

Mitigations Considered

Standard operating procedures would include the implementation of an emergency response plan prior to a test which specifies the requirement for an onsite recovery team for spill response and debris recovery and advanced notification procedures.

Possible mitigations would include:

- Design planning and engineering that would minimize the amount of new impervious surfaces and establish procedures or systems to minimize untreated surface runoff from program-related sites.
- Monitor water quality in the vicinity before and after the initial launch.

3.1.14.4.2 Cape San Blas

During TMD testing and training activities, hydrogen chloride could be deposited in surface waters resulting in a temporary increase of water acidity.

No-action Alternative

Under the no-action alternative, the proposed ground-based TMD test activities on Cape San Blas would not be implemented. Current operations at Eglin AFB involving Cape San Blas would continue at current and planned levels. Continuing Eglin AFB testing and training operations would result in negligible effects on surface and ground water resources.

Site Preparation Activities

Interceptor

There would be no site preparation for interceptor launches other than during mobile equipment onto the site and set-up and calibration. Launch crews are trained to minimize spills and other environmental impacts.

Target

In accordance with NPDES requirements, a General NPDES Permit is required for construction activities which result in the disturbance of 2 or more hectares (5 or more acres) of land. Construction activities at Cape San Blas would result in the disturbance of approximately 3.53 hectares (8.72 acres) of land and, therefore, would be subject to Federal NPDES permitting requirements.

Construction activities at Cape San Blas would require submittal of an ERP permit application to the FDEP for determination of compliance with State of Florida stormwater management requirements. Submittal of the ERP application to the USACE for federal dredge and fill permitting review would also be required. Refer to section 3.1.3.4 for a discussion of wetland impacts.

Flight Test Activities

Impacts to surface waters within the Cape San Blas ROI would be similar to those at Santa Rosa Island.

The pH levels of surface waters near Cape San Blas range from 7.4 in Panther Swamp to 8.0 in the central St. Joseph Bay. Average alkalinity levels range from 76 mg/L calcium carbonate in Panther Swamp to 89 mg/L calcium carbonate in St. Joseph Bay (Florida Department of Environmental Protection, 1994).

Project-related changes in pH of shallow marine waters near Cape San Blas were estimated for purposes of impact analysis. Calculations were conservative in that 100 percent of the hydrogen chloride present in the exhaust plume was assumed to be dissolved in rain droplets (as opposed to approximately 20 percent under normal conditions). Existing pH and alkalinity levels of nearby marine waters were assumed to be 8.0 and 89 mg/L calcium carbonate, respectively. Wetland areas located near the launch facility were assumed to have pH and alkalinity levels of 7.4 and 76 mg/L calcium carbonate, respectively. Under these circumstances, rainwater falling on nearby marine waters would result in a temporary decrease in pH level from 8.0 to approximately 7.7 within the upper 15 centimeters (6 inches) and a temporary decrease of pH levels in nearby wetlands from 7.4 to approximately 7.3. Decreases in surface water pH levels would quickly dissipate if there were currents, or may persist for several hours if the water were stagnant. Refer to section 3.1.14.4.1 for a general discussion of the effects of hydrogen chloride in relation to water quality. An interceptor missile emits approximately 1/8th as much as a target missile, and accelerates through the atmosphere mixing height much more quickly than the target missile. The resulting emissions and therefore deposition are much less than that of a target missile. With this much less deposition of hydrogen chloride there is no perceptible change in water acidity in the vicinity of the launch.

Cumulative Impacts

No existing or planned development has been identified which would result in a significant impact to water quality within the ROI. Because impacts to water quality are

not expected to be significant, and no significant impacts from other ongoing or proposed uses have been identified, no cumulative water quality impacts are expected.

Mitigations Considered

Standard operating procedures would include the implement an emergency response plan prior to test which specifies the requirement for an onsite recovery team for spill response and debris recovery and advanced notification procedures.

Possible mitigations would include:

- Design planning and engineering that would minimize the amount of new impervious surfaces and establish procedures or systems to minimize untreated surface runoff from program-related sites.
- Monitor water quality in the vicinity before and after the initial launch.