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EXTENDED RANGE INTERCEPT
TECHNOLOGY

EXTENDED RANGE INTERCEPT TECHNOLOGY

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Abstract: The Strategic Defense Initiative Program, announced by former President Reagan on March 23, 1983, is an extensive research program designed to determine the feasibility of developing and effective ballistic misslie defense systems. The program includes research of tactical or theather missile defense technologies necessary for the protection of ground forces from attacks by enemy tactical missiles. One aspect of such technology is defense against tactical missiles acccomplished by intercepting and destroying a missile before it can reach its designated target. The principles of the technology to be evaluated in the Extended Range Intercept Technology (ERINT) program were initially demonstrated at lower altitudes in the successful Flexible Lightweight Agile Guided Experiment (FLAGE). The purpose of the FLAGE program included developing hit-to-kill technology and demostrating the guidance accuracy of a small, agile, radar-homing vehicle. Provisions for the Theater Missile Defense Chemical Flight Expeiments (TMDCFE) have been included in the proposed ERINT program to quantify theater missile defense (TMD) lethality against bulk chemical warheads in the TMD Bulk Chemical Experiment (TMDBCE) and against submunition chemical warheads in the TMD Submunition Chemical Experiment (TMDSCE).

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Executive Summary

EXECUTIVE SUMMARY

INTRODUCTION

The Strategic Defense Initiative program, announced by former President Reagan on March 23, 1983, is an extensive research program designed to determine the feasibility of developing an effective ballistic missile defense system. The program includes research of tactical or theater missile defense technologies necessary for the protection of ground forces from attacks by enemy tactical missiles.

One aspect of such technology is defense against tactical missiles accomplished by intercepting and destroying a missile before it can reach its designated target. The principles of the technology to be evaluated in the Extended Range Intercept Technology (ERINT) program were initially demonstrated at lower altitudes in the successful Flexible Lightweight Agile Guided Experiment (FLAGE). The purpose of the FLAGE program included developing hit-to-kill technology and demonstrating the guidance accuracy of a small, agile, radar-homing vehicle. Provisions for the Theater Missile Defense Chemical Flight Experiments (TMDCFE) have been included in the proposed ERINT program to quantify theater missile defense (TMD) lethality against bulk chemical warheads in the TMD Bulk Chemical Experiment (TMDBCE) and against submunition chemical warheads in the TMD Submunition Chemical Experiment (TMDSCE).

TEST PROGRAM ACTIVITIES

The ERINT program activities would include the development and flight testing of two different missiles: the ERINT-1 missile and the ERINT Target System (ETS) missile, which incorporates a non-hazardous chemical simulant payload in the target for TMDCFE activities. Two types of ETS missile targets would be developed and tested: a ballistic tactical missile target and a maneuvering tactical missile target. Flight tests would also include use of an existing air-breathing target. Bulk chemical containers (i.e., the target) would hold the simulant on the ETS ballistic missiles. Submunitions (cylindrical steel containers within the target) holding simulant would be used on the ETS maneuvering targets.

Activities involving the ERINT-1 and ETS missiles would consist of design; fabrication, assembly, and testing; rocket motor development, refurbishment, and inspection; flight preparation; launch, flight, and intercept; and data collection and analysis. TMDCFE activities incorporated into the ERINT program would consist of chemical simulant handling, payload incorporation, simulant dissemination, detection, and data collection.

All test activities, except ETS flight preparation activities at the U.S. Army White Sands Missile Range (WSMR), New Mexico, would be conducted at existing facilities, with no construction or major modifications required. Several modifications (upgrades) would be required at the Sulf Site, WSMR, prior to ETS launches. These upgrades would not alter the typical use of the site, which is to support missile and rocket launches.

The ERINT-1 flight test missile development and test activities would be conducted at LTV Missiles and Electronics Group, Grand Prairie, Texas; Rockwell

International, Anaheim, California; L.A. Gauge, Sun Valley, California; and Holloman Air Force Base (AFB), New Mexico. ERINT-1 rocket motor development and test activities would take place at Atlantic Research Corporation (ARC) facilities in Gainesville and Orange County, Virginia, and in Camden, Arkansas.

ETS target development activities would be conducted at Aerotherm, a subsidiary of Dyncorp, California. Aerotherm, formerly Acurex Corporation, changed ownership effective 24 May 1991. ETS missile development and test activities would take place at Orbital Sciences Corporation, Arizona, and rocket motor refurbishment/inspection would occur at Hill AFB, Utah and Pueblo Depot Activity, Colorado.

The non-hazardous chemical agent simulant for TMDCFE activities would be prepared at Battelle facilities near West Jefferson, Ohio.

The ERINT flight test program would consist of eleven flights at WSMR (Table S-1). Seven of these flight tests would incorporate TMDCFE activities. The ERINT-1 missiles would be launched from Launch Complex (LC)50 near the south end of WSMR; the ETS missiles would be launched from the Sulf Site in the northwest corner of WSMR. The air-breathing targets would be launched from the Army Materiel and Test Evaluation Directorate Drone Launch Facility at the south end of WSMR.

METHODOLOGY

The purpose of this Environmental Assessment (EA) is to analyze the potential environmental consequences of the proposed ERINT activities in compliance with the National Environmental Policy Act, the Council on Environmental Quality regulations implementing the Act (40 CFR 1500-1508), Department of Defense DOD Directive 6050.1, *Environmental Effects in the United States of Department of Defense Actions*, and Army Regulation 200-2, *Environmental Effects of Army Actions*.

To assess the significance of any impact, a list of the activities necessary to accomplish the proposed action was developed. The affected environment at each proposed ERINT program location was then described. Eleven areas of environmental consideration were included in this description: air quality, biological resources, cultural resources, hazardous materials and waste, health and safety, infrastructure, land use, noise, physical resources, socioeconomics, and water resources. Next, those activities with the potential for environmental consequences were identified. If a proposed activity was determined to present a potential for environmental impact, then the activity was evaluated in terms of the potential for significant impacts, considering the intensity, extent, and context in which the impacts occur.

RESULTS

This section summarizes the conclusions of the evaluations made for each of the eleven areas of environmental consideration based on the application of the above methodology. Within each summary discussion below, only those facilities for which a potential environmental concern was determined are described. Table S-2 summarizes the environmental issues that were evaluated for ERINT program activities for each location.

TABLE S-1. ERINT PROGRAM FLIGHT TEST SCHEDULE

Flight Test	Proposed for Quarter/ Calendar Year	ERINT-1 Missile	ERINT Target System (ETS)	TMDCFE Payload on ETS
1	4th/1991	No	Ballistic Target Demonstration	TMDBCE
2	1st/1992	Control Test Missile 1	No	No
3	1st/1992	Control Test Missile 2	No	No
4	2nd/1992	Guided Test Missile 1	Ballistic Target 1	TMDBCE
5	3rd/1992	Guided Test Missile 2	Ballistic Target 2	TMDBCE
6	3rd/1992	Guided Test Missile 3	Ballistic Target 3	TMDBCE
7	3rd/1992	No	Air-breathing Target Demonstration	No
8	4th/1992	Guided Test Missile 4	Air-breathing Target	No
9	4th/1992	No	Maneuvering Target Demonstration	TMDSCE
10	1st/1993	Guided Test Missile 5	Maneuvering Target 1	TMDSCE
11	2nd/1993	Guided Test Missile 6	Maneuvering Target 2	TMDSCE

Source: U.S. Army Strategic Defense Command, 1991a.

TABLE S-2. ERINT LOCATIONS AND ENVIRONMENTAL ISSUES EVALUATED IN DETAIL IN THIS ENVIRONMENTAL ASSESSMENT*
Page 1 of 3

	Environmental Components										
Location	Air Quality	Biological Resources	Cultural Resources	Hazardous Materials and Waste	Health and Safety	Infrastructure	Land Use	Noise	Physical Resources	Socioeconomics	Water Resources
LTV Missiles and Electronics Group, Texas	None	None	None	Use of solid propellants, batteries, solvents, and chemical filming materials	Handling and storage of solid propellants and ordnance	None	None	None	None	None	None
Rockwell International, California	Component fabrication has potential to generate beryllium air emissions	None	None	Fabrication of beryllium components	Handling and use of beryllium	None	None	None	None	None	None
L.A. Gauge, California	Component fabrication has potential to generate beryllium air emissions	None	None	Fabrication of beryllium components	Handling and use of beryllium	None	None	None	None	None	None
Holloman Air Force Base, New Mexico	Air emissions from solid propellant rocket motors during sled tests	Affect of sled test operations on threatened and endangered species	None	Use of solid propellant rocket motors	Handling and use of solid propellant rocket motors	None	None	Noise generated by rocket motors during sled tests	None	None	None
Atlantic Research Corporation, Virginia	Air emissions from ERINT-1 solid propellant rocket motor during static fire test	None	None	Use of cleaning solvents and solid propellant rocket motor; disposal of waste solid propellants	Handling and processing of solid propellants; static fire test of ERINT-1 solid propellant rocket motor	None	None	Noise from static fire test of ERINT-1 rocket motor	None	None	None

TABLE S-2. ERINT LOCATIONS AND ENVIRONMENTAL ISSUES EVALUATED IN DETAIL IN THIS ENVIRONMENTAL ASSESSMENT*
Page 2 of 3

Location	Environmental Components										
	Air Quality	Biological Resources	Cultural Resources	Hazardous Materials and Waste	Health and Safety	Infrastructure	Land Use	Noise	Physical Resources	Socioeconomics	Water Resources
Atlantic Research Corporation, Arkansas	Air emissions from ERINT-1 solid propellant rocket motor during static fire test	None	None	Use of solid propellant rocket motor	Static fire test of ERINT-1 solid propellant rocket motor	None	None	Noise from static fire test of ERINT-1 rocket motor	None	None	None
Aerotherm, California	None	None	None	Use of solvents and TMDCFE simulant	Handling of solvents and TMDCFE simulant	None	None	None	None	None	None
Orbital Sciences Corporation, Arizona	None	None	None	Use of chemical filming materials and solvents	Handling of chemical filming materials and solvents	None	None	None	None	None	None
Hill Air Force Base, Utah	None	None	None	Use of cleaning solvents, hydraulic fluids, paints, and solid propellant rocket motor	Handling and X-raying of ETS second-stage rocket motor	None	None	None	None	None	None
Pueblo Depot Activity, Colorado	None	None	None	Use of solid propellant rocket motor	X-raying of ETS first-stage rocket motor	None	None	None	None	None	None
Battelle, Ohio	None	None	None	Use of TMDCFE simulant	Handling and processing of simulant	None	None	None	None	None	None

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TABLE S-2. ERINT LOCATIONS AND ENVIRONMENTAL ISSUES EVALUATED IN DETAIL IN THIS ENVIRONMENTAL ASSESSMENT*
Page 3 of 3

Location	Environmental Components										
	Air Quality	Biological Resources	Cultural Resources	Hazardous Materials and Waste	Health and Safety	Infrastructure	Land Use	Noise	Physical Resources	Socioeconomics	Water Resources
White Sands Missile Range, New Mexico	Air emissions from ERINT-1 and target systems rocket motors Beryllium missile components could become air pollutants during intercept impact or flight termination Air emissions from construction activities at Sulf Site TMDCFE simulant dissemination	Flight test debris may impact in bighorn sheep herd areas Debris impact and/or recovery activities may affect threatened and endangered species and/or their habitats TMDCFE simulant deposition's affect on biota Construction activities at Sulf Site have potential to disturb biological resources	Debris impact and/or recovery activities may disturb archaeological sites Construction activities at Sulf Site have potential to disturb archaeological sites	Use of solvents during pre-launch processsing Use of solid propellant rocket motors Potential for generation of beryllium component debris TMDCFE simulant deposition Renovation of building containing asbestos at Sulf Site	Handling and storage of solid propellants and ordnance Launches and flights of ERINT-1 and target systems Recovery of beryllium component debris Handling and dissemination of TMDCFE simulant Debris impact Exposure to asbestos during building renovation at Sulf Site	None	Missile overflight and temporary evacuation of White Sands National Monument Temporary closure of Highway 70 Debris impact and recovery in San Andres National Wildlife Refuge and White Sands National Monument	ERINT-1 and target launches Debris impact and recovery activities Construction activities at Sulf Site	None	None	TMDCFE simulant deposition on surface and ground waters Potential for beryllium debris falling in surface waters

* Note: A finding of no significant impact was determined for each of the issues evaluated at each location in this environmental assessment.

Air Quality – Beryllium missile component fabrication activities at Rockwell International and L.A. Gauge present potential air quality impacts. Both facilities would utilize control equipment to maintain any emissions of beryllium dust and vapors below Environmental Protection Agency (EPA) standards; therefore, no significant air quality impacts are expected. Sled test activities at Holloman AFB present potential impacts to air quality. These activities have taken place at Holloman AFB under similar conditions with no known impacts.

The proposed static motor tests at the ARC Orange County, Virginia and Camden, Arkansas facilities present potential air quality impacts. However, because the frequency of ERINT testing would not represent a significant increase in the number of tests normally conducted at these facilities, and impacts to air quality would be short term and localized, no significant air quality impacts are expected from these activities.

Proposed construction activities at the Sulf Site may result in pollutants from construction equipment exhaust and dust from vehicular traffic on unpaved roads. Because there would not be continuous emissions and the area has good atmospheric dispersion characteristics, no significant air quality impacts are expected.

ERINT flight testing activities at WSMR would produce air emissions from launch exhaust. Evaluation of emission data on ERINT Target System and ERINT-1 missiles indicate no significant impacts would result. Emission volumes are well below the standards for the 8-hour threshold limit values for carbon monoxide, aluminum oxide, carbon dioxide, hydrogen chloride, and hydrogen sulfide. Therefore, no significant impacts are expected to air quality for flight testing and related rocket engine testing activities.

Because TMDCFE testing activities at WSMR would take place only under conditions for which modeling predicts no transport of chemical simulant through the air that would result in ground deposition of measurable concentrations (i.e., greater than 1 milligram[mg]/meter $[m]^2$) of simulant beyond WSMR's boundaries or on sensitive land use areas (e.g., White Sands National Monument and San Andres National Wildlife Refuge), no significant air quality impacts are expected.

Biological Resources – No significant impacts from past sled test operations at Holloman AFB have been identified. ERINT sled tests would not involve or generate any hazardous materials that could potentially affect the White Sands pupfish found on base. No significant biological impacts from ERINT sled tests are expected.

Flight preparation activities at WSMR present potential biological resource impacts. The Sulf Site modification activities would occur entirely within a pre-disturbed, graded area which contains little or no vegetation. Surveys conducted by the WSMR Environmental Services Division indicate that no federal- or state-listed threatened or endangered species are present at the Sulf Site. For these reasons, no significant impacts to biological resources are expected from these activities.

Flight test activities at WSMR present potential biological resource impacts from debris impacts and noise. An analysis has shown that the probability of at least one bighorn sheep to be hit by at least one lethality enhancer (LE) fragment from the ERINT-1 missile is estimated to be 10^{-8} or lower. Launch-related sound levels within the San Andres and Bosque del Apache National Wildlife Refuges are likely to be low, and no significant impacts to desert bighorn sheep or other wildlife species are expected. Because LE fragments are not considered critical or hazardous debris, no recovery activities are planned within the San Andres National Wildlife Refuge or other sensitive areas. No sensitive species potentially affected by debris recovery helicopters are known to occur within areas where recovery of debris is planned; therefore, no significant impacts are expected from these activities.

Because of the high altitude of TMDCFE tests and the physical characteristics of the chemical simulant, little, if any measurable deposition of the simulant would be expected to occur. At no time would TMDCFE activities be conducted under conditions for which modeling predicts ground deposition of measurable concentrations (greater than 1 mg/m^2) of the simulant outside of WSMR's boundaries or on sensitive land use areas. Available data suggest that no significant impacts to biological resources should be expected. Results of laboratory and greenhouse studies conducted by the Tennessee Valley Authority have verified that no effect would occur to WSMR soils and vegetation at concentrations up to 400 mg/m^2.

Cultural Resources – The Sulf Site modification activities would take place entirely within a previously disturbed area. An archaeological survey conducted by the WSMR Environmental Services Division did not discover any cultural resources at the Sulf Site. The Record of Environmental Consideration (REC) for the Sulf Site and the WSMR Environmental Services Division survey have shown that the proposed ERINT activities would present no adverse effects to cultural resources either eligible for inclusion or listed on the National Register of Historic Places. Although cultural sites have been identified near LC50, the debris recovery team would keep off-road travel to a minimum and an archaeologist will accompany the recovery team on all debris recovery activities. An archaeologist will be contacted 4 weeks prior to firing to arrange for accompaniment with the recovery team. If any cultural resources were to be potentially affected, the WSMR Environmental Services Division would be contacted. No significant impacts to cultural resources are expected.

Hazardous Materials/Waste – The use of small quantities of hazardous materials (e.g., solvents, chemical filming materials, paints, beryllium) and/or solid propellants in support of the ERINT program presents potential hazardous materials/waste impacts at each ERINT test location discussed in this EA. Each facility would store and handle all hazardous materials according to the manufacturer's recommendations on the material safety data sheet for each substance.

In addition, each contractor facility (i.e., LTV, Rockwell International, L.A. Gauge, ARC, Aerotherm, Orbital Sciences Corporation, and Battelle) would follow internal procedures for the storage, handling, and disposal of hazardous materials.

Beryllium materials at Rockwell International and L.A. Gauge would be handled in accordance with EPA regulations regarding hazardous materials as administered by the California Department of Health Services.

Chemical simulant preparation at Battelle would generate little or no chemical waste because most of the simulant would be prepared, transported, and stored in its original shipping container. None of the individual simulant components is listed as a hazardous substance by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

At LTV and ARC, solid propellants would be handled in accordance with Department of Defense and Department of Transportation regulations for handling and transport of explosives. Waste propellant at ARC would be disposed of by thermal treatment under an EPA permit.

Holloman AFB, Hill AFB, Pueblo Depot Activity, and WSMR would also follow Department of Defense and Department of Transportation regulations regarding the handling and transport of explosives when conducting ERINT activities involving solid propellant rocket motors.

Hill AFB would handle cleaning solvents, hydraulic fluids, and paints in accordance with the requirements of its Resource Conservation and Recovery Act permit. WSMR would follow Army Materiel Command regulations for the handling and use of any hazardous materials.

Renovation of a building containing asbestos as part of upgrades to the Sulf Site would follow WSMR safety operating procedures for handling asbestos that incorporate EPA and Occupational Safety and Health Administration (OSHA) regulations.

Hazardous debris, if any, resulting from flight tests at WSMR would be recovered immediately after impact.

None of the components of the TMDCFE simulant that would be disseminated at WSMR is considered a hazardous material under the CERCLA. At no time would TMDCFE activities be conducted under conditions for which modeling predicts ground deposition of measurable concentrations (greater than 1 mg/m^2) of simulant outside of WSMR's boundaries or on sensitive land use areas. In addition, it is expected that little, if any, measurable deposition of the simulant would occur even within WSMR. Any simulant that did reach ground level would continue to evaporate and break down.

For these reasons, no significant hazardous materials/waste impacts are expected from ERINT activities.

Health and Safety – The use of small quantities of hazardous materials and/or solid propellants and ordnance in support of the ERINT program presents a potential health and safety impact at each ERINT test location discussed in this EA. The procedures and regulations for the safe handling of hazardous materials and solid propellants, as discussed under Hazardous Materials/Waste, also apply to Health and Safety. In addition, explosive safety quantity-distances (ESQDs) are established around facilities where propellants or ordnance would be stored or handled at LTV, Holloman AFB, ARC, Hill AFB, Pueblo Depot Activity, and WSMR.

Hill AFB would follow safety procedures for all M57A-1 refurbishment activities, including X-raying the motor, as described in an Air Force technical order. A standard operating procedure based on Army Materiel Command regulations would be used during radiographic inspection of the SERGEANT booster at Pueblo Depot Activity. At Battelle, personnel working with the simulant would wear protective clothing and eyewear, and these activities would take place under ventilated hoods.

At WSMR, safety measures outlined in Army Regulations would be followed for the use and handling of explosives. All flight plans and trajectories must be approved by the WSMR Flight Safety Office. All debris would impact in areas approved by the WSMR Range Safety Office and recovered in accordance with WSMR Regulations. Hazardous debris, if any, would be recovered immediately after impact. For these reasons, no significant health and safety impacts are expected.

Infrastructure – At all ERINT locations except the Sulf Site, ERINT facilities would take place in existing facilities that are routinely used for these types of activities. These facilities would operate at levels and intensities similar to current conditions. No new construction or modification of existing facilities would be required. At WSMR, upgrades to the Sulf Site would be required. However, these upgrades would not alter the typical use of the site, which is to support missile and rocket launches. Except for small numbers of temporary personnel required at Holloman AFB, Pueblo Depot Activity, and WSMR, no additional personnel would be required at any facility. For these reasons, no significant impacts to infrastructure are expected.

Land Use – ERINT flight testing at WSMR would involve ETS overflights of the western portion of White Sands National Monument. WSMR has a memorandum of understanding with the National Park Service to allow this. Flight testing would also require the temporary closure of U.S. Highway 70 and evacuation of White Sands National Monument. These are both routine precautions used during flight tests, and are allowed by agreements with the New Mexico Department of Transportation and the National Park Service. All nominal debris impact areas would occur on WSMR or on the co-use area of White Sands National Monument. Although some lethality enhancer fragments could potentially impact in the San Andres National Wildlife Refuge, the debris would be non-hazardous and would not be recovered and therefore should not present a significant land use impact to the refuge. No significant land use impacts are expected from any ERINT activities.

Noise – Sled test activities at Holloman AFB present potential noise impacts. However, similar tests have been conducted at Holloman AFB with no known noise impacts; therefore, no significant noise impacts are expected.

Static testing activities at the ARC Orange County, Virginia, and Camden, Arkansas facilities present potential noise impacts. Because personnel would be evacuated near the testing areas and noise levels are regulated at the facilities, no significant noise impacts are expected.

Because construction equipment used during modifications to the Sulf Site would generate noise, personnel working on site would wear appropriate ear protection as required. No significant noise impacts from these activities are expected.

Flight test activities (i.e., missile launches and debris recovery activities) at WSMR present potential noise impacts. Because the ERINT-1 rocket motor burns for less than 5 minutes and the ERINT Target System's SERGEANT motor burns for less than 36 seconds, and because the approximate noise emissions for both are less than the 115 dBA OSHA noise exposure limit, noise impacts should not be significant. Debris recovery activities may require helicopter support, and should last less than one day per operation. Helicopters are used throughout WSMR without any known impacts. The short recovery durations would limit any potential noise impacts to wildlife. No debris recovery activities would take place in the San Andres National Wildlife Refuge where helicopter noise could startle the desert bighorn sheep. Therefore, noise impacts from these activities should not be significant.

Physical Resources – At all ERINT facilities except for the WSMR Sulf Site, ERINT activities would take place at existing facilities and would not require any construction or major modifications to existing facilities. No significant impacts to physical resources are expected at these facilities.

Modifications at the Sulf Site would not alter the typical use of the site, which is to support missile and rocket launches. The area is previously disturbed; therefore, no significant impacts to physical resources are expected.

Socioeconomics – ERINT activities would not require a permanent or significant increase in personnel at any location. The temporary personnel required at Hill AFB, Holloman AFB, and WSMR would not create significant socioeconomic impacts.

Water Resources – Debris from ERINT-1 flight test activities and TMDCFE activities would present the potential for water resource impacts at WSMR. Because the deeper aquifer is separated from surface waters by an impermeable silt and clay barrier, it is unlikely that any debris or deposited simulant would affect the local groundwater. Any beryllium components remaining in surface water would have such a low leach rate that no appreciable concentrations would be produced or be available for accumulation in the food chain. Any electrolyte from a missile's batteries would be quickly diluted. Because TMDCFE simulant dissemination would only occur under meteorological conditions for which computer modeling predicts no measurable deposition beyond WSMR boundaries or in sensitive land use areas, any surface waters in these areas should not be significantly affected by TMDCFE activities. It is likely that little, if any, simulant deposition would occur in surface waters on or off WSMR. For these reasons, no significant water resource impacts are expected.

Overall, for the eleven areas of environmental consideration evaluated, no significant impacts from the ERINT program are expected. In addition, no cumulative environmental impacts were identified. In summary, analysis of the proposed ERINT test activities results in a determination of no significant environmental impacts.

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Table of Contents

TABLE OF CONTENTS

TABLE OF CONTENTS
(Cont'd)

LIST OF APPENDICES

LIST OF FIGURES

LIST OF FIGURES
(Cont'd)

LIST OF TABLES

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1.0 Description of Proposed Action and Alternatives

1.0 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

The *National Environmental Policy Act* (NEPA), the Council on Environmental Quality (CEQ) regulations implementing the Act (40 CFR 1500-1508), Department of Defense (DOD) Directive 6050.1, *Environmental Effects in the United States of Department of Defense Actions,* (U.S. Department of Defense, 1979) and Army Regulation (AR) 200-2, *Environmental Effects of Army Actions*, (U.S. Department of the Army, 1988b) which implements these laws and regulations, direct that DOD and U.S. Army officials consider environmental consequences when authorizing or approving federal actions. Accordingly, this Environmental Assessment (EA) analyzes the potential environmental consequences of the Extended Range Intercept Technology (ERINT) program. The disciplines represented in this EA reflect the unique features of the proposed action and its environmental setting.

This section of the EA describes the purpose and need for the action and the proposed action and alternatives. Descriptions of individual mitigation measures are incorporated into the proposed action. Section 2.0 describes the affected environment at locations where activities would be conducted. Section 3.0 assesses the potential environmental consequences of and mitigations for the proposed action and alternatives at these locations, and Section 4.0 summarizes the conclusions reached as a result of the evaluation.

1.1 BACKGROUND

The Strategic Defense Initiative program, announced by former President Reagan on March 23, 1983, is an extensive research program designed to determine the feasibility of developing an effective ballistic missile defense system. The program includes research of tactical or theater missile defense technologies necessary for the protection of ground forces from attacks by enemy tactical missiles.

One aspect of such technology is defense accomplished by intercepting and destroying a missile before it can reach its designated target. The principles of the technology to be evaluated in the ERINT program were initially demonstrated at lower altitudes in the successful Flexible Lightweight Agile Guided Experiment (FLAGE). The purposes of the FLAGE program included developing hit-to-kill technology and demonstrating the guidance accuracy of a small, agile, radar-homing vehicle. The FLAGE program included flight tests at the U.S. Army White Sands Missile Range (WSMR), New Mexico. (LTV Missiles and Electronics Group, undated)

The initial ERINT program began in September 1983 as a supplement to the FLAGE program. It demonstrated the technologies required to extend the range of the FLAGE vehicle to higher, tactically representative altitudes. More recently, the U.S. Army Strategic Defense Command re-directed the ERINT program to develop and demonstrate a preprototype missile system for use in tactical missile defense. ERINT missile subsystems would be similar to those used on the FLAGE missile. ERINT, however, would use a newly-developed, solid-propellant rocket motor (SRM) to fly faster and higher than FLAGE and would also incorporate other changes and improvements for increased performance. (LTV Missiles and Electronics Group, undated)

Provisions for Theater Missile Defense Chemical Flight Experiments (TMDCFE) have been included in the proposed ERINT program to quantify theater missile defense (TMD) lethality against bulk chemical warheads in the TMD Bulk Chemical Experiment (TMDBCE) and against submunition chemical warheads in the TMD Submunition Chemical Experiment (TMDSCE).

1.2 PURPOSE OF AND NEED FOR THE ACTION

The purpose of the ERINT program is to demonstrate a preprototype missile and launch control systems technology for tactical missile defense applications, including performance demonstrations against ballistic and maneuvering tactical missiles, and air-breathing aircraft and cruise missiles (U.S. Army Strategic Defense Command, 1990). Objectives of the ERINT program also include developing a surrogate tactical ballistic missile target and emulating a portion of a threat trajectory (U.S. Army Strategic Defense Command, 1990). The objectives of TMDCFE activities as part of the ERINT program are to provide a realistic TMD quantification of intercept lethality against chemical warheads. These tests are required in order to provide the technical information necessary to reduce the operational risks if a later decision is made to develop an operational TMD system.

The ERINT ballistic tactical missile target would be used for testing by other defense programs at WSMR. Use of this missile and target systems by other programs will be covered by appropriate environmental documentation.

1.3 DESCRIPTION OF THE PROPOSED ACTION

The ERINT program activities would include the development and flight testing of two different missiles: the ERINT-1 missile and the ERINT Target System (ETS) missile, which incorporates a non-hazardous chemical simulant payload in the target for TMDCFE activities. Two types of ETS missiles would be developed and tested: a ballistic tactical missile target and a maneuvering tactical missile target. Bulk chemical containers (i.e., the target) would hold the simulant on the ETS ballistic missiles. Submunitions (cylindrical steel containers within the target) holding simulant would be used on the ETS maneuvering targets. Flight tests would also include use of an existing air-breathing target (a pilotless aircraft operated by remote control). TMDCFE tests would not be incorporated in air-breathing target flights.

Activities involving the ERINT-1 and ETS missiles would consist of design; fabrication, assembly, and testing; rocket motor development, refurbishment, and inspection; flight preparation; launch, flight, and intercept; and data collection and analysis. TMDCFE activities incorporated into the ERINT program would consist of chemical simulant preparation, payload incorporation, simulant dissemination, detection, and data collection.

The ERINT flight test program would consist of eleven flights at WSMR (see Table 1-1). The first would be the ETS ballistic tactical missile target demonstration flight. In the second and third flights, an ERINT-1 control test missile would be flown to a designated point in the atmosphere that is representative of the expected engagement arena, where the flight would be terminated by remote control (LTV Aerospace and Defense Company, 1990a). The purpose of these two flights would be to verify flight performance and stability of the basic air frame and control system design (LTV Missiles and

TABLE 1-1. ERINT PROGRAM FLIGHT TEST SCHEDULE

Flight Test	Proposed for Quarter/ Calendar Year	ERINT-1 Missile	ERINT Target System (ETS)	TMDCFE Payload on ETS
1	4th/1991	No	Ballistic Target Demonstration	TMDBCE
2	1st/1992	Control Test Missile 1	No	No
3	1st/1992	Control Test Missile 2	No	No
4	2nd/1992	Guided Test Missile 1	Ballistic Target 1	TMDBCE
5	3rd/1992	Guided Test Missile 2	Ballistic Target 2	TMDBCE
6	3rd/1992	Guided Test Missile 3	Ballistic Target 3	TMDBCE
7	3rd/1992	No	Air-breathing Target Demonstration	No
8	4th/1992	Guided Test Missile 4	Air-breathing Target	No
9	4th/1992	No	Maneuvering Target Demonstration	TMDSCE
10	1st/1993	Guided Test Missile 5	Maneuvering Target 1	TMDSCE
11	2nd/1993	Guided Test Missile 6	Maneuvering Target 2	TMDSCE

Source: U.S. Army Strategic Defense Command, 1991a.

wp/B-28/V230/TBL1-1

Electronics Group, undated). In the fourth, fifth, and sixth flights, the ERINT-1 would attempt to intercept the ETS ballistic tactical missile target. Flight seven would be a system demonstration flight of the air-breathing target. In the eighth flight, the ERINT-1 guided test missile target would attempt to intercept the air-breathing target (LTV Missiles and Electronics Group, 1991d). Flight nine would be the ETS maneuvering tactical missile demonstration flight. In the tenth and eleventh flights, the ERINT-1 guided test missile would attempt to intercept the ETS maneuvering tactical missile target.

The seven flight tests involving ETS missiles (e.g., flight tests one, four, five, six, nine, ten, and eleven) would incorporate TMDCFE activities (U.S. Army Strategic Defense Command, 1991a). During the ballistic tactical missile target and maneuvering tactical missile target demonstration flight tests (one and nine), the flight of the target would be terminated at a representative altitude. At that altitude, an explosive charge within the target would be detonated by remote control to terminate these two flights. The flight termination would also disseminate the non-hazardous chemical simulant contained in the target. During the fourth, fifth, sixth, tenth, and eleventh flight tests, the ERINT-1 missile intercept of the ETS would also cause the violent dissemination of the simulant. Flight tests one, four, five, and six would contain the TMDBCE payload, while flight tests nine, ten, and eleven would contain the TMDSCE payload. If no intercept occurs, a linear shaped charge in the ETS target assembly would release the chemical simulant payload before it hits the ground and the target would impact close to the intercept debris impact area.

For all flight tests involving TMDBCE activities, the resultant simulant cloud and potential ground footprint would be analyzed to determine agent transport and diffusion characteristics and assess intercept lethality effectiveness. The data collection systems that would be used to analyze the simulant cloud and ground footprint would be defined by TMDBCE static testing activities occurring at Dugway Proving Ground (DPG), Utah. These activities have previously been described in the Theater Missile Defense Bulk Chemical Experiment Environmental Assessment (U.S. Army Strategic Defense Command, 1991b).

The TMDBCE activities at DPG would also generate data to validate the Anti-Tactical Missile Non-Uniform Simple Surface Evaporation Model 3 (ATM NUSSE3). This computer model is used to predict transport, diffusion, and evaporation of a chemical simulant after a chemical warhead has been intercepted at a high altitude (Strietzel, 1990).

Flight tests (specifically, nine, ten, and eleven) involving the maneuvering tactical missile target system would incorporate the TMDSCE simulant. Twenty to thirty containers of simulant would be incorporated in the target for each of these flights. During the demonstration flight (test nine), these steel containers are not expected to break open. In flight tests ten and eleven, intercept of the maneuvering target by the ERINT-1 missile would cause most, if not all, of the containers to break open, and allow the release of the simulant. A photonic hit indicator would be imbedded in the target's surface for TMDSCE activities. The photonic hit indicator uses a grid of optical fibers to provide information on the location and damage size of an impact on the target (Kaman Sciences Corporation, 1989). In addition, the number of submunition containers opened by the intercept would be determined by the use of radio transmitters that would be attached to each canister (Strietzel, 1991b). Debris impact areas for the maneuvering target will be determined after a flight trajectory has been selected.

Further documentation of these activities will be provided in an addendum to this EA, prior to this portion of the action proceeding, verifying no significant impacts.

The ERINT flight test program would include evaluation of the AN/MPQ-53 PATRIOT ground radar system for target tracking applications (LTV Aerospace and Defense Company, 1990a). This system would be one of the radars supplying targeting data to the Launch and Update Control System (LUCS), which computes the ERINT-1 missile launch time and aim point for target intercept (LTV Aerospace and Defense Company, 1990a). The proposed flight system components, development, and operations are described in the following sections. The primary test sites, and associated activities at these sites, are shown in Figure 1-1. Activities at all other subcontractor locations were reviewed, and only those locations where activities present potential adverse environmental effects were evaluated and included in this EA.

1.3.1 ERINT-1 Flight Test Missile

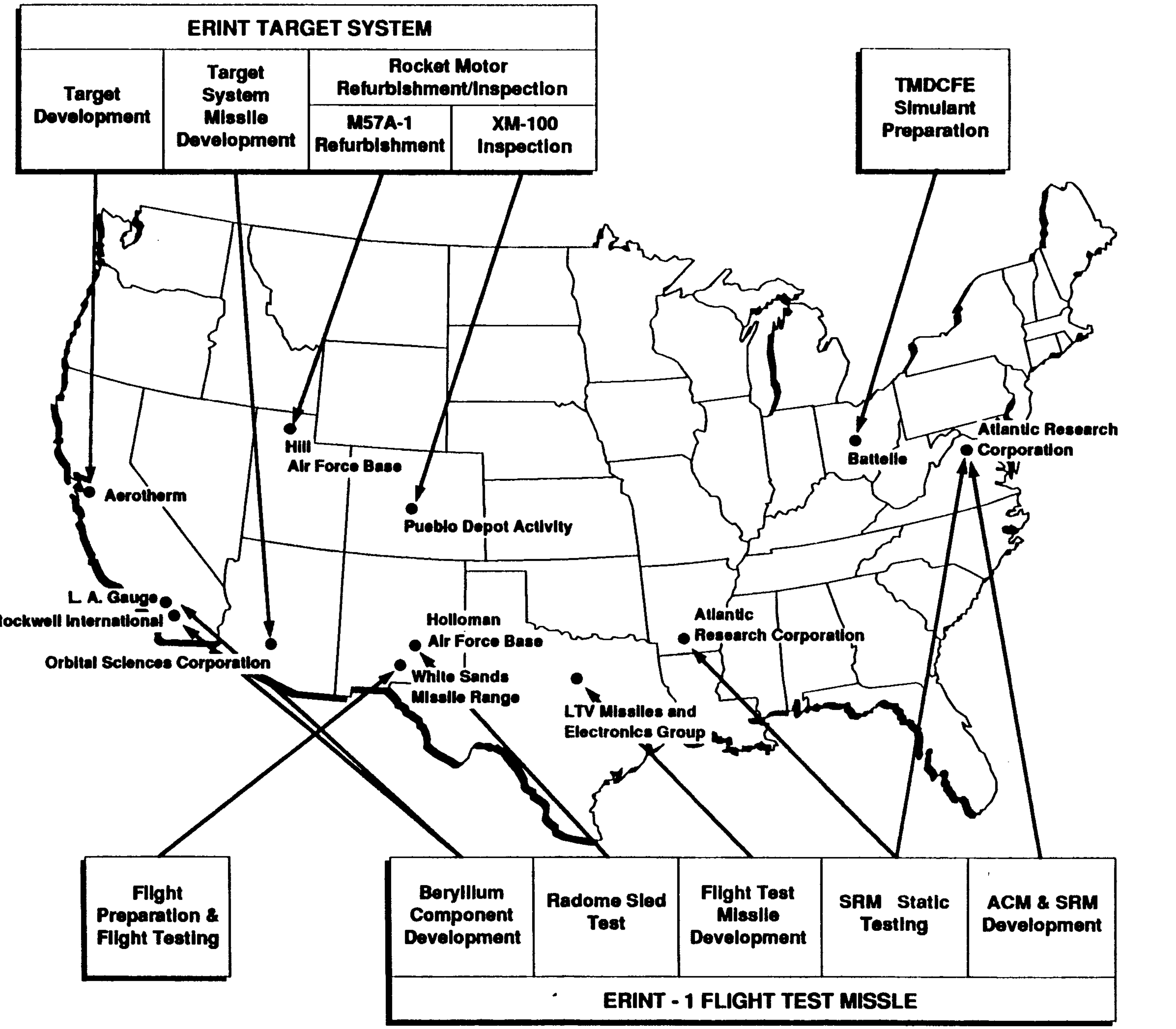
The proposed ERINT-1 flight test missile (Figure 1-2) is a preprototype anti-tactical missile. It would consist of a single stage boost/sustain solid propellant rocket motor (the SRM), a radar section, an attitude control section, an aerodynamic maneuvering system, a mid-section containing inertial measurement and guidance processor units, a lethality enhancer, a telemetry system, and a thrust termination system. The ERINT-1 flight test missile would be approximately 4.8 meters (15.7 feet) long with a diameter of 25.5 centimeters (10 inches). The total missile weight would be approximately 315 kilograms (694 pounds). (LTV Missiles and Electronics Group, undated)

The first two ERINT-1 missile flight tests would be the control (non-intercept) tests to test inertial guidance and general missile performance parameters. In these tests, there would be no radar seeker in the missile's radar section. The remaining flight test missiles, with radar seekers, would be radar-guided test missiles. (LTV Missiles and Electronics Group, undated)

The radome of the radar section would have a removable duroid cover to provide protection from the initial aerodynamic heating caused by the high-velocity flight (LTV Missiles and Electronics Group, undated). During flight, this cover tears into finger-sized pieces and peels away to expose the radome surface (LTV Missiles and Electronics Group, 1991c).

The attitude control section would contain multiple attitude control motors (ACMs) that provide thrust perpendicular to the longitudinal axis of the missile. The ACMs are spaced evenly around the attitude control section of the missile in ten rings of 18 motors each. Each ACM is fabricated of a graphite/epoxy composite case, is 70.1 millimeters (2.76 inches) long, and contains approximately 25 grams (0.9 ounce) of a solid propellant. The ACMs are fired by the motor fire circuit in response to the guidance processor unit for hit-to-kill accuracy as the missile homes in on the target. (Atlantic Research Corporation, 1991b; LTV Missiles and Electronics Group, undated)

The mid-section assembly would contain a lethality enhancer (LE). The LE would consist of 24 individual tungsten fragments (each weighing approximately 214 grams [7.5 ounces]) that are deployed symmetrically around the missile. This configuration effectively increases the lethal radius of the missile, thus

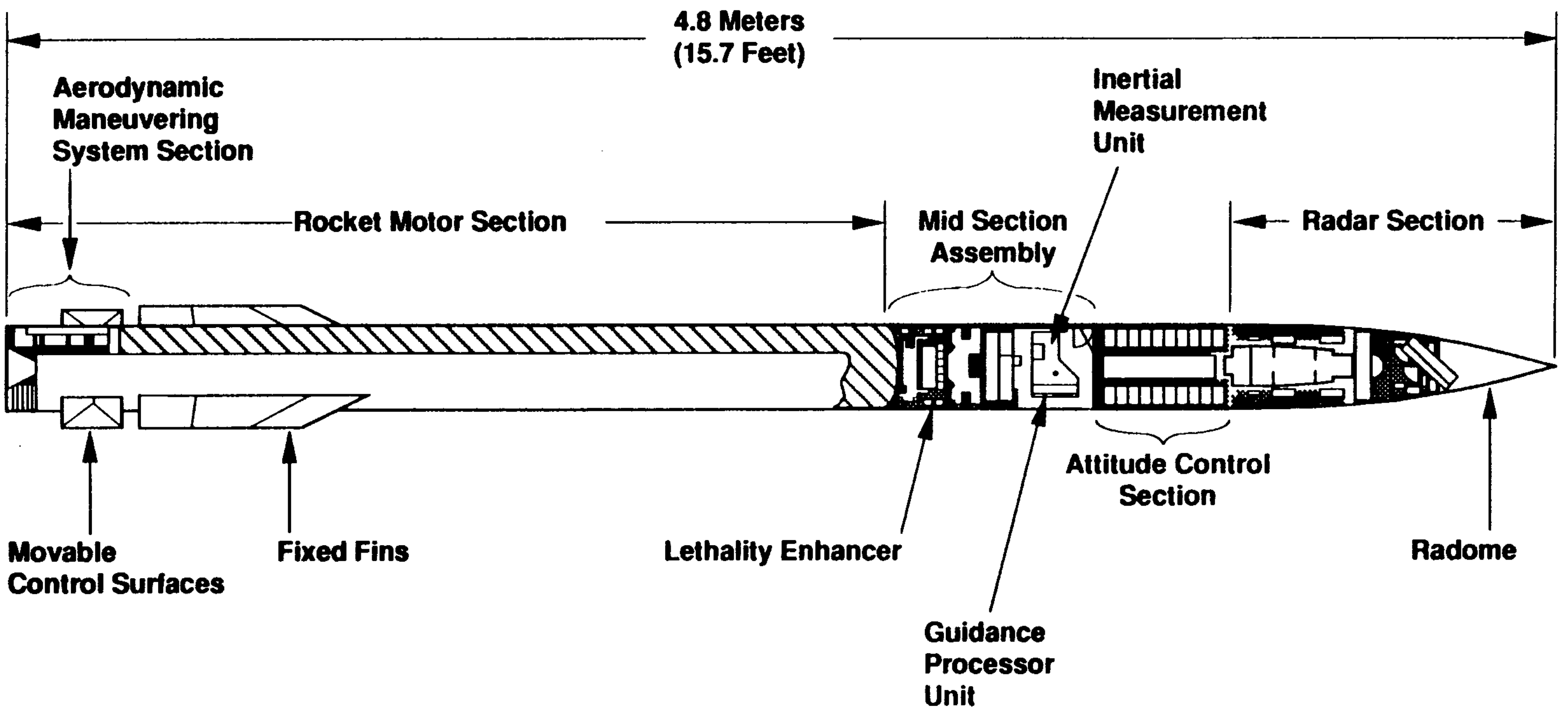


Primary ERINT Test Locations and Activities

Figure 1-1

ERINT/048-2

ERINT-1 Flight Test Missile



Source: LTV Aerospace and Defense Company, 1990a.

Figure 1-2

ERINT/033-1

increasing the probability of target intercept. The mid-section assembly also houses the telemetry system for flight test data transmission to ground stations, and the flight termination system, which is designed to destruct the ERINT-1 missile upon Range Safety command in case of malfunction during flight tests. (LTV Aerospace and Defense Company, 1990a; LTV Missile and Electronics Group, undated)

The rocket motor section would consist of a single stage boost/sustain SRM and dual fin system. It would contain approximately 162 kilograms (357 pounds) of the solid propellants Arcadene 451 and Arcadene 452. The fin system consists of four fixed control surfaces mounted on the SRM case and four movable fins mounted on the aerodynamic maneuvering system, aft of the rocket motor (see Figure 1-2). The aerodynamic maneuvering system actuates the movable fins using electromechanical controls. (Atlantic Research Corporation, 1991b; LTV Missiles and Electronics Group, undated)

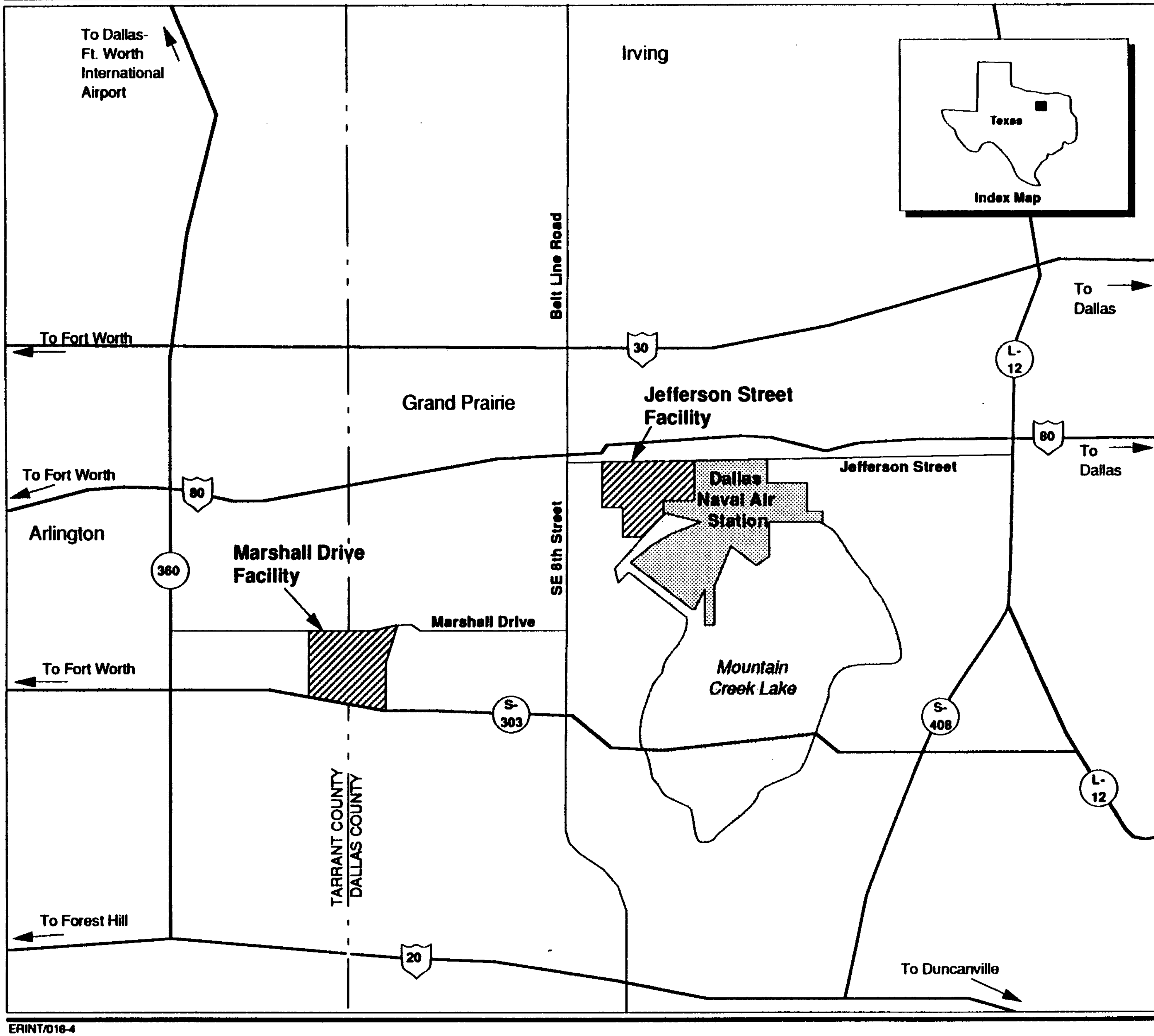
The proposed activities involved in the development of the ERINT-1 missile and pertinent information related to each test location are described in the following sections.

1.3.1.1 Flight Test Missile Development. The LTV Missiles and Electronics Group in Grand Prairie, Texas (Figure 1-3), would be responsible for the design, fabrication, assembly, and testing of the ERINT-1 flight test missile. ERINT activities would take place at LTV's Marshall Drive and Jefferson Street facilities. Beryllium missile components would be developed and manufactured at Rockwell International facilities in Anaheim, California, and L.A. Gauge facilities in Sun Valley, California. High-velocity sled tests would be conducted on the radome of the radar section at Holloman Air Force Base (AFB), New Mexico. Activities at these facilities are described below.

LTV facilities and building locations (Figures 1-4a and 1-4b) that would be used, and the specific ERINT activities that would be conducted, are listed below:

<u>LTV - Marshall Drive Facility</u>

- Building M2: Computerized testing of the guidance and aerodynamic maneuvering system, hardware-in-loop testing
- Building M10: Fabricating the missile airframe models and structure components, LE, attitude control section, LUCS, and the metal frame launch canister
- Building M37: Fabricating, assembling, and testing the electronics, including the guidance processor, ACM firing circuits, aerodynamic maneuvering system control circuit, LUCS, metal frame launch canister, and telemetry instrumentation; fabricating the attitude control section; static load testing of missile airframe models, missile fins, and radome; electromagnetic compatibility/electromagnetic interference testing of the missile forebody; environmental testing of missile components and systems including thermal shock, temperature-altitude, random vibration, and mechanical shock tests; mass properties testing of each missile section assembly to determine weight, center of gravity, moments of inertia, and principal axis inclination; subsystems testing including radar acceptance testing, motor fire circuit acceptance testing, guidance system functional test, telemetry acceptance test, and aerodynamic maneuvering



Vicinity Location Map

LTV Missiles and Electronics Group, Texas

NORTH

NOT TO SCALE

Figure 1-3

Test Facilities Location Map

Marshall Drive Facility, LTV Missiles and Electronics Group, Texas

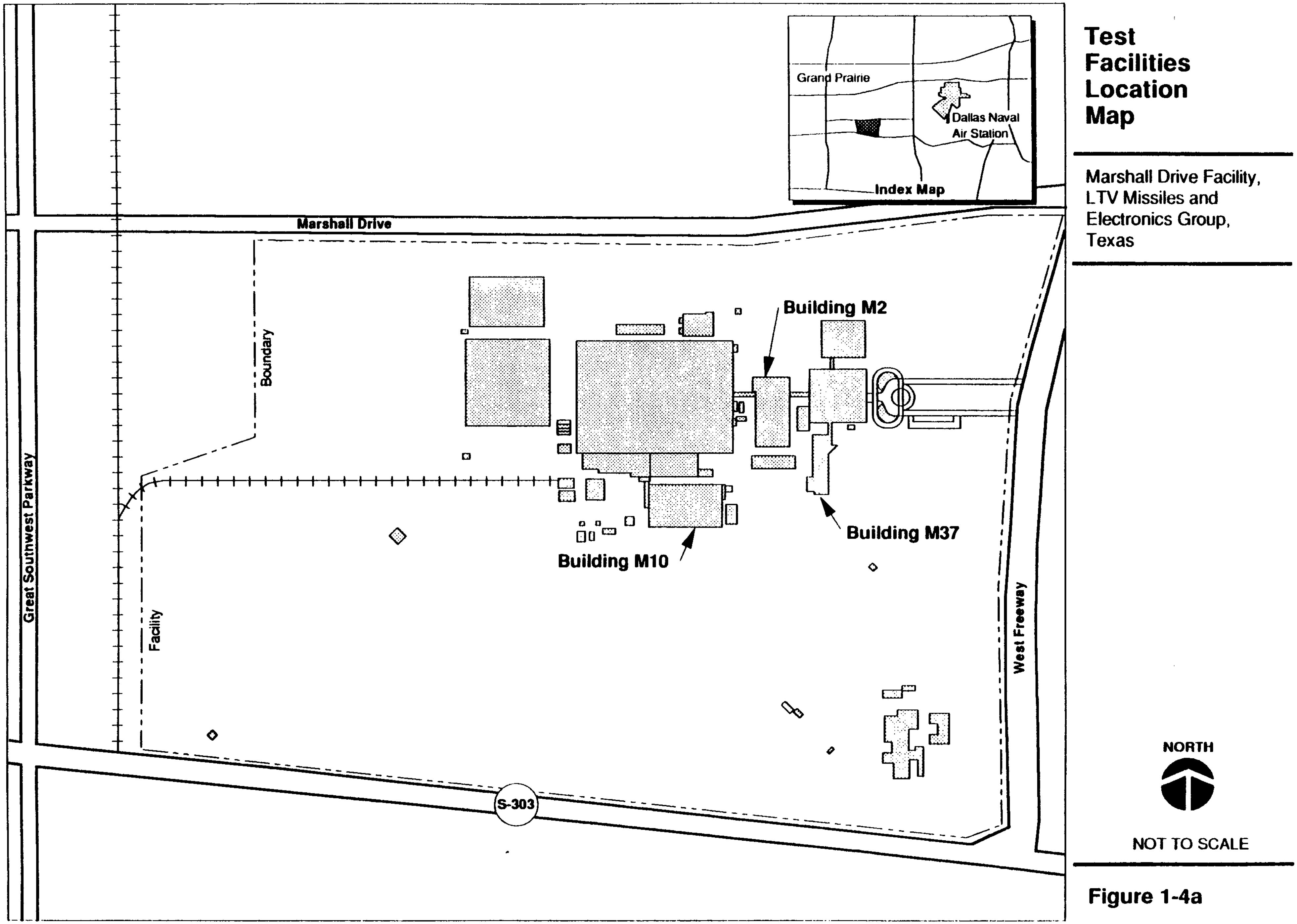
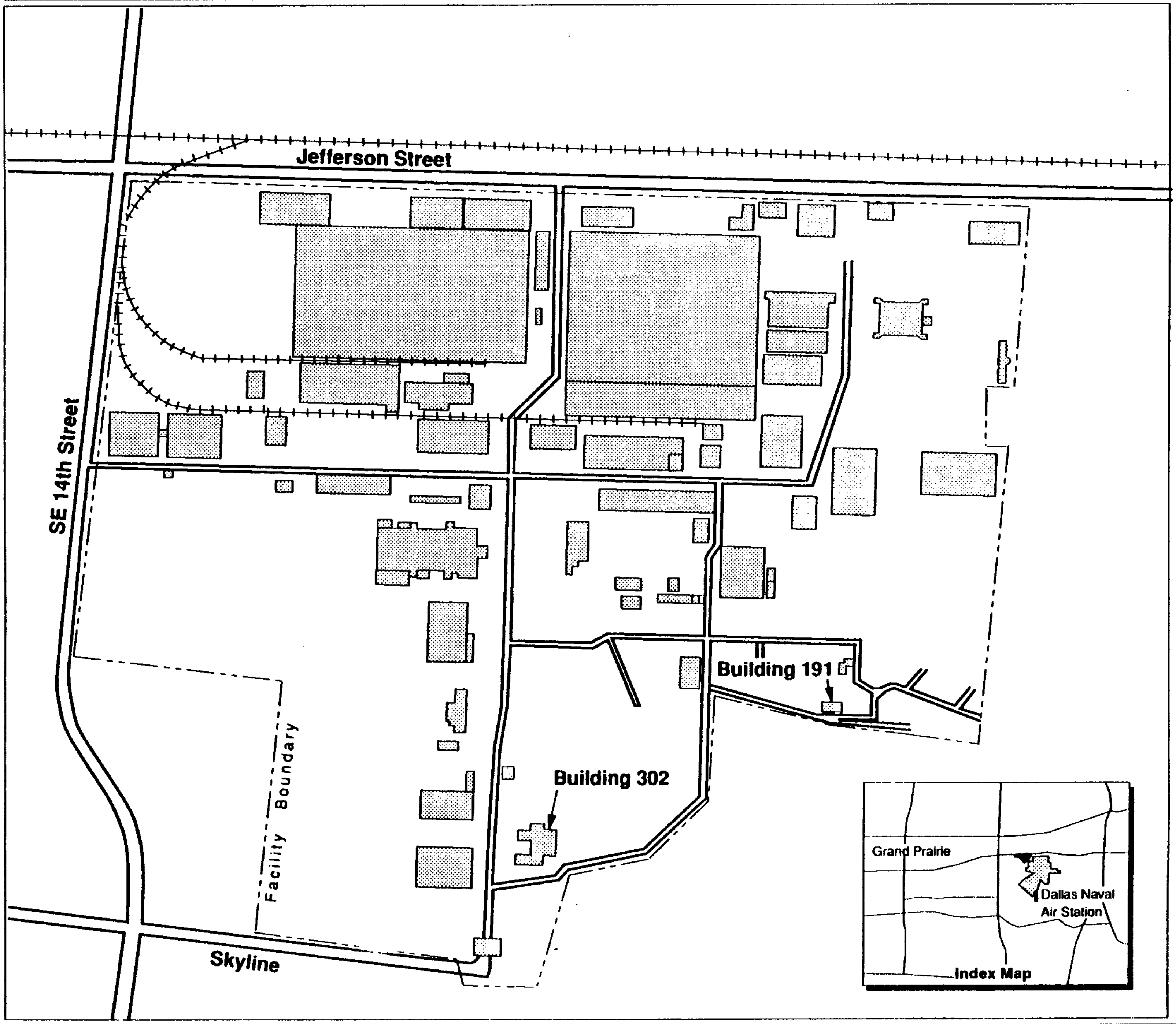


Figure 1-4a



Test Facilities Location Map

Jefferson Street Facility, LTV Missiles and Electronics Group, Texas

Figure 1-4b

FRINT/017-8

system acceptance test. (LTV Missiles and Electronics Group, undated; 1991c)

LTV - Jefferson Street Facility

- Building 91: Assembling the attitude control section, assembling and testing the missile airframe and structure components, and LE acceptance testing; test firing of the LE in the adjacent ordnance testing pit; flight termination system (FTS) testing; ACM compatibility test firing
- Building 302: Wind tunnel testing of missile airframe (using models), subsystems and radome cover separation testing. (LTV Missiles and Electronics Group, undated; 1991c)

These activities are considered routine at LTV. Approximately 140 existing personnel would be involved in ERINT activities (LTV Missiles and Electronics Group, 1991c). LTV would use existing facilities and operate them at levels and intensities similar to current conditions. No construction or modifications to existing facilities would be required.

Missile components and subassemblies would contain solid propellant ACMs supplied by the Atlantic Research Corporation (ARC), procured low-expansion-velocity explosive in the LE, an FTS cutting charge explosive, and procured thermal and nickel-cadmium batteries. The radar section would contain eight procured/formed beryllium missile component parts, with a combined weight of approximately 1.23 kilograms (2.7 pounds) (LTV Aerospace and Defense Company, 1990b; LTV Missiles and Electronics Group, 1991d; Rockwell International, 1991). The missile would contain no more than 100 milligrams (0.004 ounce) of lithium, which is combined with iron and a sulfide as part of an anode in the thermal batteries (Boychuk, 1990).

LTV would use typical fluids, expendables, and solvents for electronic subassembly manufacturing, such as solder flux, sodium chlorite (etching solution), sodium hydroxide, cupric chloride dihydrate, sodium carbonate monohydrate, and AL-CHELATE (cleaning solution) used for processes in electronic printed circuit boards. The total amount of these materials to be used for all ERINT activities at LTV would be approximately 45 liters (12 gallons). Typical lubricants, machining coolants, and solvents and inspection penetrants would be used in manufacturing mechanical parts. The missile would be covered with an application of Korotherm for thermal protection and would be painted for surface preparation before flight testing. (LTV Aerospace and Defense Company, 1990b; LTV Missiles and Electronics Group, 1991d)

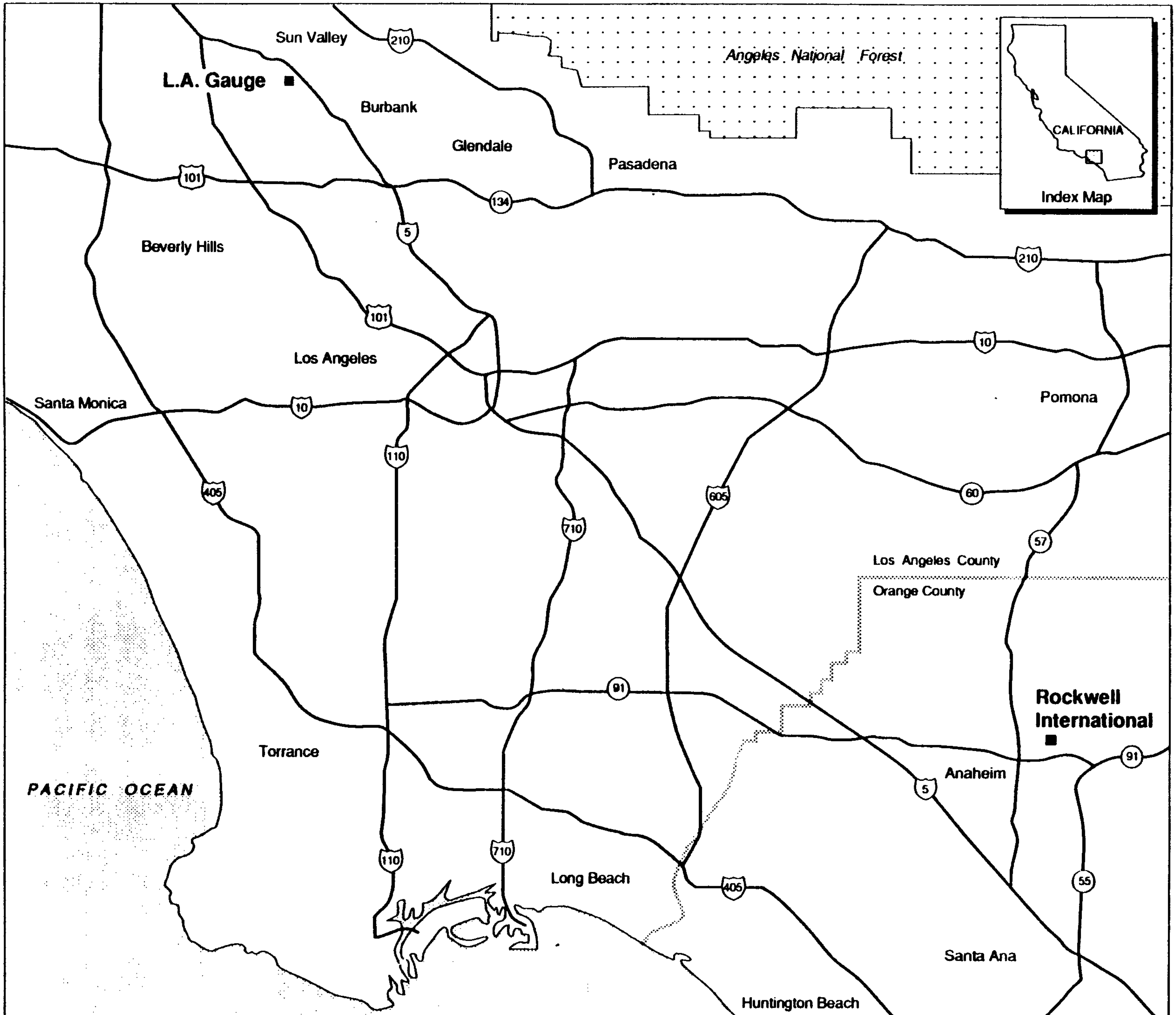
Procedures for the use and handling of these materials would follow the recommendations on Material Safety Data Sheets (MSDSs) for each substance. MSDSs present information, required under *Occupational Safety and Health Act* (OSHA) standards, on a chemical's physical properties, health effects, and use precautions. Handling precautions are directed at controlling exposure to the chemical via potential pathways for injury (e.g., inhalation, dermal contact, ingestion, etc.) based on the health effects information. The MSDS is typically provided by the chemical manufacturer, and includes the manufacturer's recommended precautions for handling and measures to be taken in case of spills, leaks, or other unintentional releases. Companies are required to keep MSDSs on file for certain chemicals used in the workplace, so that workers can be informed about the chemical hazards they are exposed to and can take necessary precautions in handling the substances. Many facilities require additional safety measures for chemical handling as a matter of standard operating procedure.

Explosive and pyrotechnic devices would be stored at LTV's approved ordnance facility (Building 191), where they would be fabricated or installed. Explosive safety quantity-distances (ESQDs) have been established around ordnance storage and test facilities. ESQDs are distances which must be maintained for safety purposes and provide defined types of protection. Distance separation relationships between the explosive being used and exposed personnel are based upon levels of risk considered acceptable for the stipulated exposure. The appropriate Hazard Quantity Distances are tabulated in Chapter 9 of DOD 6055.9-STD, *Ammunition and Explosives Safety Standards* (U.S. Department fo Defense, 1984). An ESQD of approximately 146 meters (480 feet) has been established around Building 191, and surrounding test cells and ordnance testing pit. This ESQD extends off LTV property to the south, approximately 91 meters (300 feet) into Mountain Creek Lake. LTV would follow safety measures required by the DOD and described in DOD 4145.26-M, *DOD Contractors' Safety Manual for Ammunition and Explosives* (U.S. Department of Defense, 1986). Additional safety measures would be used during transportation of these materials, as required by the U.S. Department of Transportation (DOT) and described in Bureau of Explosives, Tariff No. BOE 6000-I, *Hazardous Materials Regulations of the Department of Transportation* (Association of American Railroads, 1989). In addition, LTV would follow procedures specified in *Explosives Control* (LTV Missiles and Electronics Group, 1989a), *Standard Operating Procedure; General Procedures for Ordnance Testing* (LTV Missiles and Electronics Group, 1988a), and *Supplement to Standard Operating Procedure; General Procedures for Ordnance Test Area* (LTV Missiles and Electronics Group, 1988b).

Explosive devices contained in the missile forebody include the LE, safe arm fuze, slap detonators, booster ring, adapter assembly, and FTS shaped charge. The missile forebody has a distance hazard classification of 1.1 and an ordnance weight of approximately 0.7 kilograms (1.5 pounds).

Beryllium Subcontractors. Supporting LTV with missile development activities, the radar seeker subcontractor, Rockwell International, Anaheim, California, and the second tier subcontractor, L.A. Gauge, Sun Valley, California (Figure 1-5), would fabricate beryllium radar section components as part of the radar seeker in the ERINT-1 missile, which would be delivered to LTV in Grand Prairie, Texas, (LTV Missiles and Electronics Group, 1991d).

The application of high-strength, low mass metals in the ERINT-1 missile design is necessary for the development of a lightweight, high-performance missile. Aluminum, magnesium, stainless steel, and beryllium were considered for use in the radar seeker components. Throughout the radar seeker design process these metals were considered for different components based on the ERINT-1 performance requirements. These requirements included weight, size, thermal characteristics, and structural properties (i.e., strength). Magnesium could not be used for several components because it was too heavy and did not have the thermal characteristics required. Aluminum did not have the stiffness required for one of the components, and magnesium and stainless steel were too heavy. Although there are components within the radar seeker made with aluminum, stainless steel, and magnesium, eight components required the use of beryllium



Vicinity Location Map

Rockwell International and L.A. Gauge, California

NORTH

Kilometers
0 2 4 6 8 10 12

0 2 4 6 8
Miles

Figure 1-5

because it met the weight, size, thermal, and strength characteristics necessary for ERINT-1 performance standards which none of the other metals could meet. (Kemp, 1991)

Rockwell International - Rockwell International, Anaheim, California, would fabricate seven of the eight beryllium missile components for the ERINT-1 radar seeker. ERINT activities would take place in Building 265 (Figure 1-6a) (Rockwell International, 1991). Specific activities that would take place include grinding, milling, drilling, lathing, and applying a nickel plating to the finished component.

These activities would involve about 40 of approximately 8,500 existing personnel. These activities are considered routine at Rockwell International and would require no construction or modification of existing facilities. Rockwell International would use existing facilities and operate them at a level and intensity similar to current conditions. (Rockwell International, 1991)

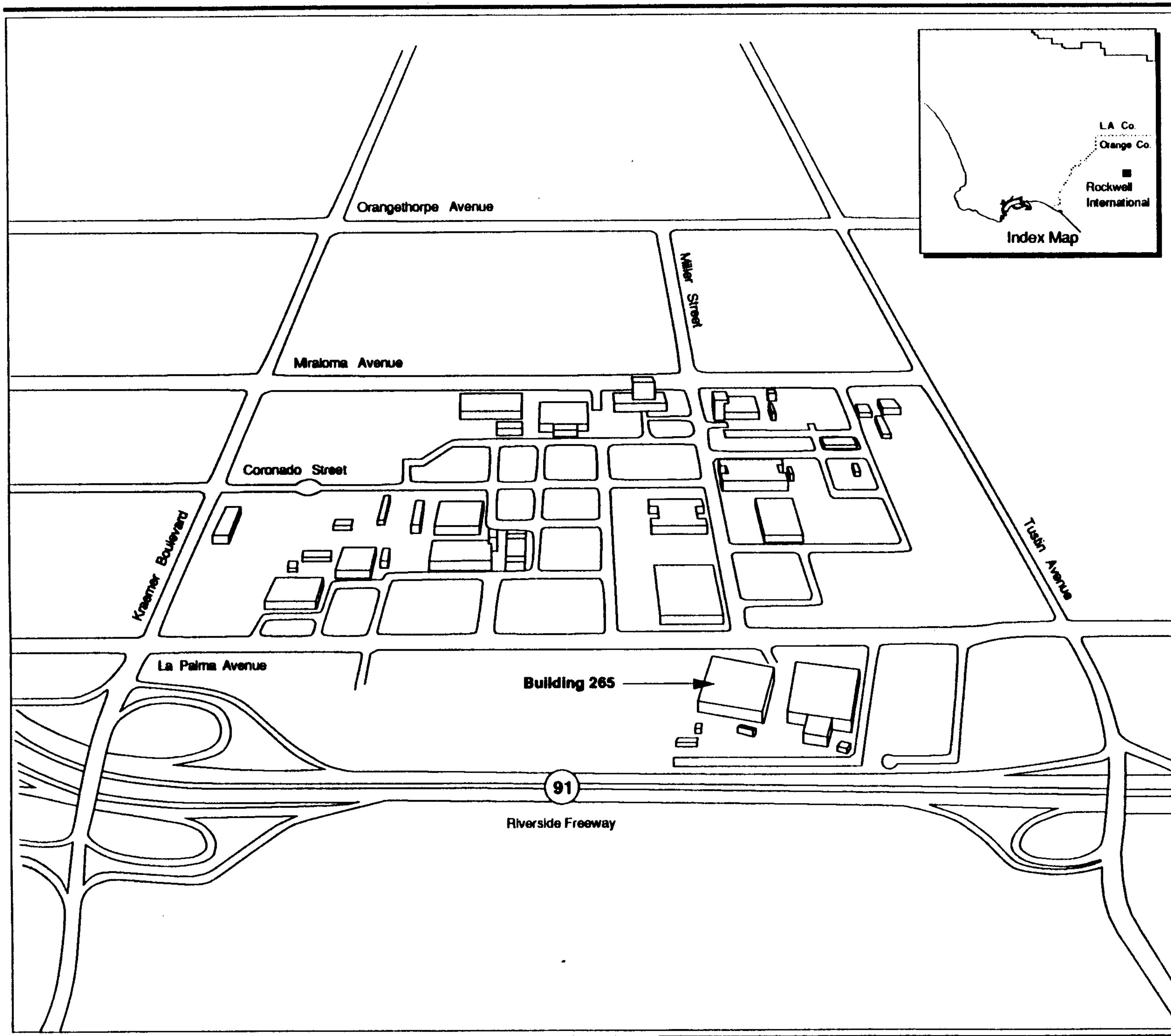
Beryllium is a potentially hazardous material. Beryllium is listed as a hazardous air pollutant by the Environmental Protection Agency's (EPAs) National Emission Standards for Hazardous Air Pollutants (NESHAP) (40 CFR 61). The EPA emission standard for beryllium is 10 grams (0.4 ounce) over a 24-hour period for constant emissions (e.g., at a machine shop or factory). Beryllium emissions (e.g., dust and vapors) would be controlled by a vacuum collection system which operates around each piece of equipment (grinders, lathes, etc.), all ducted together to a common two-stage control device. This system would effectively remove 99.97 percent of all particles with aerodynamic diameters of 0.3 micron and above. Personnel working with beryllium would be required to attend safety training courses and have yearly physicals. During the beryllium fabrication process, personnel would wear protective clothing and safety glasses, as recommended by the MSDS for beryllium. Rockwell International has implemented safety procedures for the use and handling of beryllium, which are described in *Operating Procedure - Anaheim Autonetics Electronics Systems, Beryllium Materials, Acquisition and Control* (Rockwell International, 1988) and *Safety and Environmental Health Requirements for the Machining and Handling of Beryllium Metal, Alloys, and Compounds* (Rockwell International, 1982). (Quizon, 1991; Rockwell International, 1991)

All scrap beryllium pieces from the ERINT program would be collected and sold to a recycling firm for incorporation in alloys requiring beryllium. Shipment of these materials would be accomplished in approved packaging by truck. Solvents utilized in the manufacturing process would be purchased, packaged, and stored using established hazardous materials practices. Waste generated by the ERINT program would be accumulated on-site for no more than 90 days in appropriately labeled containers, and shipped out by a certified waste hauler for disposal in compliance with the facility's EPA permit. (Rockwell International, 1991)

L.A. Gauge - L.A. Gauge, Sun Valley, California, is responsible for the fabrication of one of the eight beryllium missile components for the ERINT-1 flight test missile radar seeker. The completed component would be delivered to Rockwell International by truck. L.A. Gauge consists of one building (Figure 1-6b). Specific ERINT activities that would take place include grinding, milling, drilling, and lathing the component. (L.A. Gauge, 1991)

Test Facilities Location Map

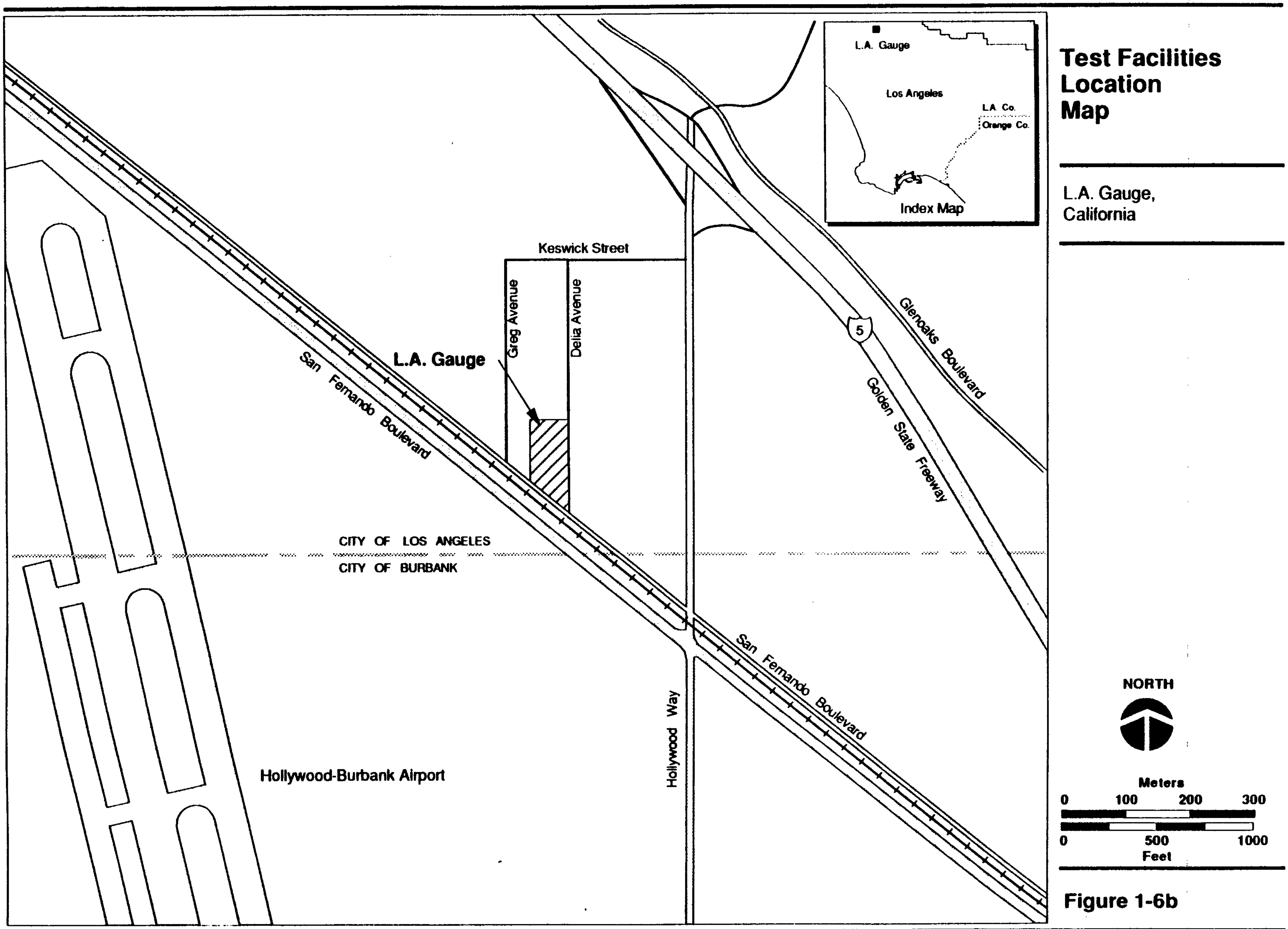
Rockwell International, California



NORTH

SCALE VARIES WITH PERSPECTIVE IN THIS OBLIQUE VIEW

Figure 1-6a



Test Facilities Location Map

L.A. Gauge, California

Figure 1-6b

FRINT/042-3

These activities would involve 10 to 15 of the existing 56 personnel at L.A. Gauge. These activities are considered routine at L.A. Gauge and would require no construction or modification of existing facilities. L.A. Gauge would use existing facilities and operate them at levels and intensities similar to current conditions. (L.A. Gauge, 1991)

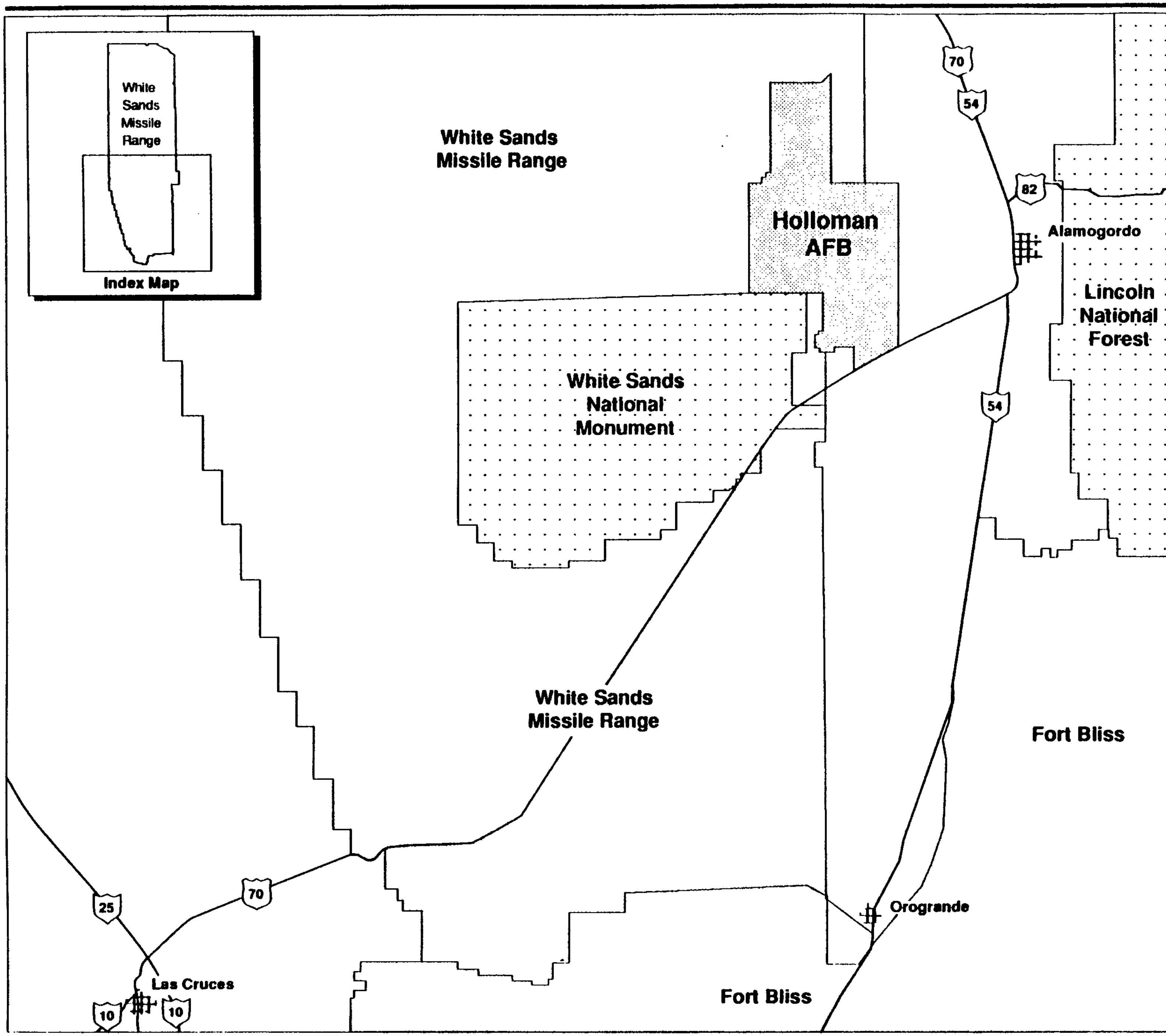
As described for Rockwell International, beryllium fabrication could present certain hazards. Beryllium emissions (e.g., dust and vapors) would be controlled by a vacuum collection system which operates around each piece of equipment (grinders, lathes, etc.), all ducted together to a common two-stage control device. This system would effectively remove 99.97 percent of all particles with aerodynamic diameters of 0.3 micron and above. L.A. Gauge has implemented a Hazard Communication Program to train employees in the use and handling of beryllium. An orientation safety course and yearly physical examinations would be mandatory for personnel involved in ERINT activities. A safety procedures manual for these activities is currently being developed. (L.A. Gauge, 1991; Quizon, 1991)

All scrap beryllium pieces from the ERINT program would be collected and sold to a recycling firm for incorporation in alloys requiring beryllium. Shipment of these materials would be accomplished in approved packaging by truck. Solvents utilized in the manufacturing process would be purchased, packaged, and stored using established hazardous materials practices. Waste generated by the ERINT program would be accumulated on-site for no more than 90 days in appropriately labeled containers, and shipped out by a certified waste hauler for disposal in compliance with the facility's EPA permit.

Holloman Air Force Base - Three rocket powered sled tests would be conducted at Holloman AFB (Figure 1-7) in support of LTV's flight test missile development activities. The High Speed Test Track (Figure 1-8) where the tests would be conducted is approximately 15,480 meters (50,788 feet) long. The objective of the sled tests is to obtain ablation data on a radome without a protective cover under simulated flight test conditions. The radome would be attached to a solid propellant rocket motor, provided by Holloman AFB. An LTV-provided adapter ring would connect the rocket motor to the radome assembly. One of these tests would involve use of nine High Velocity Aerial Rocket (HVAR) motors and one Multiple Launch Rocket System (MLRS) rocket motor, and two would combine one Little John motor and one MLRS motor. All of these rocket motors use a solid propellant, and the motors would be attached to a sled vehicle provided by Holloman AFB. Metal slipper feet beneath the rocket sled vehicle are channeled to grip the rails. For all tests, six high-speed cameras would be positioned to view the radome at the sled's maximum velocity. (Air Force Special Weapons Center, 1974; Holloman Air Force Base, 1991; Rhine, 1991a, b)

The following are the other primary facilities that would be involved in the ERINT sled tests:

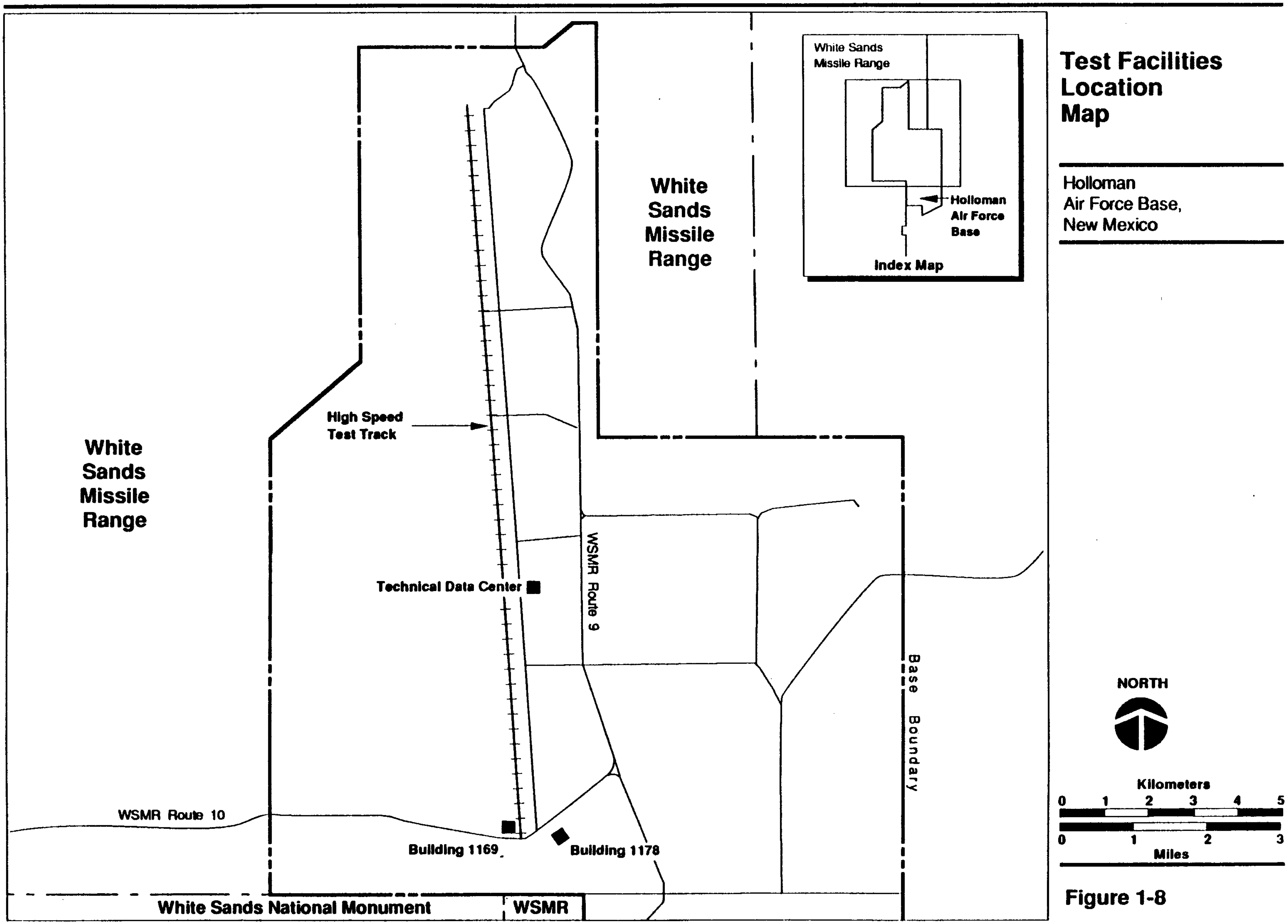
- Building 1178: Sled construction
- Building 1169: Attaching the rocket motors and radome to the sled
- Technical Data Center: Test operations control.



Vicinity Location Map

Holloman
Air Force Base,
New Mexico

Figure 1-7



Test Facilities Location Map

Holloman
Air Force Base,
New Mexico

Figure 1-8

In addition, an armored mobile launch van would be placed near the north end of the test track for use by the 4 to 6 people required to arm the rocket motors immediately prior to the start of each test. The mobile launch van would use its own portable generator, and other portable generators would be used for back-up power during the sled tests. (Holloman Air Force Base, 1991)

These tests would use over-age, surplus rocket motors which require no additional processing (i.e., they would not require fueling, x-raying, cleaning with solvents, or painting). Holloman AFB would use safety measures required by the U.S. Air Force and described in Air Force Regulation (AFR) 127-100, *Explosive Safety Standards* (U.S. Department of the Air Force, 1990b). No solvents or paints would be required for these tests. An ESQD of 305 meters (1,000 feet) is established around the test track; no personnel would be in this area during the tests. The ERINT sled tests would be conducted at night to minimize the possibility of equipment damage caused by hitting birds which tend to roost on the rail during daylight hours. (Holloman Air Force Base, 1991; Rhine, 1991b)

Holloman AFB conducts between 100 and 300 sled tests a year, and these tests are considered routine activities. The base would use existing facilities and operate them at levels and intensities similar to current conditions. No construction or modifications to existing facilities would be required. Approximately 20 existing personnel and 7 visiting LTV personnel would be required to support these tests. (Edwards, 1991; Holloman Air Force Base, 1991; Rhine, 1991b; Schotter, 1991)

1.3.1.2 Rocket Motor Development. The ARC, Virginia Propulsion Division, in Gainesville and in Orange County, Virginia (Figure 1-9), and Arkansas Propulsion Division, in Camden Arkansas, is responsible for design, fabrication, assembly, and testing of the SRM for the ERINT-1 flight test missile. The ARC Gainesville facility would develop the ACMs. The Orange County and Camden facilities would conduct static tests on the SRM.

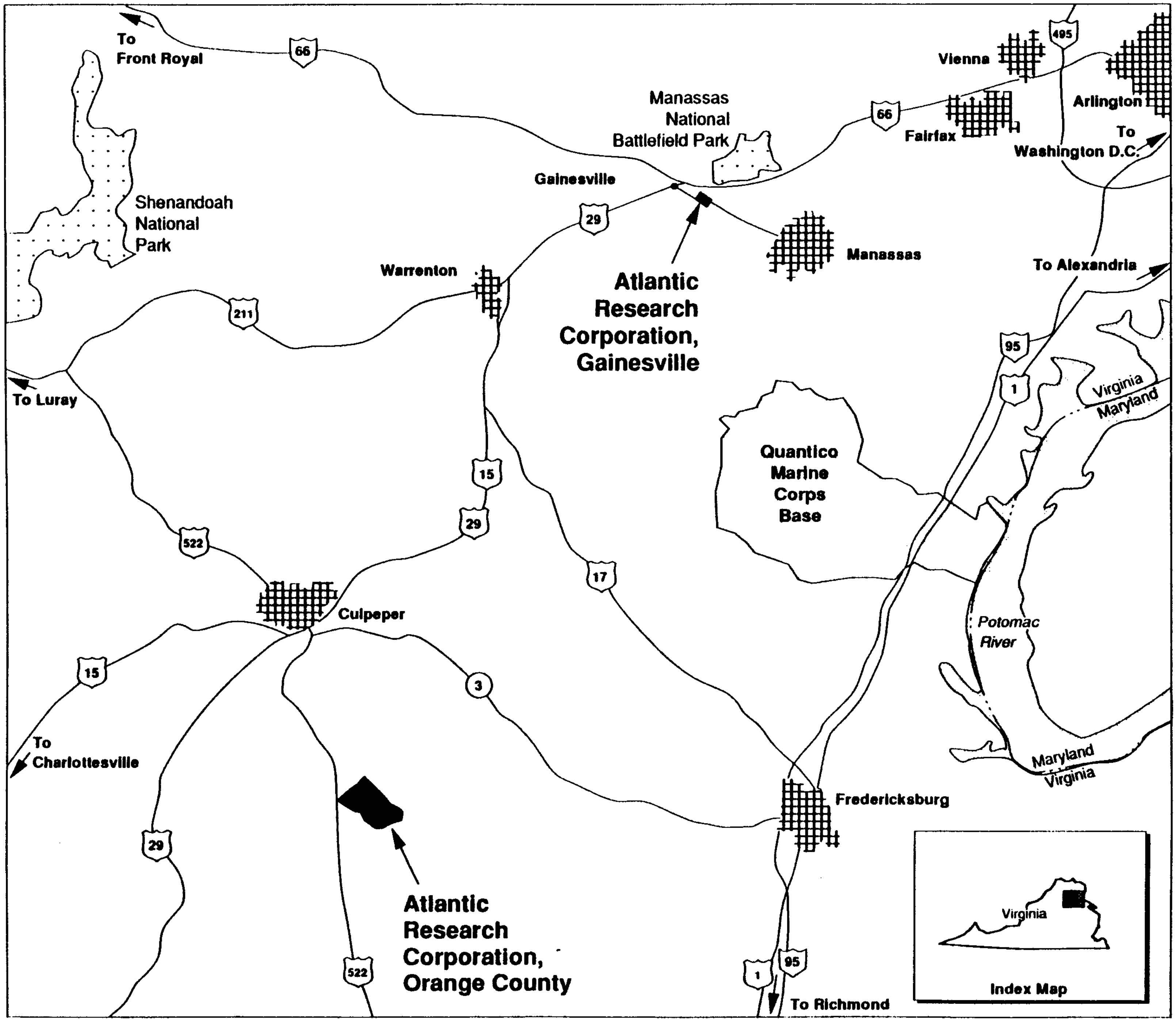
Gainesville Facility. ARC Gainesville facilities and building locations (Figure 1-10a) that would be used, and the specific ERINT activities that would be conducted, are listed below:

ACM Development

- Building 230: Mixing the propellant ingredients and casting it into tubes
- Building 16: X-raying the propellant tubes for voids
- Building 103: Casting the propellant in molds
- Building 86: Oven-curing of the cast propellant
- Building 212: Mixing the propellant liner
- Building 41: Spraying the propellant liner over the cured propellant
- Building 74: Casing the propellant in graphite-epoxy and grinding the cured case into the ACM shape
- Building 40: Visually inspecting the finished ACMs. (Atlantic Research Corporation, 1991b)

Vicinity Location Map

Atlantic Research Corporation, Virginia



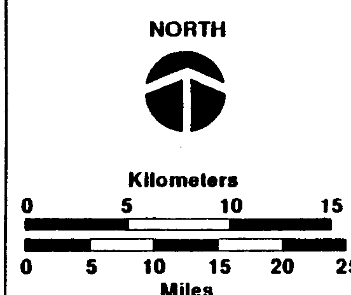


Figure 1-9

FF NT/035.2

Test Facilities Location Map

Gainesville Facility, Atlantic Research Corporation, Virginia

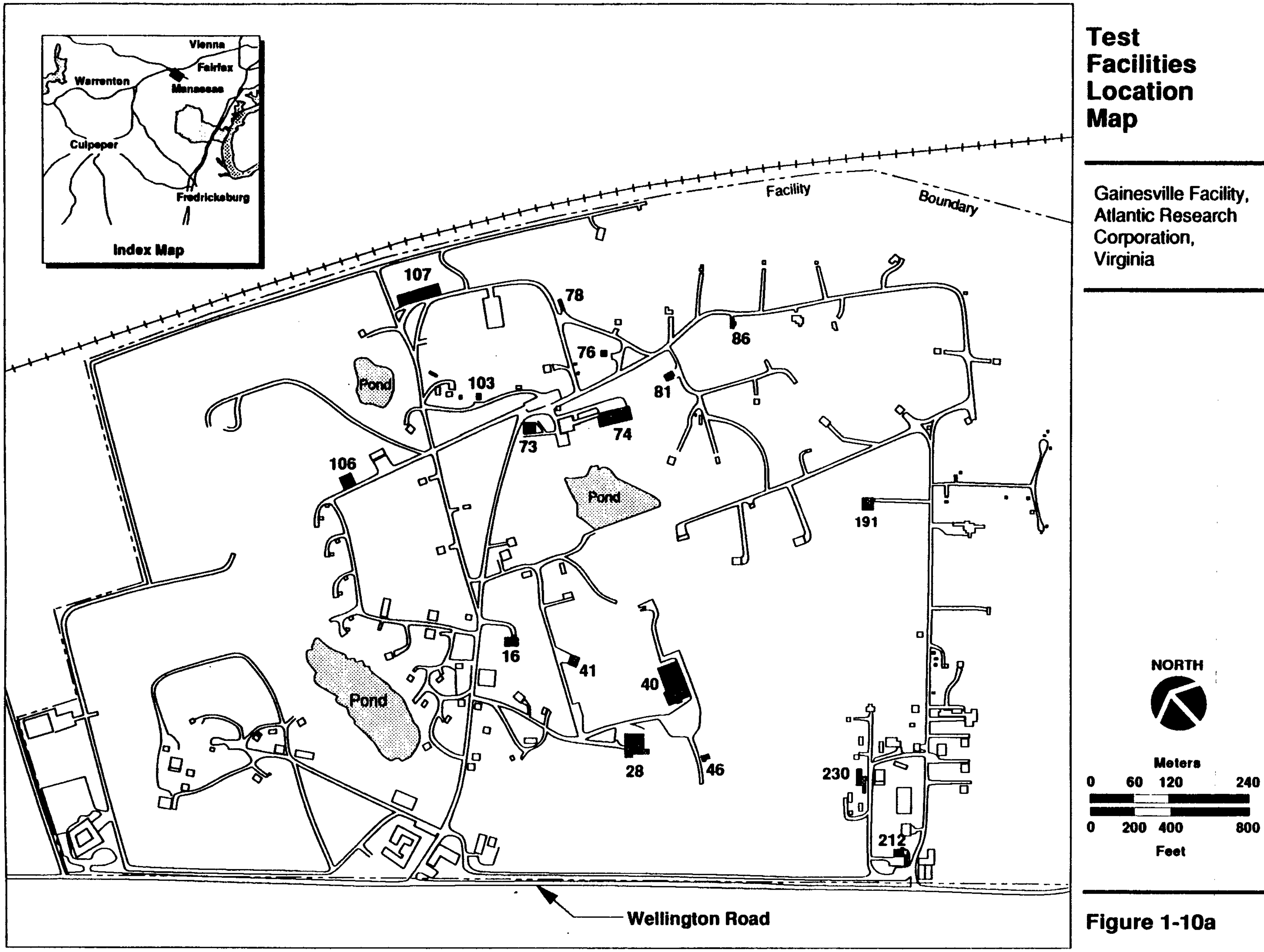


Figure 1-10a

ERINT/029-6

SRM Development

- Building 107: Weighing out inert materials (e.g., polymers, resins) for the SRM
- Building 78: Grinding ammonium perchlorate for use in the propellant (as an oxidizer)
- Building 76: Mixing the propellant ingredients
- Building 106: Cast Rohm-Haas test motors (4.5 kilogram [10 pound] motors)
- Building 81: Cast propellant and motor assembly
- Building 73: Mixing the propellant liner
- Building 191: X-raying the propellant for voids
- Building 46: Assembling the igniter
- Building 28: Painting and final assembly (e.g., nozzles) of the rocket motor. (Atlantic Research Corporation, 1991b)

These activities would require about 15 of the approximately 900 existing personnel at the Gainesville facility.

ARC would use approximately 55 kilograms (121 pounds) of Freon for each missile during ACM development. Freon is used in two processes at ARC. The majority of the Freon is used as a medium to prevent the agglomeration of ammonium perchlorate during a grinding process. Since ammonium perchlorate is an explosive material, the process is conducted in a contained environment. The Freon will be contaminated by this process and cannot be reused. It is, therefore, disposed of as hazardous waste. Currently, no other solvent is commercially available and qualified to process ammonium perchlorate to a one micron particle size other than Freon class fluids. The requirements for a solvent used in grinding ammonium perchlorate to a one micron particle size are high volatility, low carbon content/zero flammability, no wetability (dry gas) or reactivity with the ammonium perchlorate. Other solvents such as trichloroethane and trichloroethylene are carbon based and could cause an explosion if used with ammonium perchlorate. The remainder of the Freon, approximately 15 percent, is used to clean the rocket motor case. ARC is unable to reclaim the Freon used in this process. In addition, chemlok 205 and 252 (bonding materials), 1,2-dichloroethane, methylene chloride, and methyl ethyl ketone would be used. A maximum quantity of 15 kilograms (34 pounds) of these materials would be required for each missile. These materials would be handled according to manufacturer's recommendations for safe handling on the MSDS for each.

The facility personnel would also follow safety measures required by the DOD (described in DOD 4145.26-M) and the DOT (described in BOE 6000-I), as referenced in Section 1.3.1.1.

Although the SRM propellant, which weighs 162 kilograms (358 pounds), is a 1.3 class/division explosive, ARC considers the propellant a 1.1 class/division explosive during the mixing process. ESQDs of 381 meters (1,250 feet) are established for a 1.1 explosive. This distance extends off ARC property from Building 76 onto undeveloped land. DOD 4145.26M allows undeveloped land off site to be used in an ESQD. The ESQD for a 1.3 explosive would not extend off-site. ARC considers the propellant a 1.1 explosive during mixing as an additional precaution. The SRM would be grounded at all times and electrical safety features to prevent accidental fire-up would be in place. All personnel working in the vicinity of explosives would be required to wear non-sparking safety shoes or leg stats, eye protection, and flame resistant clothing (Atlantic Research Corporation, 1991b).

ARC would use existing facilities and operate them at levels and intensities similar to current conditions. No construction or modifications to existing facilities would be required.

Orange County Facility. ARC Orange County facilities and building locations (Figure 1-10b) that would be used, and the specific ERINT SRM test activities that would be conducted, are listed below:

- Building 100: Control room for static fire testing
- Building 107: Environmental conditioning (temperature, relative humidity) of the SRM prior to test firing
- Test Bay 106: Static fire testing of the SRM. (Atlantic Research Corporation, 1991b)

These activities would require about 10 personnel out of approximately 45 existing personnel at the Orange County Facility (Atlantic Research Corporation, 1991b).

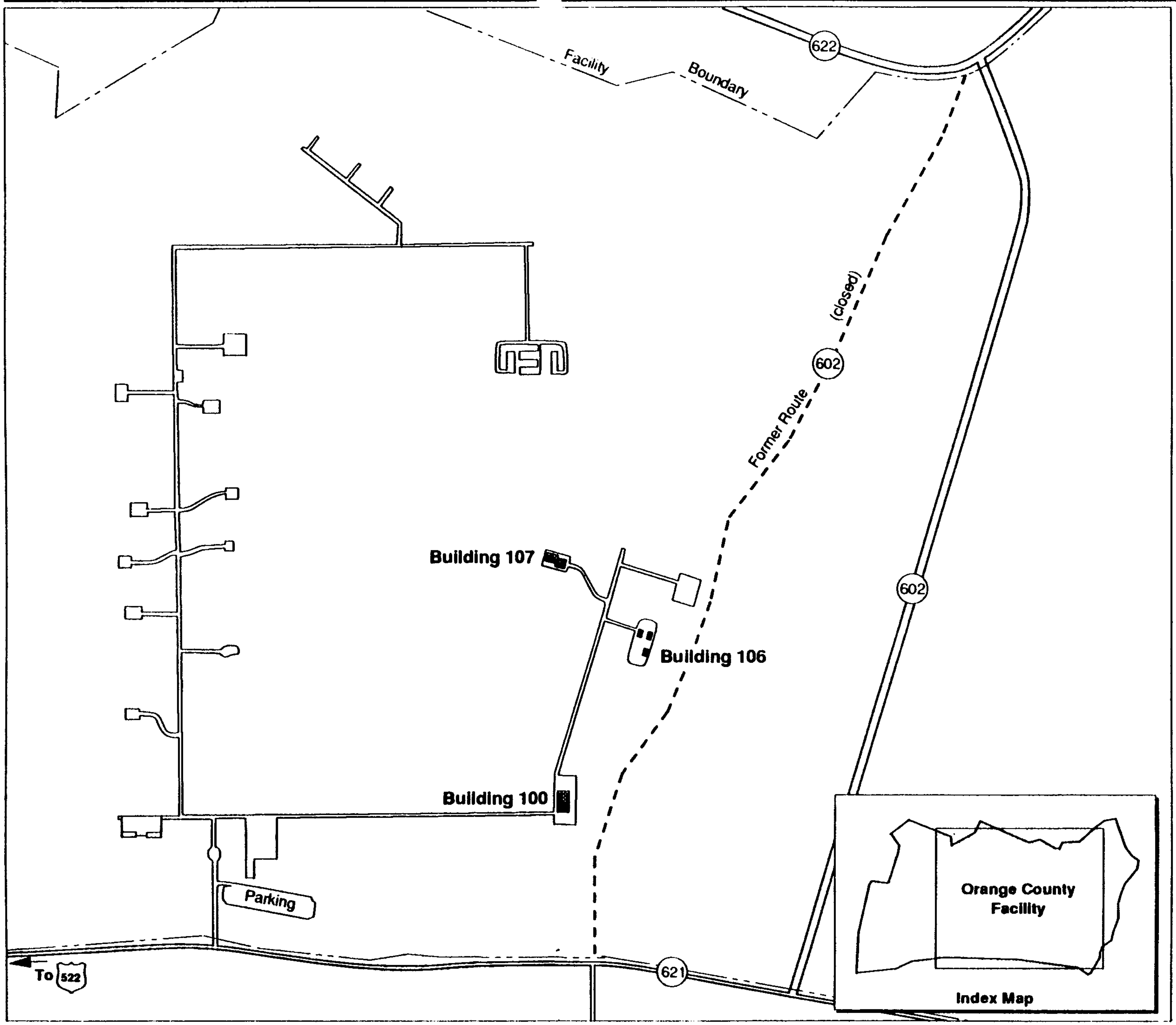
Prior to test firing, a 381-meter (1,250-foot) ESQD from Test Bay 106 would be cleared of all nonessential personnel. Test firings would take place between 7:00 a.m. and 7:00 p.m., Monday through Saturday, as specified by the ARC Orange County special use permit for the static test facility (Dunwell, 1991). A fire truck is available on site. (Atlantic Research Corporation, 1991b; Grady, 1991)

The facility would follow safety measures required by the DOD (described in DOD 4145.26-M) and the DOT (described in BOE 6000-I), as referenced in Section 1.3.1.1. All personnel working in the vicinity of explosives would be required to wear non-sparking safety shoes or leg stats, eye protection, and flame resistant clothing (Atlantic Research Corporation, 1991b).

ARC would use existing facilities for ERINT activities and operate them at levels and intensities similar to current conditions. No construction or modifications of existing facilities would be required.

The SRMs would be shipped via truck directly from ARC to WSMR, and stored in an approved SRM storage facility until needed for missile assembly operations and flight tests (LTV Aerospace and Defense Company, 1990b).

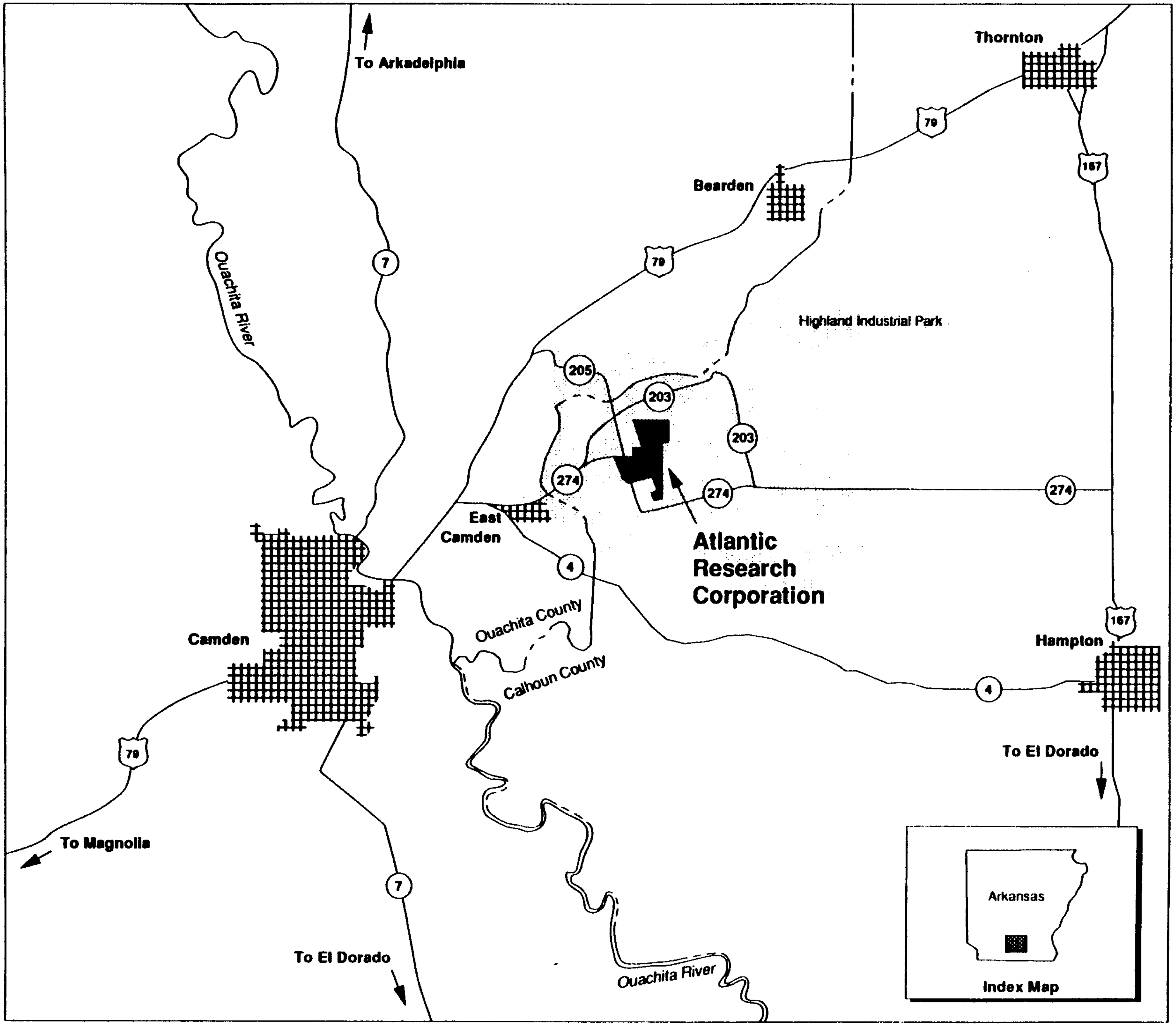
Camden, Arkansas Facility. LTV, the prime contractor for ERINT-1 flight test missile system activities, determined that a more remote location than the Orange County facility for static testing activities was desired as a safety precaution. Therefore, a secondary ARC location in Camden, Arkansas (Figure 1-11), was selected based on its isolation from public roads and other public access areas, and prior activities conducted for the MLRS program. (Boychuk, 1991a)



Test Facilities Location Map

Orange County Facility, Atlantic Research Corporation, Virginia

Figure 1-10b



Vicinity Location Map

Camden Facility, Atlantic Research Corporation, Arkansas

NORTH

Kilometers 0 2 4 6 8

0 2 4 6 Miles

Figure 1-11

ERINT/043-2

ARC Camden facilities and building locations (Figure 1-12) that would be used, and the specific ERINT activities that would be conducted, are listed below:

- Building 14: Control room for static fire testing
- Building 45 or M2: Environmental conditioning (temperature, humidity) of the SRM prior to test firing (Building 45 is adjacent to the static test firing stand)
- Building 46: X-raying the propellant for possible voids. (Atlantic Research Corporation, 1991c)

These activities would require about 10 personnel out of approximately 530 existing personnel at the Camden Facility (Atlantic Research Corporation, 1991c).

Prior to test firing, an ESQD of 450 meters (1,475 feet) from the test bay would be cleared of all nonessential personnel. The ESQD extends approximately 53 meters (175 feet) off ARC property onto undeveloped land. (Atlantic Research Corporation, 1991c)

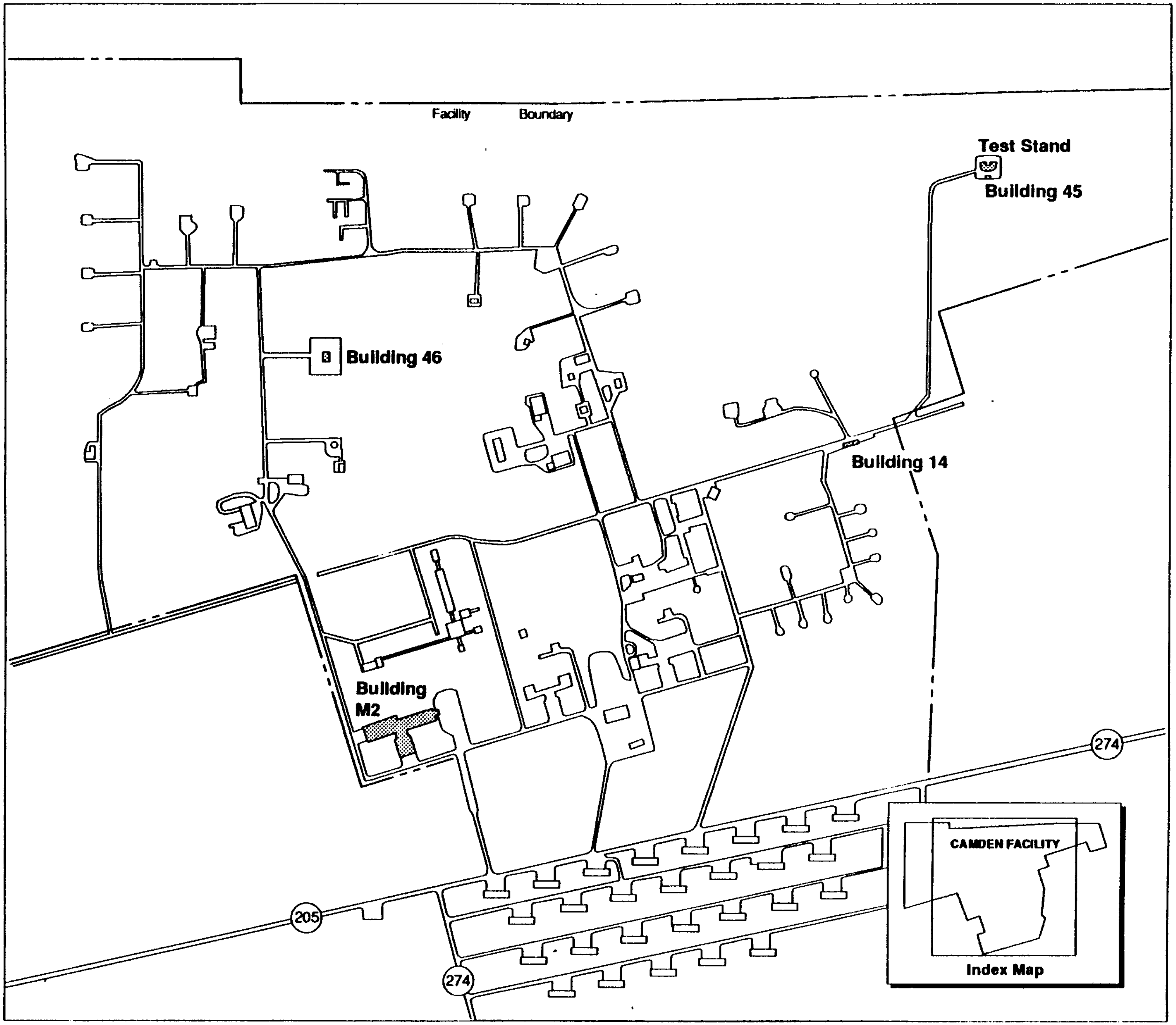
The facility would follow safety measures required by DOD 4145.26-M and the U.S. Occupational Safety and Health Administration (OSHA). All personnel working in the vicinity of explosives would be required to wear flame resistant clothing, eye protection, and non-sparking safety shoes and/or leg stats. (Atlantic Research Corporation, 1991c)

After static test activities have been completed, the ARC Camden facility would return the spent SRM by flatbed truck to the ARC Gainesville facility for disposal under that facility's open burning and thermal treatment permit requirements.

The Camden facility would use existing facilities for ERINT activities and operate them at levels and intensities similar to current conditions. No construction or modification of existing facilities would be required.

1.3.2 ERINT Target System (ETS)

ERINT Ballistic Tactical Missile Target System. The ETS ballistic tactical missile (Figure 1-13) would consist of a target assembly; a guidance, control, and avionics module; and two solid propellant rocket motors. Existing XM-100 (SERGEANT) (first stage) and M57A-1 (MINUTEMAN I, Stage 3) (second stage) solid propellant rocket motors would be used. These rocket motors would be furnished by the government for use in the ERINT program; they are not part of the ERINT development program. The solid-propellant rocket motors would be mated by use of a SERGEANT interstage assembly. This two-stage system is referred to as the STORM booster (Fitzgerald, 1991). A forward interstage assembly containing the second-stage flight termination system would connect the M57A-1 motor to the guidance, control, and avionics module (Space Data Corporation, 1990). An aft skirt with four fixed fins on the first stage would assist in providing aerodynamic stability and ailerons would provide control. The ETS ballistic tactical missile would be approximately 13.3 meters (43.8 feet) long overall with a diameter varying from 79 to 112 centimeters (31 to 44 inches) and would weigh approximately 6,804 kilograms (15,000 pounds) (Meyers, 1990).



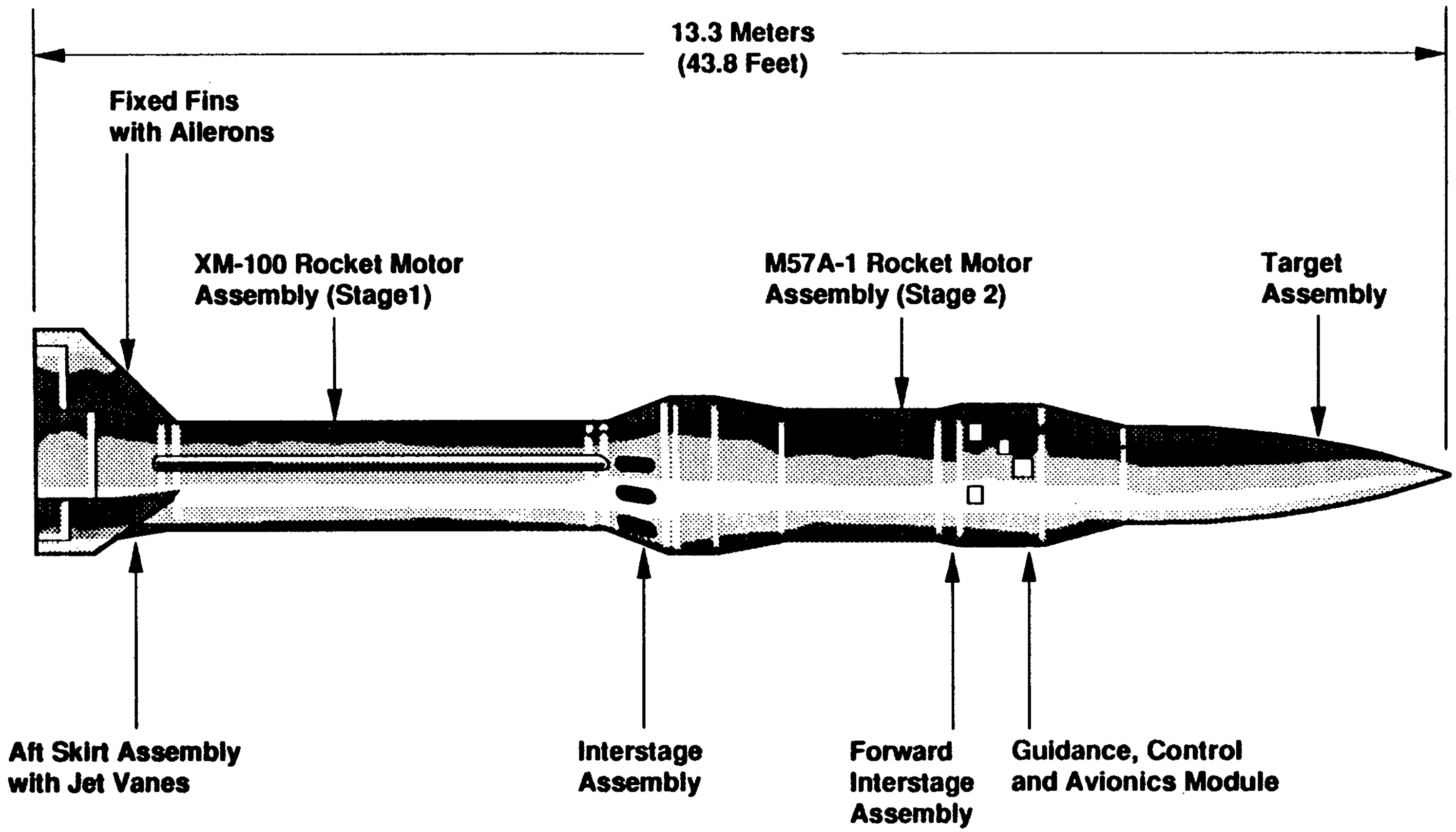
Test Facilities Location Map

Camden Facility,
Atlantic Research
Corporation,
Arkansas

Figure 1-12

ERINT/044-2

ERINT Ballistic Tactical Missile Target System



Source: LTV Aerospace and Defense Company, 1990a; Meyers, 1990.

Figure 1-13

The ballistic target (Figure 1-14) would be a steel assembly that would be used for the non-hazardous liquid chemical simulant. Interception of the target by the ERINT-1 missile during flight testing would disseminate the simulant for TMDCFE testing activities (see Section 1.3.3.3). For target demonstration flights, the simulant would be disseminated when target flight is terminated by remote control.

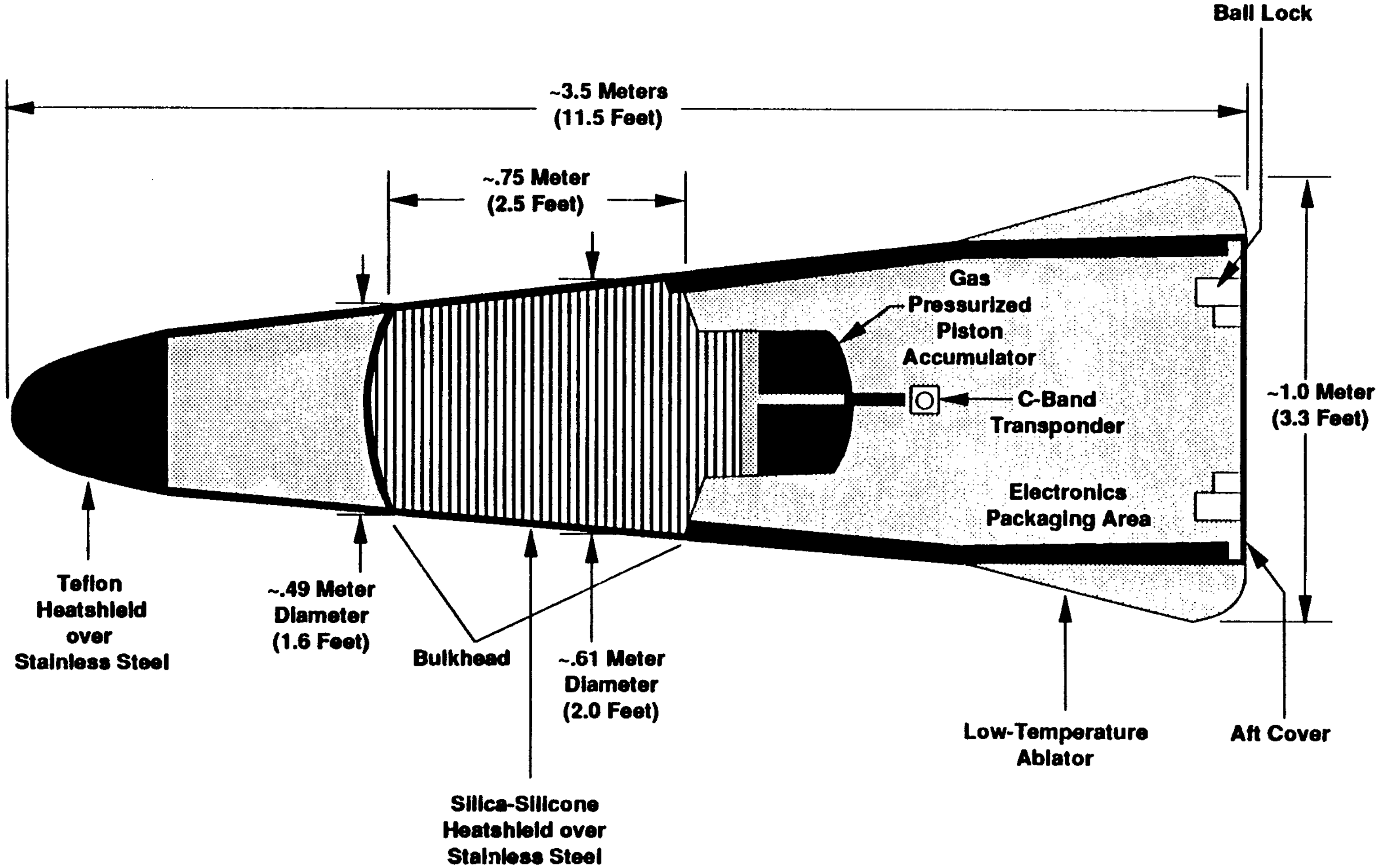
Target testing activities would involve the use of ordnance. A linear-shaped charge would be installed in the target at WSMR. If not intercepted by the ERINT-1 missile, a linear shaped charge would break up the target over a designated area at a representative altitude.

Air-Breathing Target. The air-breathing target that would be used is the MQM-107 (Figure 1-15). It is existing government equipment, furnished by the MICOM Target Office; it is not part of the ERINT development program. The MQM-107 is approximately 5.5 meters (18.1 feet) long, with a fuselage diameter of 0.4 meters (1.4 feet) and a wing span of 3.0 meters (9.8 feet). It has a launch weight (including booster) of 494 kilograms (1,090 pounds). The MQM-107 uses a Teledyne CAE 373-8 engine (U.S. Air Force Association, 1989) and is launched using an existing, government-furnished solid propellant booster. The MQM-107 would be surface launched from a zero length ground launcher using a Jet Assist Take-Off booster. The solid propellant booster fires for 2 to 2.5 seconds lifting the target vehicle up to an altitude of 46 meters (150 feet). The turbojet powered engine fueled with JP-4 provides the required power for the target drone for up to 1-hour flight time. Flight tests involving use of the MQM-107 (i.e., flight tests seven and eight) would not incorporate TMDCFE activities. Debris impact areas for the MQM-107 will be determined after all details of these flight tests have been specified. Further documentation of these activities will be provided in an addendum to this EA, prior to this portion of the action proceeding, verifying no significant impacts.

ERINT Maneuvering Tactical Missile Target System. The target for this system would be a government-furnished PERSHING II re-entry vehicle; it is not part of the ERINT development program. The maneuvering tactical missile would use the same two-stage booster system (STORM booster) as the ETS ballistic tactical missile described above (Provancha, 1990). The PERSHING II re-entry vehicle consists of a radar section, a warhead section containing a bulkhead for payloads, and a guidance and control module (Fitzgerald, 1991). The existing PERSHING II re-entry vehicle components would be provided by either the U.S. Army Pueblo Depot Activity, Colorado, or the U.S. Army Missile Command (MICOM) Target Office at Redstone Arsenal, Huntsville, Alabama (Provancha, 1990). Maneuvering target tests would involve use of the TMDSCE payload. In flight tests ten and eleven, the ERINT-1 test missile would attempt to intercept the maneuvering tactical target, which would contain the TMDSCE simulant. TMDSCE flight tests would involve incorporating 20 to 30 individual canisters of unthickened chemical simulant into the target for each flight. Radio transmitters would be attached to each canister to relay information on the number of canisters opened during flight termination or intercept. An optical sensor attached to the target would provide data on the location of intercept for flights ten and eleven (Strietzel, 1991c).

Because complete details are not currently available on the maneuvering target activities, further documentation will be provided as an amendment to this EA, prior to this portion of the action proceeding, verifying no significant impacts.

Ballistic Target Assembly



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

Figure 1-14

Air-Breathing Target

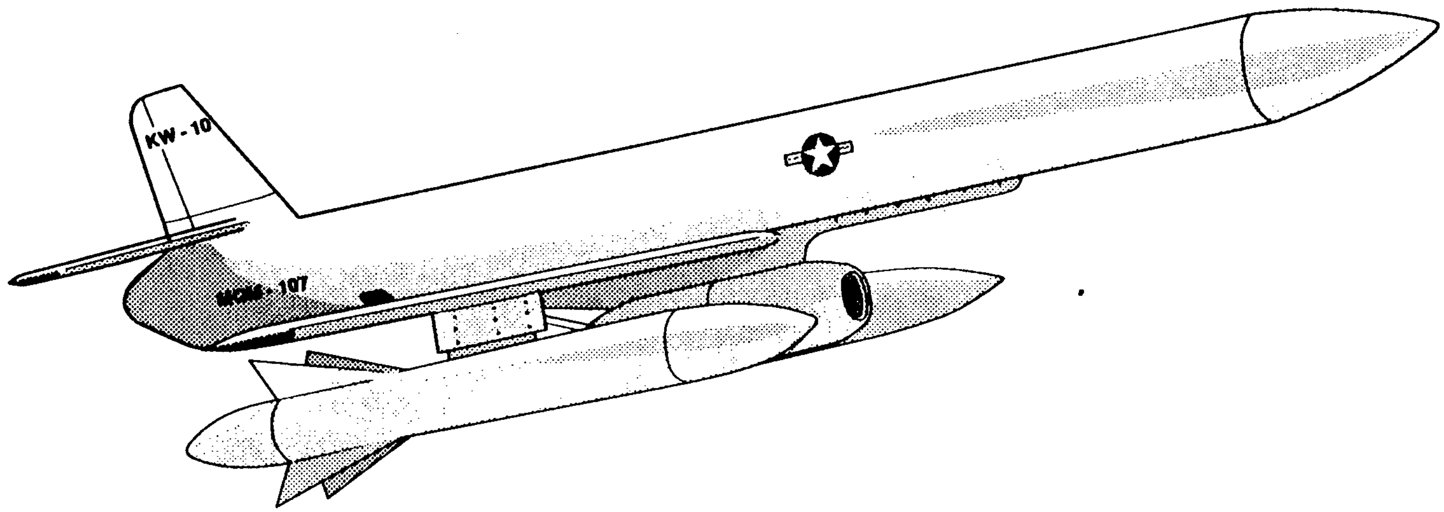


Figure 1-15

ERINT/049

The proposed activities involved in developing the ETS are described in the following sections.

1.3.2.1 Ballistic Target Assembly Development. The ETS ballistic tactical missile target assembly would be developed by Aerotherm, a subsidiary of Dyncorp, in Mountain View, California (Figure 1-16). Aerotherm, formerly Acurex Corporation, changed ownership effective 24 May 1991. ERINT activities would take place in Building 3 (Figure 1-17) (Rocco, 1990c). Specific activities that would take place are listed below:

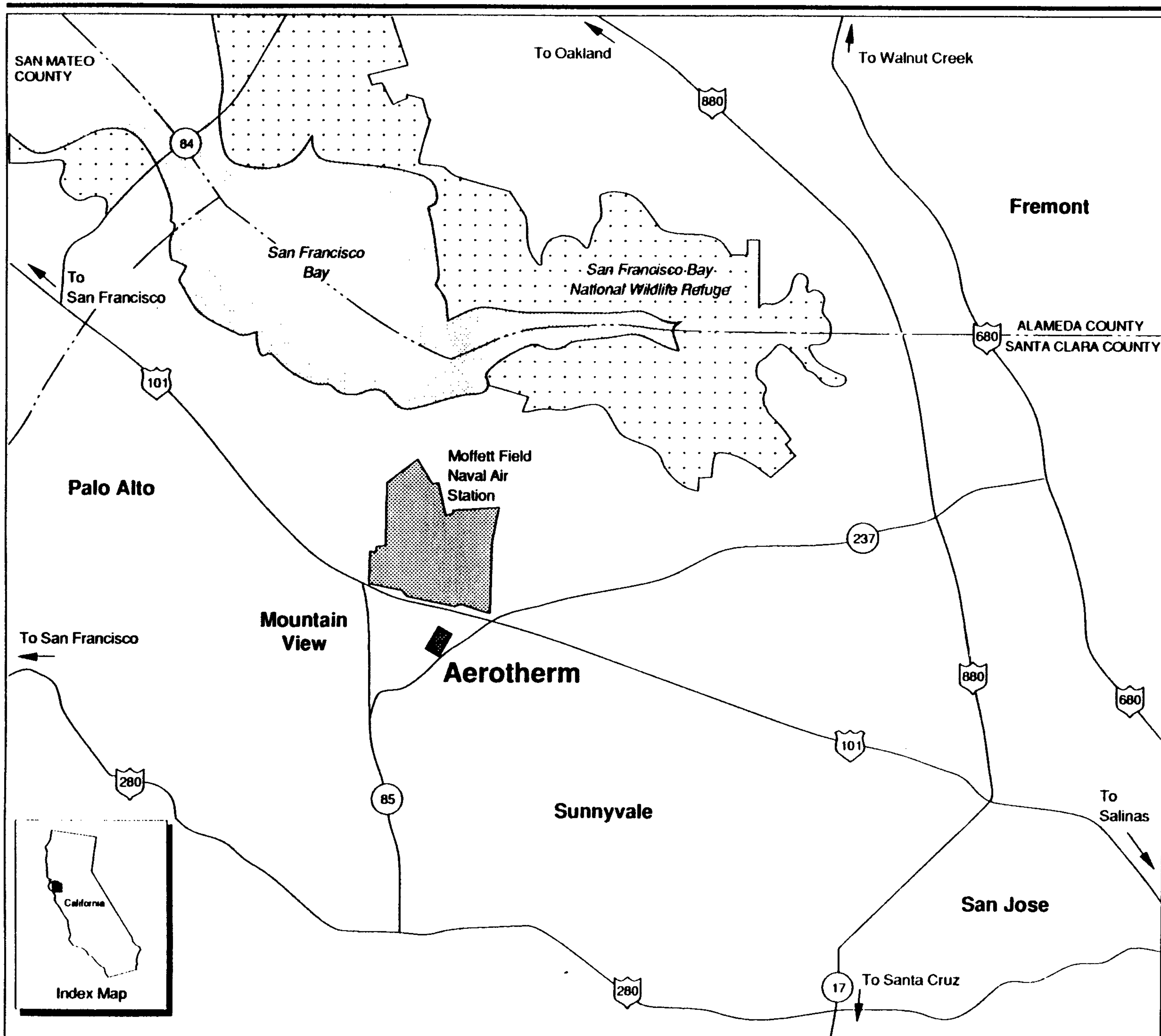
- Applying the thermal protection sheath on the target
- Qualification and acceptance tests on the target
- Radar system checks
- Leak tests on the target. (Acurex Corporation, 1991)

Approximately 5 to 10 existing personnel would be involved in ERINT activities. Aerotherm would use existing facilities and operate them at levels and intensities similar to current conditions. No construction or modifications to existing facilities would be required. (Rocco, 1990c)

Fabrication of the target's thermal protection sheath would involve the use of heptane, methyl ethyl ketone, quartz fibers, quartz microballoons, and DC 1200 metal primer. Although quartz fibers and microballoons are not considered hazardous materials, machining of the target's thermal protection sheath may create dust. Therefore, safety procedures that would be followed include use of personal protective equipment such as respirators, and area ventilation, consistent with procedures specified on the MSDS for each material. Acurex would follow procedures for storage and handling of hazardous materials described in Chapter 24 of the Mountain View City Code *Hazardous Materials Storage Permit Code* (City of Mountain View, 1990). Procedures for usage of hazardous materials are described in the company *Occupational Health and Safety Manual and Injury and Illness Prevention Program* (Aerotherm Corporation, 1991) as required by the State of California OSHA. (Acurex Corporation, 1991; Delano, 1991b; Rocco, 1990c)

One 208-liter (55-gallon) drum of the non-hazardous chemical simulant (see Section 1.3.3.1) would be sent to Aerotherm from Battelle, Ohio, by motor freight. The simulant would be used for several qualification and acceptance tests on the target. After the tests have been conducted, any remaining simulant would be sent in the original container back to Battelle or to WSMR by motor freight. (Acurex Corporation, 1991)

1.3.2.2 Target System Ballistic Missile Development. Orbital Sciences Corporation, Space Data Division, in Chandler, Arizona (Figure 1-18), would be responsible for the development of the ETS ballistic missile. Orbital Sciences would design, fabricate, assemble, and test the ETS guidance, control, and avionics module; the forward interstage assembly containing the second-stage flight termination system; the SERGEANT forward interstage assembly; and the aft skirt assembly (Rocco, 1990a). Orbital Sciences is also responsible for integrating the TMDCFE payloads with the target at WSMR (Rocco, 1990a).



Vicinity Location Map

Aerotherm, California

Figure 1-16

ERINT/010-5

Test Facilities Location Map

Aerotherm, California

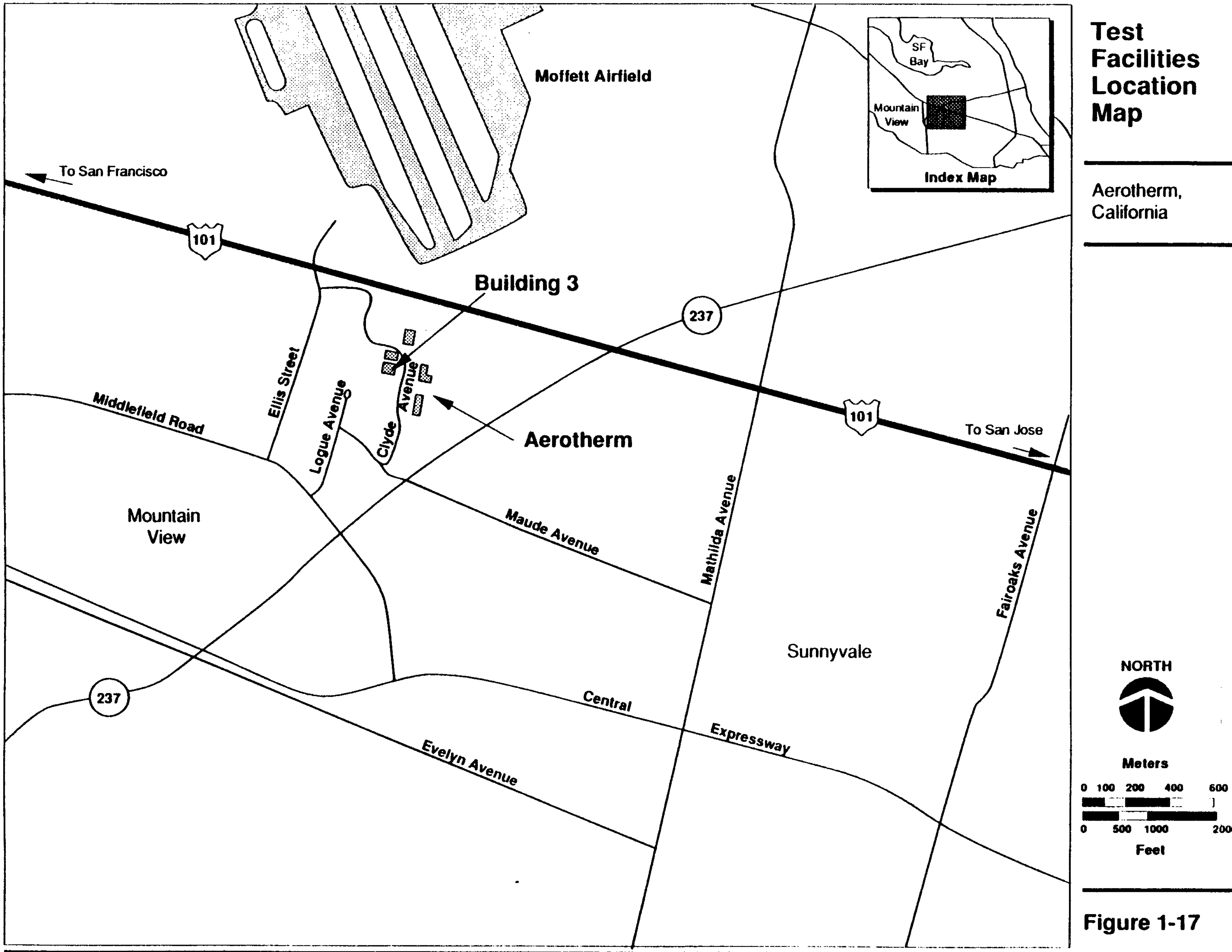
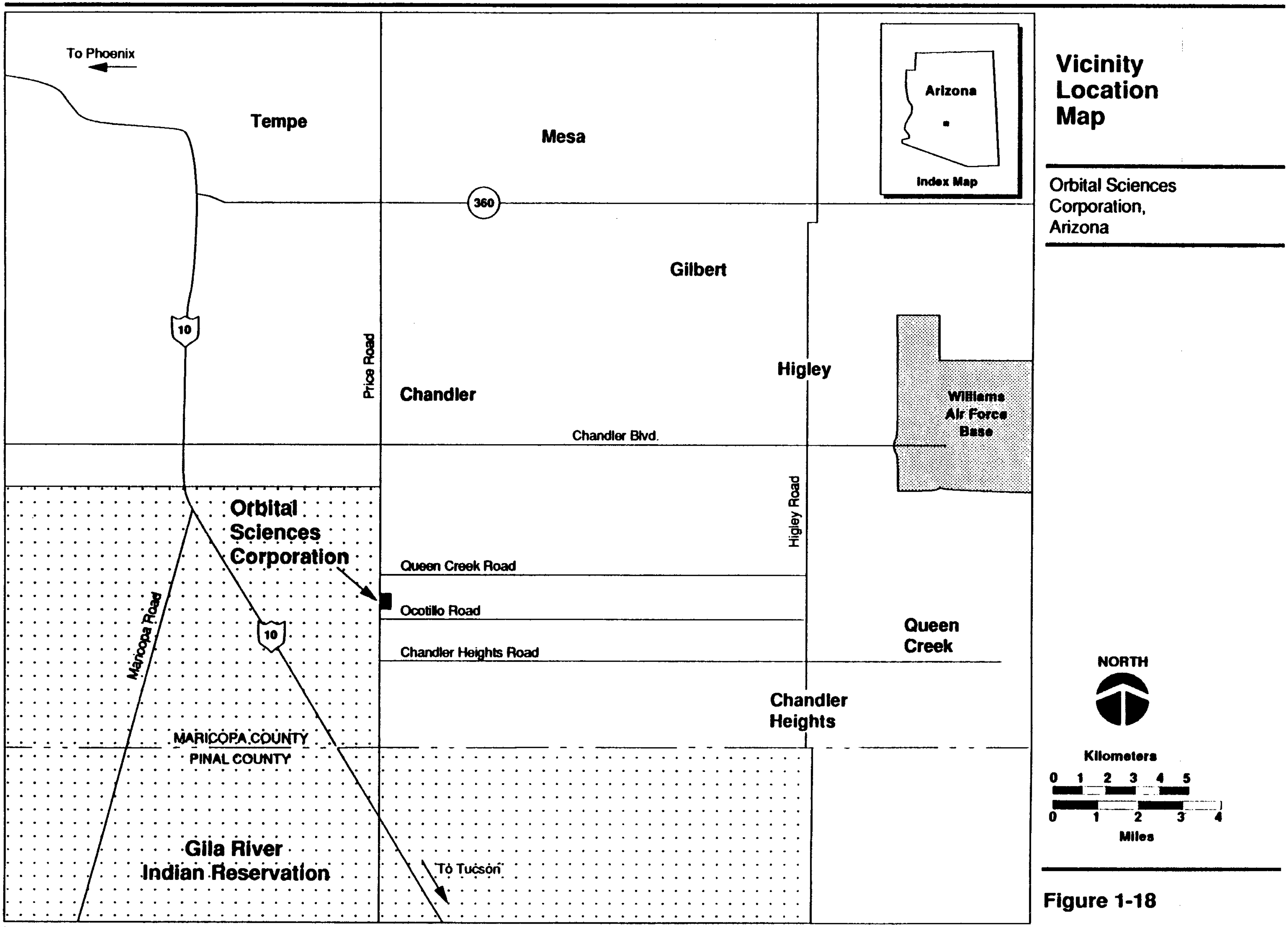


Figure 1-17



Vicinity Location Map

Orbital Sciences Corporation, Arizona

Figure 1-18

ERINT/019-8

The Space Data Division facility consists of one building (Figure 1-19). Specific activities that would take place are listed below:

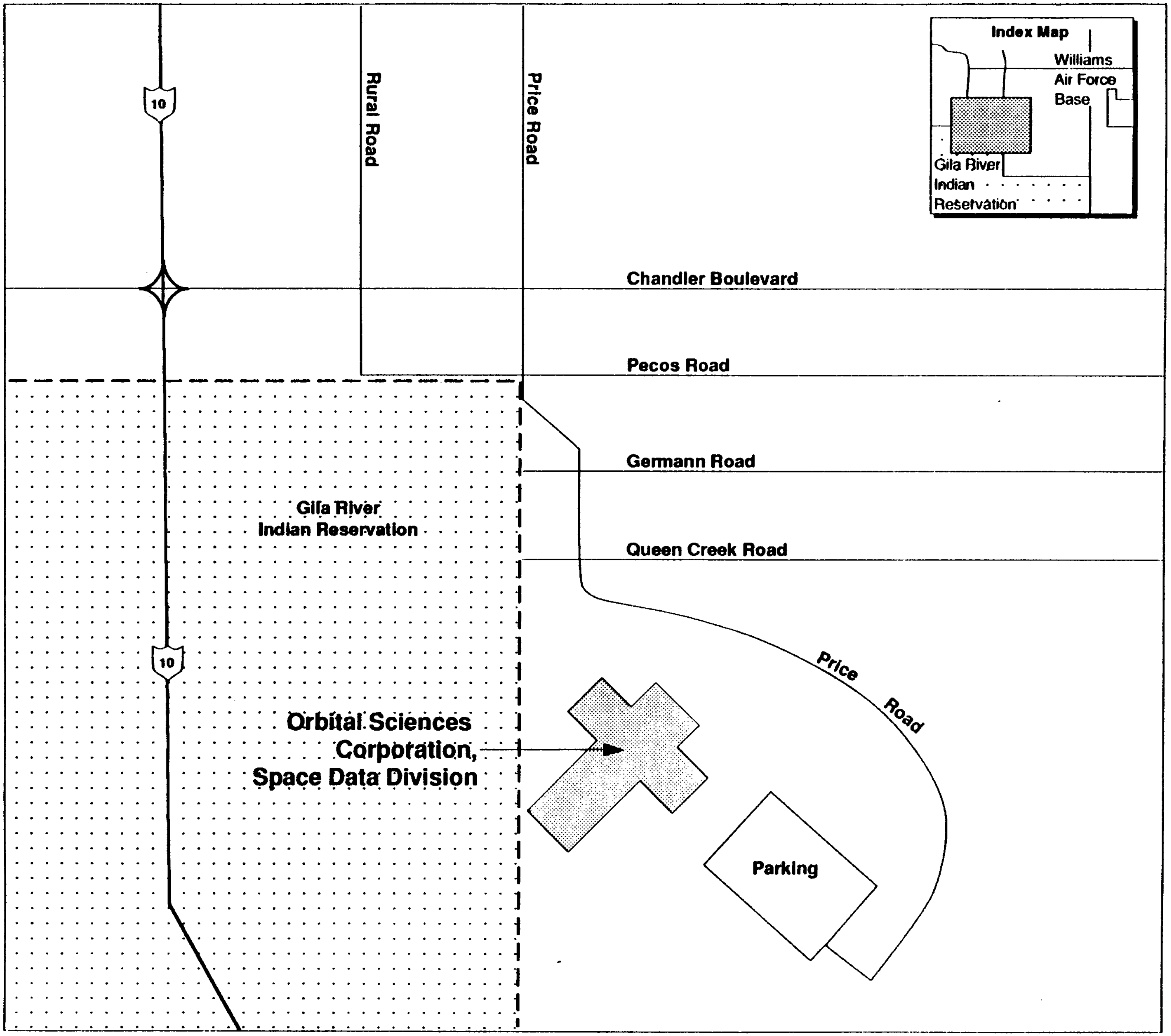
- Designing the ETS mechanical hardware
- Chemical filming of aluminum hardware
- Designing and assembling electrical printed wiring boards and cables
- Performing mechanical hardware fit checks
- Performing first- and second-stage control software and hardware checks
- Attitude control system air bearing testing
- Leak testing and electronics functional testing
- Conducting complete system electronic flight simulation
- Environmental testing of missile components and systems, including temperature cycling, shock, and vibration testing
- Structural bend testing. (Orbital Sciences Corporation, 1991; Rocco, 1990a,b)

Approximately 15 existing personnel would be involved in ERINT activities (Genest, 1990). These activities are considered routine at Orbital Sciences and would require no construction or modification of existing facilities. Orbital Sciences would use existing facilities and operate them at levels and intensities similar to current conditions.

Chemical filming of the aluminum hardware provides a protective coating, as well as increasing the conductivity. The chemical filming activities would involve the use of small quantities of 63 Brawl (acid bath), Deoxidizer 342 (neutralizer bath), Chromicoat 103 (coating bath), and Oakite FH 3 (setting bath). Development of the ETS ballistic target missile would involve use of solvents (acetone and isopropyl alcohol) in cleaning missile components. Circuit board development would involve the use of small quantities of the cleaning solvent 1,1,1-trichloroethane (TCA), isopropyl alcohol, and oakite. These chemicals would be handled according to recommendations on the MSDSs. Orbital Sciences has developed a system safety plan for the ERINT program to implement Military Standard-882B and to outline steps to ensure system and personnel safety. The facility has a *Hazard Communication Program Plan* and a *Hazardous Materials Management Plan* for the safe handling and disposal of hazardous materials on-site. (Orbital Sciences Corporation, 1991; Rocco, 1990b; Space Data Division, 1990a, b; Space Data Corporation, 1990)

1.3.2.3 Rocket Motor Refurbishment/Inspection. The ETS ballistic and maneuvering missiles would utilize refurbished M57A-1 and XM-100 solid propellant rocket motors. The M57A-1 rocket motors would be refurbished at Hill AFB, Utah, and the XM-100 rocket motors would be inspected at Pueblo Depot Activity, Colorado. Eight of each type would be prepared for ERINT flight test activities (Provancha, 1991a). Rocket motors would be checked and tested in existing facilities routinely used for these types of activities. The refurbishment/ inspection activities at these locations are described below.

M57A-1. The M57A-1 rocket motors would be refurbished at the Ogden Air Logistics Center (ALC) at Hill AFB, Utah (Figure 1-20). The building locations

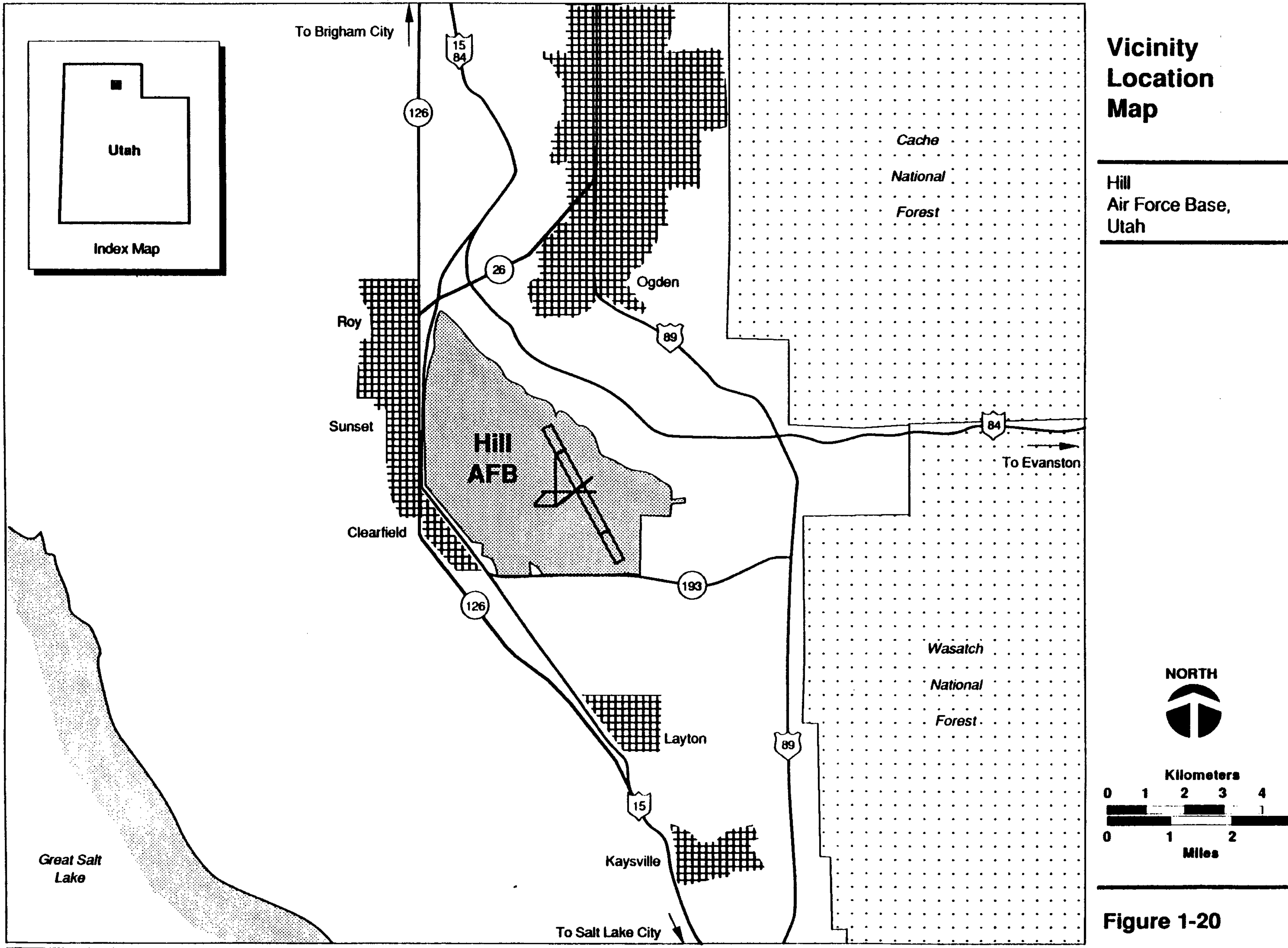


Test Facilities Location Map

Orbital Sciences Corporation, Arizona

Figure 1-19

ERINT/023-4



Vicinity Location Map

Hill
Air Force Base,
Utah

Figure 1-20

ERINT/040

(Figure 1-21) to be used and the refurbishment activities to be performed on the whole rocket motors are as follows:

- Building 2113 and/or 985: X-raying the rocket motors for possible cracks and voids in the solid propellant to ensure that the motor performs to its specifications. A computer tomography system may be used in place of or in addition to the x-rays.
- Buildings 2114 and/or 2213: Verifying that all O-rings are present; testing for leaks: inspecting for propellant cracks; reworking the thrust termination port; and repairing the aft center port. (Cooper, 1990; Hill Air Force Base, 1991; Vlaardingerbroek, 1990a,b)

Leak testing would be conducted to verify a maximum leak rate of 39 milliliters (1.3 fluid ounces) per year. The motor would be pressurized to approximately 207 kilopascals (30 psi) using nitrogen gas and a soap-mixture solution, and checked for leaks (Orton, 1991). At the conclusion of the test, the nitrogen would be released to the atmosphere (Vlaardingerbroek, 1991).

Other refurbishment activities, involving only components of the rocket motors, and the buildings in which they would take place, are as follows:

- Building 100: Overhauling the nozzle control units
- Building 1208: Checking the raceway cables
- Building 2014: Testing the cartridge-activated devices
- Building 1946: Modifying the safe arm and igniter. (Hill Air Force Base, 1991; Vlaardingerbroek, 1990a)

Small quantities of TCA would be used in these activities. Overhauling the nozzle control units would also involve changing hydraulic fluids. Additionally, spray paint would be used to label each rocket motor with identification numbers. ESQDs of 381 meters (1,250 feet) have been established around the missile maintenance area based on requirements of AFR 127-100 . Hill AFB would use safety measures as required by the DOT, as referenced in Section 1.3.1.1, and as described in Technical Order 2K-SRM57-3, *Technical Manual, Overhaul Instructions with Maintenance Parts List, M57A-1 MINUTEMAN Third State Rocket Motor, Part No. 01A00063* (U.S. Department of the Air Force, 1990a), which includes safety measures for X-raying the motor. (Graziano, 1991b; McCarty, 1991; Vlaardingerbroek, 1990a, b; 1991)

Approximately 15 existing personnel would be involved in the refurbishment process. These procedures are routine at Hill AFB and no modifications to existing buildings would be required. (Vlaardingerbroek, 1990a, b)

XM-100. The XM-100 rocket motors are stored in munitions igloos (J Block) at Pueblo Depot Activity, Colorado (Figure 1-22). The buildings that would be used (Figure 1-23), and the inspection activities that would be performed on the rocket motors, are as follows:

- Building 935: Borescoping the solid propellant and visually inspecting the motor case for any damage; conducting electronic system checks

Test Facilities Location Map

Hill
Air Force Base,
Utah

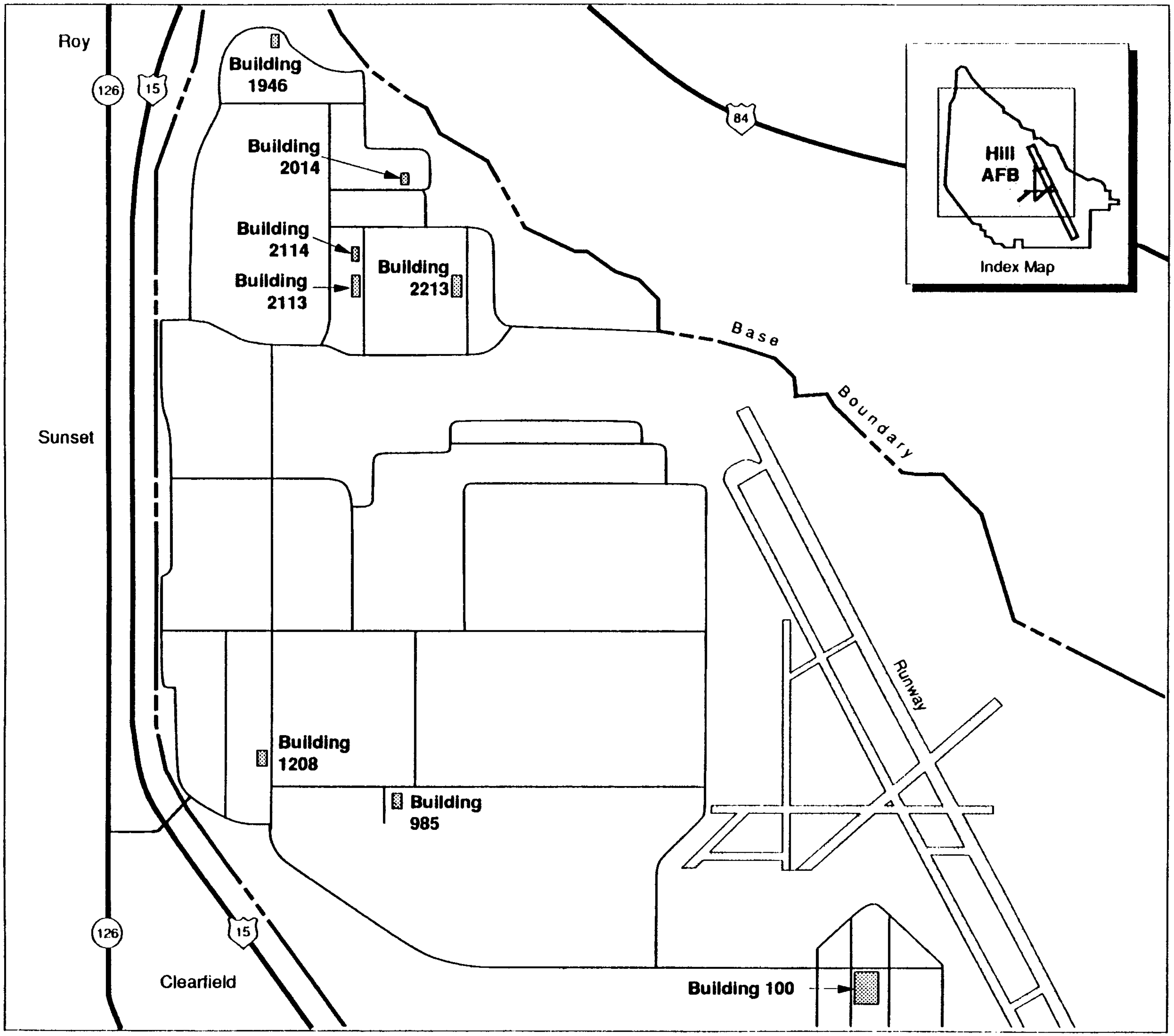


Figure 1-21

ERINT/009-3

Vicinity Location Map

Pueblo Depot Activity, Colorado

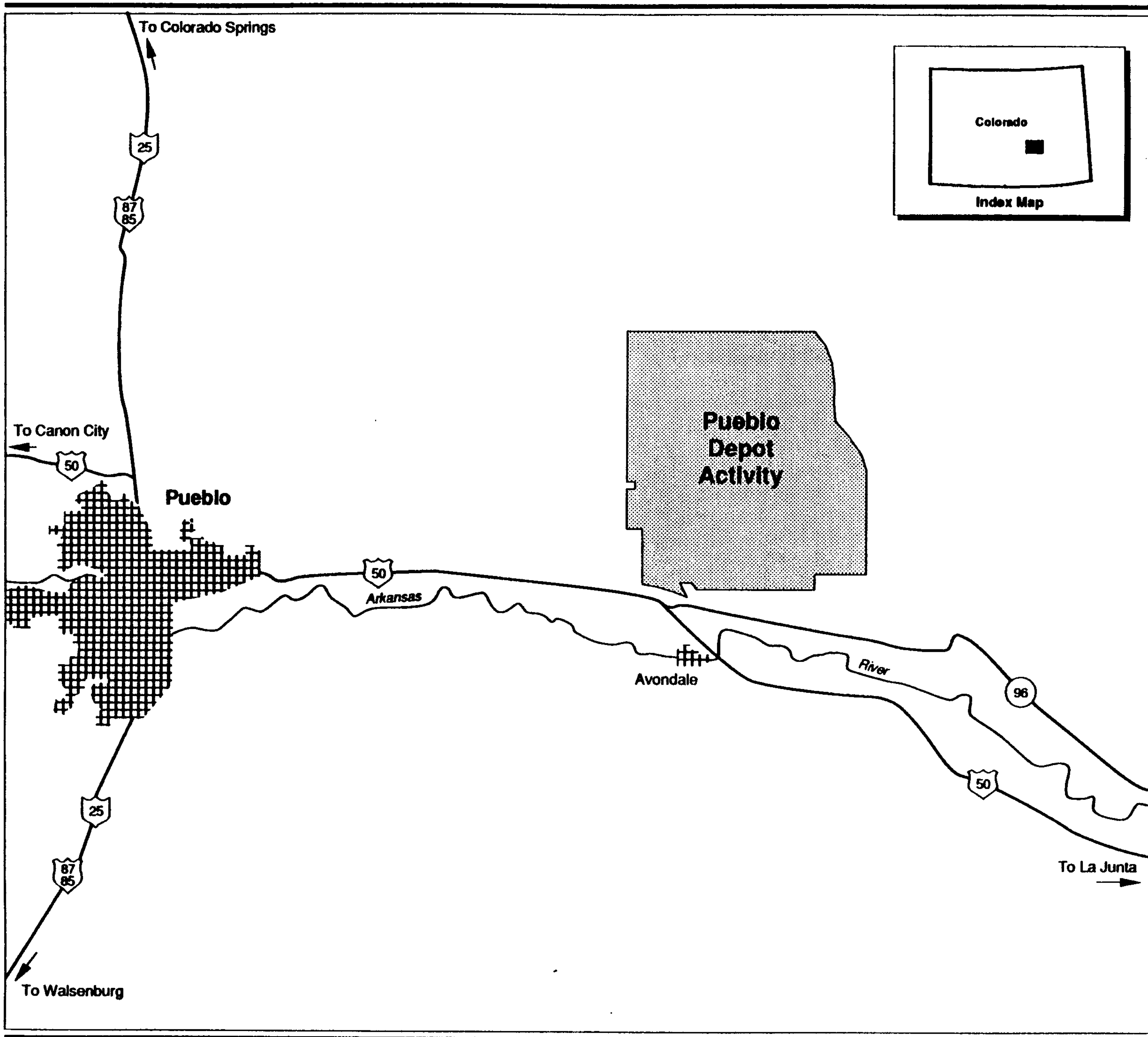
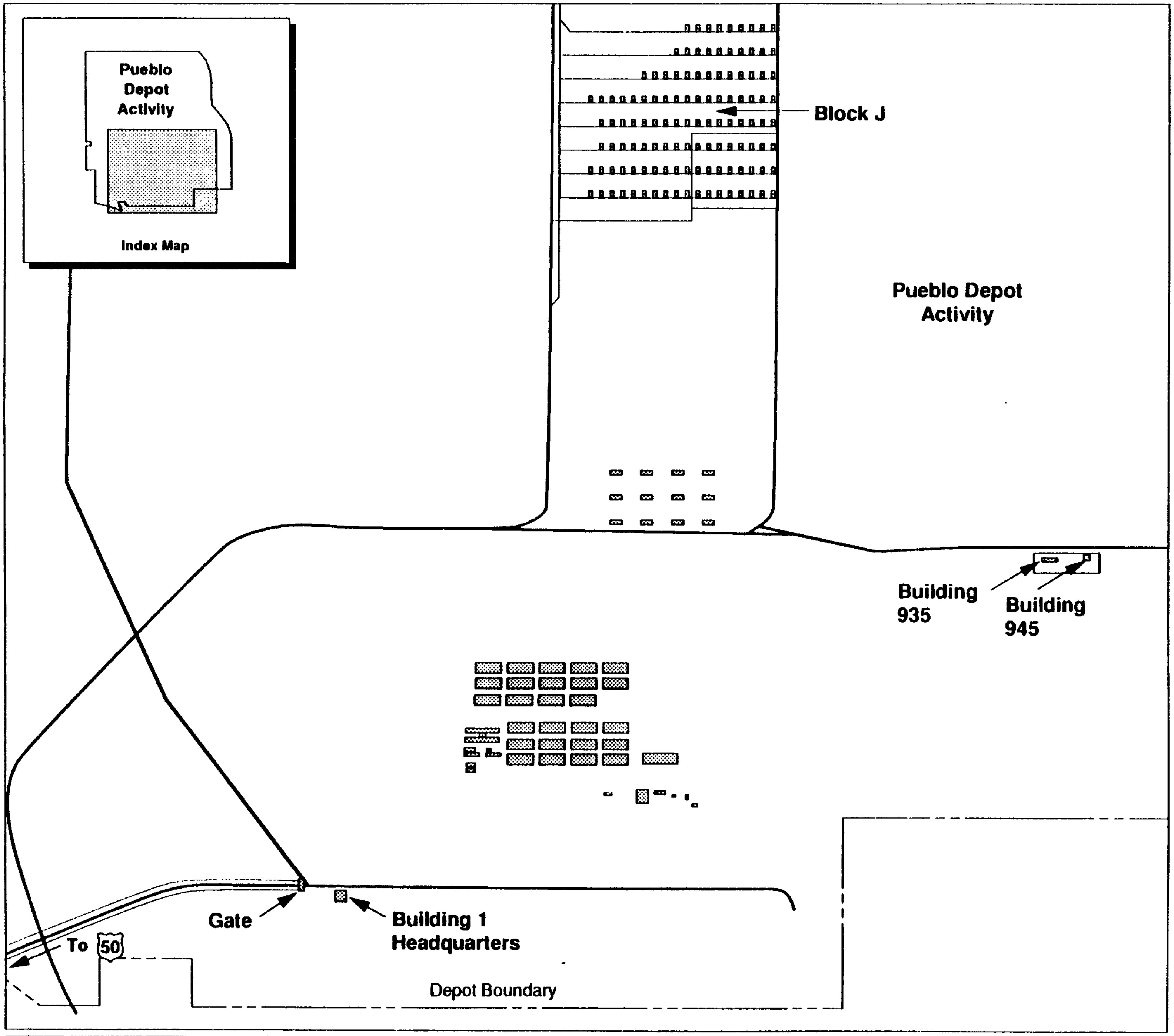


Figure 1-22

ERINT/014-3



Test Facilities Location Map

Pueblo Depot Activity, Colorado

Figure 1-23

ERINT/018-5

- Building 945: X-raying the rocket motor for possible debonding of the solid propellant, to ensure that the motor performs to its specifications. (Glendenning, 1990a; Pueblo Depot Activity, 1991)

ESQDs of 381 meters (1,250 feet) are established around Buildings 935 and 945, and of 1,210 meters (3,970 feet) around the munitions igloos in Block J (Dale, 1991). Pueblo Depot Activity would use safety measures as required by the DOD and the DOT, as referenced in Section 1.3.1.1, and the U.S. Army, as described in Army Materiel Command-Regulation (AMC-R) 385-100, *Safety Manual* (U.S. Army Materiel Command, 1985), and AR 385-64, *Ammunition and Explosives Safety Standards* (U.S. Department of the Army, 1987). A Standing Operating Procedure for the movement of rocket motors from the storage igloos to a working area, based on AMC-R 385-100 and BOE 6000-I, would be followed.

In addition, a Standing Operating Procedure, based on AMC-R 700-107, *Preparations of Standard Operating Procedures for Ammunition Operations* (U.S. Army Materiel Command, 1986), for the radiographic inspection of the booster motors would be followed. These activities are routine at Pueblo Depot Activity, and would require approximately seven existing personnel and three temporary duty Air Force personnel. No modifications to existing buildings would be required. These activities would not involve the use of any paints or solvents. (Pueblo Depot Activity, 1991)

1.3.3 Theater Missile Defense Chemical Flight Experiment Activities

1.3.3.1 Simulant Characteristics. The chemical simulant for the TMDSCE would consist entirely of triethyl phosphate (TEP), while the TMDBCE simulant would require the addition of a small quantity of polymethyl methacrylate (PMMA), an acrylic thickener, to the TEP so that the simulant more closely resembles the viscosity of actual, thickened, toxic chemical agents that would be contained in bulk chemical warheads. The TMDSCE simulant would not be thickened because actual toxic chemical agents that would be used in submunition chemical warheads would not be thickened (Cowles, 1991b). A fluorescent dye would be added to the thickened TEP for TMDBCE testing to aid in remote detection of the chemical simulant during the proposed tests (i.e., tests one, four, five, and six). The characteristics of the individual simulant components are described below, and MSDSs for each can be found in Appendix A.

Triethyl Phosphate. TEP ($C_6H_{15}O_4P$) is a stable, colorless liquid. It is listed in the *Toxic Substances Control Act* (TSCA) (40 CFR 702-799) *Chemical Substance Inventory* (Bennett, 1984); however, the U.S. Department of Transportation does not list TEP as a hazardous material (49 CFR 172) (Engrum, 1990). TEP is not listed as a hazardous substance by the *Comprehensive Environmental Response, Compensation and Liability Act* (CERCLA) (40 CFR 302.4) (Jacobs, 1990). Summary discussions of the TSCA and CERCLA can be found in Appendix C.

TEP is an industrial chemical, commonly used as an ethylating agent (i.e., it releases ethyl groups) and as one of the raw materials used in the preparation of some insecticides (Bennett, 1984). TEP alone is not the active ingredient in these products. It is also approved for use as an adhesive component for articles intended for packaging, holding, and/or transporting food under U.S. Food and Drug Administration regulations (21 CFR 175.105).

Available information on TEP indicates that it is a weak cholinesterase inhibitor (inhibits normal neuromuscular functioning) (Bennett, 1984), and can cause eye and skin irritation, although it is not absorbed through the skin. Good general room ventilation is sufficient for safe handling and use of TEP; however, the manufacturer recommends that any personnel handling TEP should wear protective gloves, clothing, and safety glasses. TEP has a flash point of 99°C (210°F), is volatile, and is soluble in water (Eastman Kodak Company, 1986).

A literature survey conducted to identify ecological concerns regarding TEP revealed that it may be toxic in large concentrations, based on studies using laboratory rats. A sublethal intravenous dose of 1,000 milligrams (mg)/kilogram (kg) (0.018 ounce/pound) of TEP in rats has been found to produce deep anesthesia, but no cholinergic symptoms. For comparison, the lethal amount of malathion (a widely used insecticide), also classified as a weak cholinesterase inhibitor, was 600 mg/kg (0.009 ounce/pound), with pronounced cholinergic symptoms evident at 300 mg/kg (0.005 ounce/pound) (Grumbmann, 1968). In tests in which TEP was administered orally, the LD_{50} was 1,600 mg/kg (0.026 ounce/pound) for rats and guinea pigs, and 1,500 mg/kg (0.024 ounce/pound) for mice (National Institute of Occupational Safety and Health, 1990b). In addition, one test has also shown that inhalation of 28,000 parts per million of TEP over 6 hours caused death in three out of three rats (Bennett, 1984). Doses ranging from 1,700 to 27,180 mg/kg (0.027 to 0.436 ounce/pound) are reported to be mutagenic to bacteria and fruit flies (Bennett, 1984). TEP is also used as a thermometer fluid, and has been listed as a poisonous substance found in the household, along with other commonly found household items (e.g. soap, pine oil, and synthetic rubber) in *Poisoning: Toxicology, Symptoms, Treatments* (Arena and Drew, 1986). No exposure limits have been established for TEP (Eastman Kodak Company, 1986).

Studies have been conducted by the Tennessee Valley Authority in Alabama to determine the effect of TEP on soils and vegetation. They include studies of TEP hydrolysis, greenhouse studies on TEP toxicity to plants, effects of TEP on soil chemistry and microbial activity, and the retention and degradation of TEP in soils from WSMR (Sikora et al., 1991). Results of these laboratory and greenhouse studies have verified that no effect would occur at concentrations up to 400 mg/m^2.

Polymethyl Methacrylate. PMMA $(C_5H_8O_2)n$ is a solid, non-hazardous polymer, commonly used as an acrylic resin. Applications include the production of transparent/translucent plastics, lenses, windows, and aircraft canopies. Well-known product trademarks for PMMA use include Plexiglas and Lucite (Sax, 1984). PMMA is listed in the *TSCA Chemical Substance Inventory*, but it is not listed as a hazardous substance by the CERCLA.

Although PMMA is generally non-toxic, the literature indicates that it has caused cancer in laboratory animals. However, the quantity of PMMA required to cause cancer was not described. Small nuisance particulates of PMMA may cause skin or eye irritation and use of safety glasses is recommended during processing. No special ventilation requirements are necessary when using PMMA, and protective clothing is not required. The flash point for PMMA is approximately 304°C (580°F). It is less than 1 percent volatile, and is not soluble in water (Chemcentral, 1985; Sax, 1984).

Stilbene 420. A fluorescent dye, Stilbene 420, could be used to enhance chemical simulant detection during the proposed TMDBCE activities at WSMR. It is not listed as a hazardous substance by the CERCLA. Stilbene 420 ($C_{28}H_{20}O_6S_2Na_2$) is a yellow, odorless powder, used as a fluorescent brightening agent in cloth (Knaak, 1991). It forms an essentially colorless solution with TEP (Alexander, 1990d). The following information is from the MSDS for Stilbene 420 (Exciton Chemical Company, 1986). The chemical components of Stilbene 420 are listed on the *TSCA Chemical Substance Inventory*. The compound is non-volatile and is soluble in water. Exposure effects have not been established. Although it is not a skin irritant, protective gloves and safety glasses should be worn when handling Stilbene 420. Room ventilation should be good, and air exhaust and use of a dust respirator may be required. However, because of the small quantities that would be used during simulant processing at Battelle, use of a respirator would not be required.

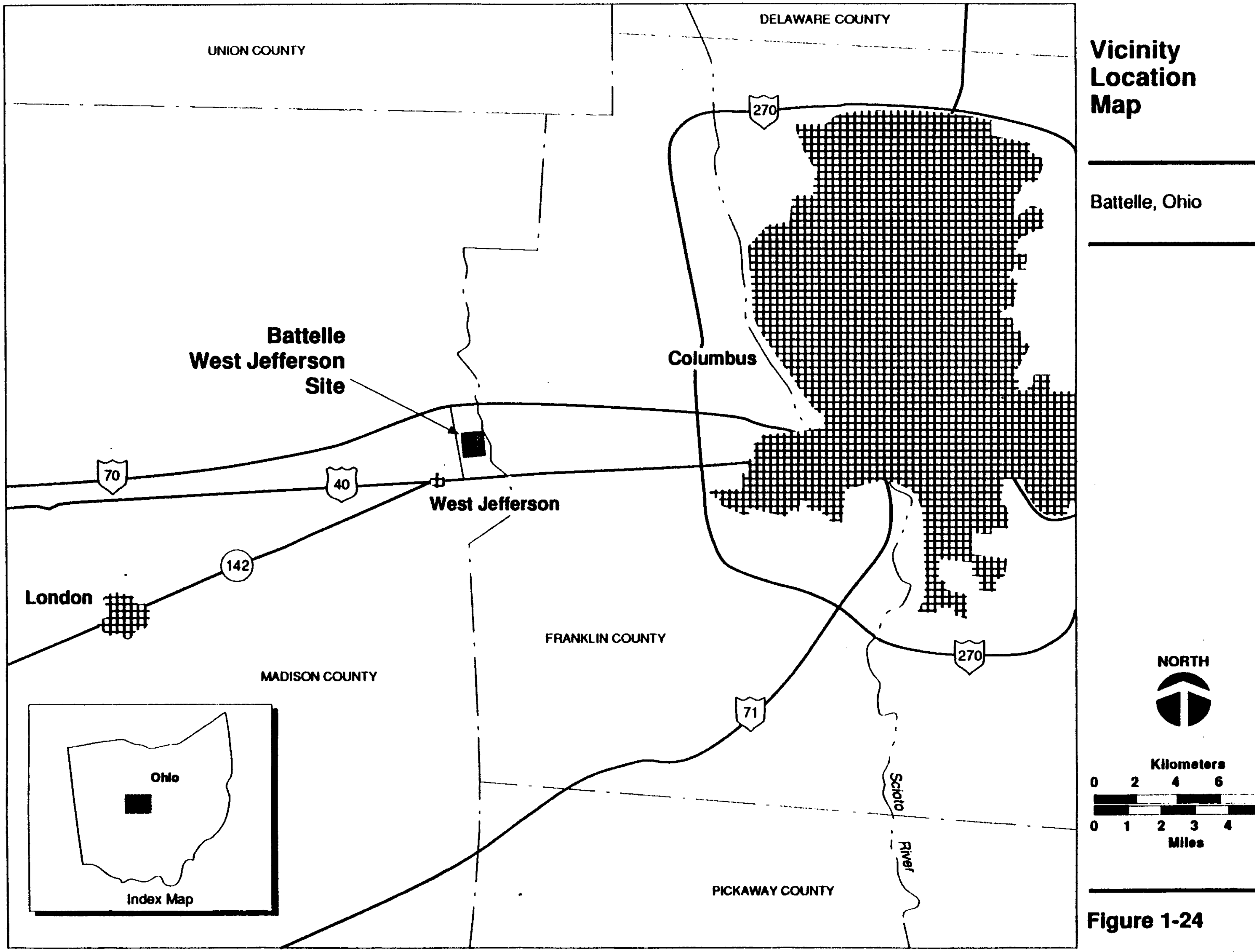
In terms of material toxicity, available data seem to indicate that large doses of Stilbene 420 are required to produce toxic effects. In laboratory tests in which Stilbene 420 was given orally, LD_{50} concentrations of 5,580 mg/kg (0.89 ounce/pound) for rats and 4,920 mg/kg (0.79 ounce/pound) for mice were reported (National Institute of Occupational Safety and Health, 1990a).

1.3.3.2 Simulant Preparation. TMDCFE simulant preparation would be conducted at Battelle facilities near West Jefferson, Ohio (Figure 1-24) in the chemistry laboratory in Building JS-3 (Figure 1-25). (Alexander, 1990b). This activity would consist of adding PMMA and the fluorescent dye to TEP for TMDBCE, and filling individual containers with unthickened TEP for TMDSCE.

TMDBCE Simulant Processing - For TMDBCE processing, commercially pure TEP (approximately 98 percent TEP, with less than 2 percent water and ethanol), would be received in 208-liter industrial shipping containers at Battelle. In the chemistry laboratory, each drum would be opened under a ventilating hood and powdered PMMA would be added to the TEP at a ratio of approximately 4.5 percent by weight (i.e., 170 grams [6 ounces] of PMMA per 3.8 liters [1 gallon] of TEP). The TEP and PMMA would be mechanically mixed to an even texture at room temperature, at which point the PMMA would be forced into solution with the TEP. The fluorescent dye would also be added at this time, at a ratio of no more than 1.0 percent by weight (i.e., 1.0 gram [0.04 ounce] of dye per 100 grams [3.5 ounces] of thickened TEP). (Alexander, 1990a, g, i; Cowles, 1991a; Dugas, 1990; Dye, 1991)

Samples of the mixture would be withdrawn for viscosity characterization using a viscosimeter. The samples would then be returned to their original bulk containers. The thickened TEP would be stored, and later transported, in the original TEP industrial shipping containers (Dugas, 1990).

Safety measures recommended in the MSDSs for the individual simulant components would be used during the storage, handling, and transportation of the simulant chemicals (Alexander, 1990c). During simulant processing, Battelle employees would be working in an open, well-ventilated area. They would wear clear, plastic face shields, laboratory coats, and gloves. Respirators would be used when handling powders (e.g., PMMA) (Alexander, 1990i). The safety

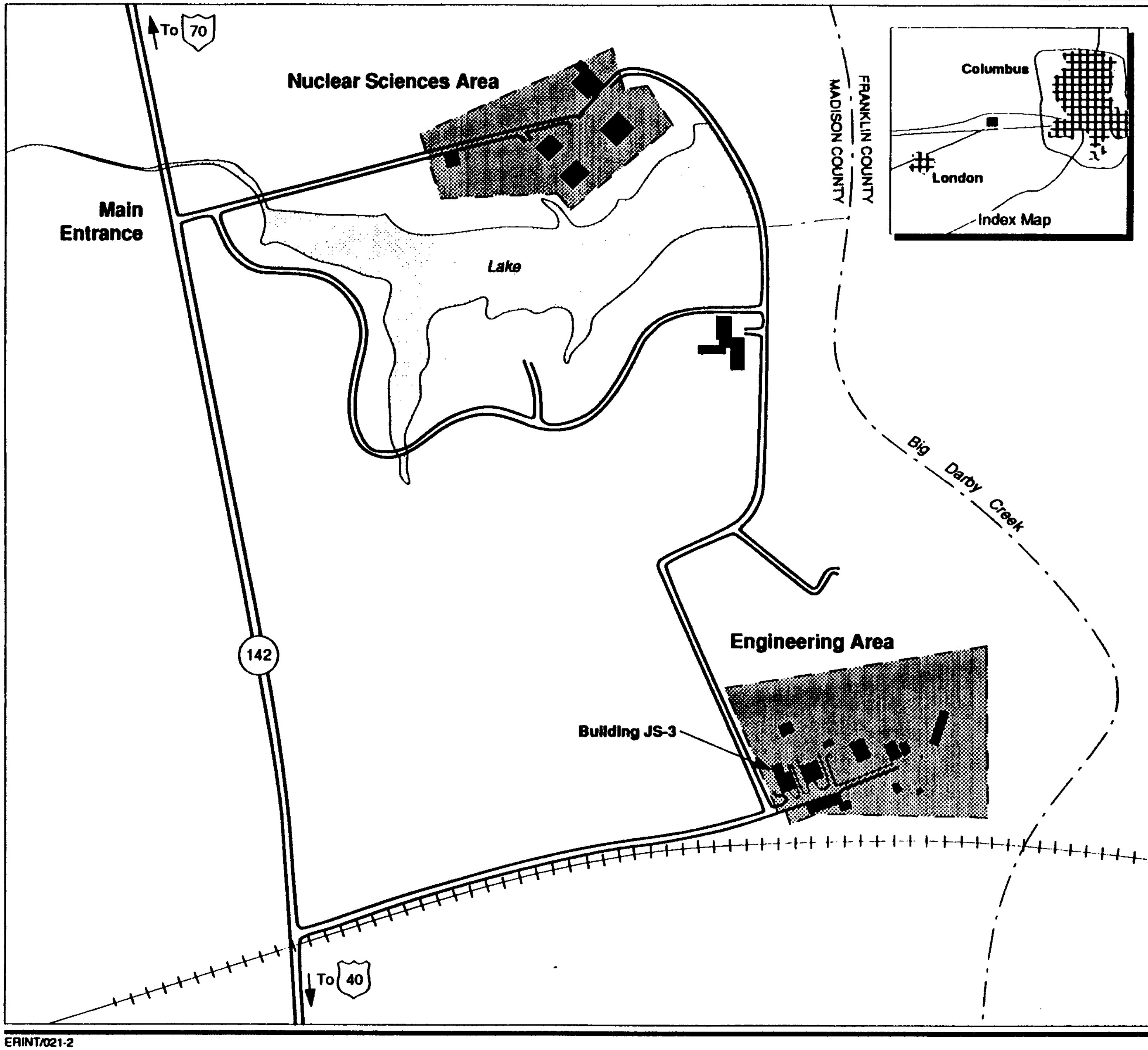


Vicinity Location Map

Battelle, Ohio

Figure 1-24

ERINT/020-2



Test Facilities Location Map

Battelle, Ohio

NORTH

NOT TO SCALE

Figure 1-25

measures for TEP would be followed because TEP is the main simulant component and it does not react with the other components in the simulant mixture (Alexander, 1990h). Additional safety measures for the other components no longer would apply once they are mixed into the TEP (Alexander, 1990i). If an accidental spill should occur, cleanup procedures would follow Battelle's *Emergency Plan, Battelle West Jefferson Site* (Battelle, 1990), which is based on guidelines described in the *State of Ohio Environmental Protection Agency Laws and Regulations*, Section 3745-54-56, "Emergency Procedures" (Ingalls, 1991a).

Battelle has been processing thickened TEP since 1988, under contract with the U.S. Army Chemical Research Development Engineering Center and MICOM (Alexander, 1991a; Mapes, 1991). These activities are routine at Battelle and would require approximately two existing personnel (Alexander, 1990b).

The TMDBCE simulant processing activity has been previously described in the Theater Missile Defense Bulk Chemical Experiment Environmental Assessment (U.S. Army Strategic Defense Command, 1991b).

TMDSCE Simulant Preparation - The TMDSCE simulant would consist entirely of unthickened TEP, with no PMMA or dye added. Handling precautions described for the TMDBCE simulant would be followed. TEP would be ladled into individual submunition containers at Battelle and shipped to WSMR by motor freight.

1.3.4 Flight Preparation

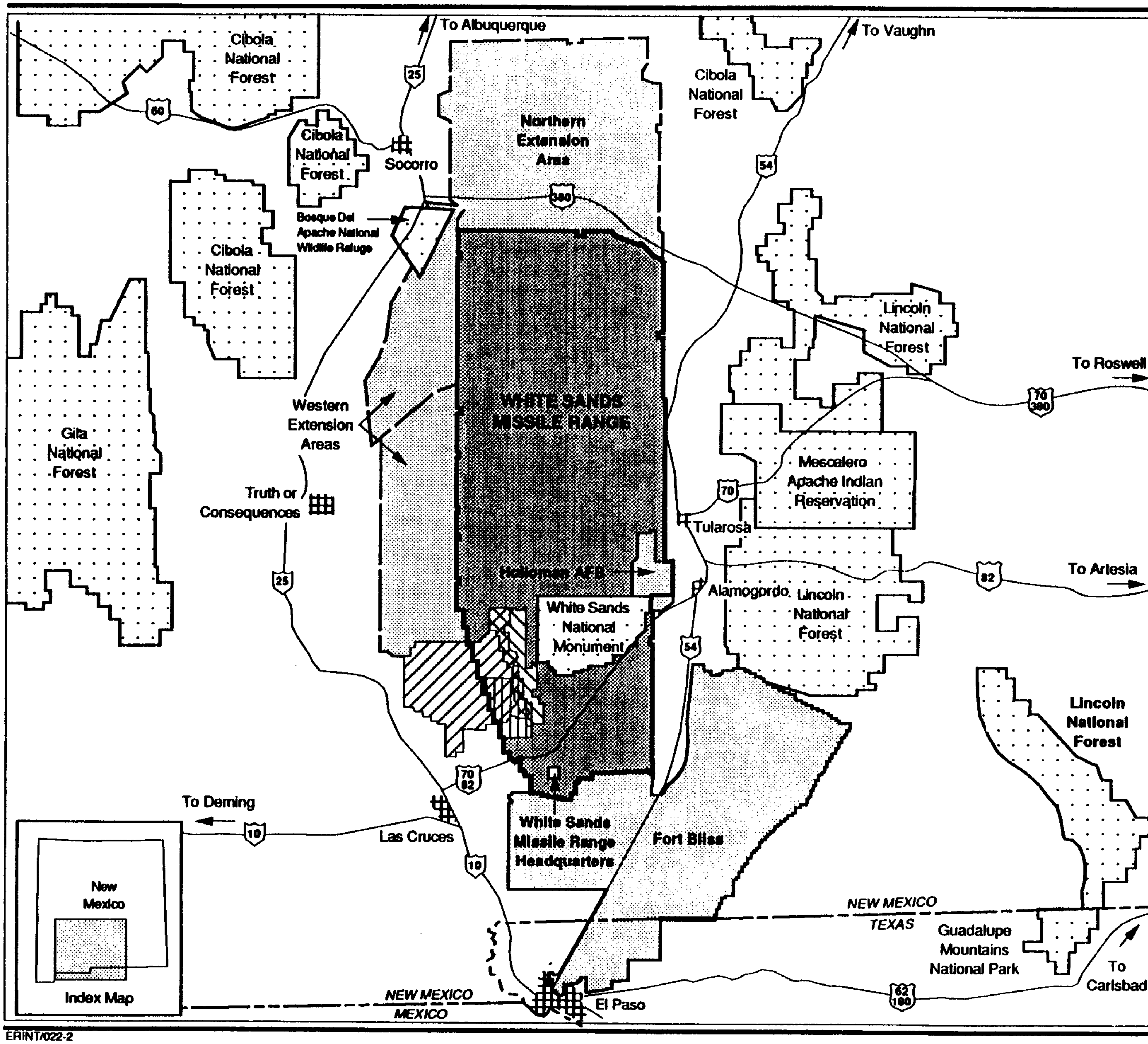
ERINT activities at WSMR (Figure 1-26) would consist of both flight preparation and flight testing. Flight preparation would include assembling, integrating, and testing the ERINT-1 and ETS missiles and the MQM-107, and limited construction/modifications to existing launch facilities for the ETS missile.

1.3.4.1 ERINT-1 Flight Test Missile. The SRM from ARC and the ERINT-1 missile forebody and aerodynamic maneuvering system from LTV would be off-loaded into magazines at the south end of WSMR. Flight preparation would involve use of the following facilities (Figure 1-27a):

- Building 21695: Installing the aerodynamic maneuvering system and maneuvering fins onto the SRM; checking out and spin balancing the SRM and the missile forebody; mating the SRM to the missile forebody; loading the assembled missile into a launch tube
- Building 21564: X-raying the SRM.

A radar Doppler test may be conducted using the ERINT-1 forebody (White Sands Missile Range, 1991). The radar Doppler test would be conducted in accordance with the guidelines of Technical Guide Number 153, *Guidelines for Controlling Potential Health Hazards from Radiofrequency Radiation* (U.S. Army Environmental Hygiene Agency, 1987) which presents the Surgeon General's guidelines for controlling potential health hazards from radiofrequency radiation, and implements DOD instructions for protecting personnel from exposure to radiofrequency radiation (Blevins, 1991; Richey, 1991d).

The loaded launch tube would be transported to the LC50 launch site and loaded onto a PATRIOT (XM901) or Lance launcher (LTV Missiles and



Vicinity Location Map

White Sands Missile Range, New Mexico

EXPLANATION:

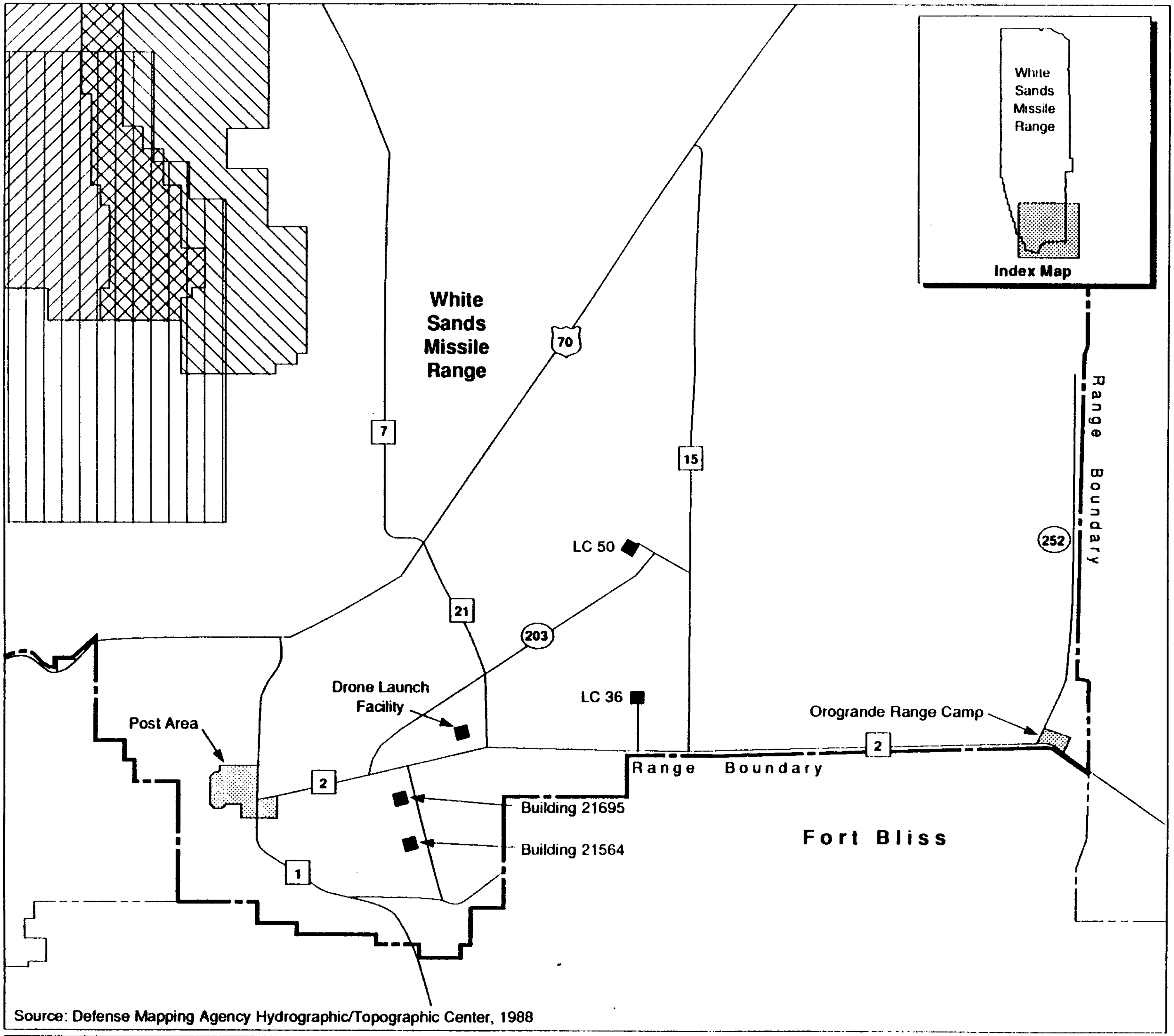
- NASA White Sands Test Facility
- Jornada Experimental Range
- San Andres National Wildlife Refuge

NORTH

Kilometers 0 10 20 30 40

0 10 20 30 Miles

Figure 1-26



Test Facilities Location Map

South Range, White Sands Missile Range, New Mexico

EXPLANATION:

- NASA White Sands Test Facility
- Jornada Experimental Range
- San Andres National Wildlife Refuge

NORTH

Kilometers 0 1 2 3 4 5 6 7 8

Miles 0 1 2 3 4 5

Figure 1-27a

ERINT/025-6

Electronics Group, 1991b). Safety measures for storage, handling, and transportation of missile components containing ordnance, described in AMC-R 385-100, would be followed. ESQDs of 381 meters (1,250 feet) based on AMC-R 385-100 requirements are established around facilities where these components would be stored and handled (Richey, 1991c).

It has not yet been determined whether the use of solvents and other hazardous materials/wastes during these activities would be required. If so, the user must follow WSMR regulations for their safe use and handling. Procedures for storage, handling, and transport of ordnance, and ESQDs of 381 meters (1,250 feet) around facilities where ordnance is stored or handled are established in compliance with AMC-R 385-100 (U.S. Department of the Army, 1985).

All handling, assembly, and testing of hardware would be performed in accordance with LTV's *Configuration and Management Plan for the ERINT Program* (LTV Missiles and Electronics Group, 1989b), which includes approved procedures written specifically for ERINT-1 assembly and testing procedures. Only these approved and released procedures would be used for assembly and testing procedures related to ERINT-1 activities at WSMR. The LTV Quality Assurance Department would monitor all operations to ensure that these procedures are followed. Safety Standard Operating Procedures (SSOPs) would be approved by WSMR Safety Engineering (Boychuk, 1991a; LTV Aerospace and Defense Company, 1990b).

These activities would require approximately 5 existing post personnel and a maximum of 30 contractor personnel for each launch (LTV Aerospace and Defense Company, 1990a, b). An M 109 type van would be required to house launch pad equipment at LC50 (LTV Aerospace and Defense Company, 1990a).

1.3.4.2 ERINT Target System (ETS)

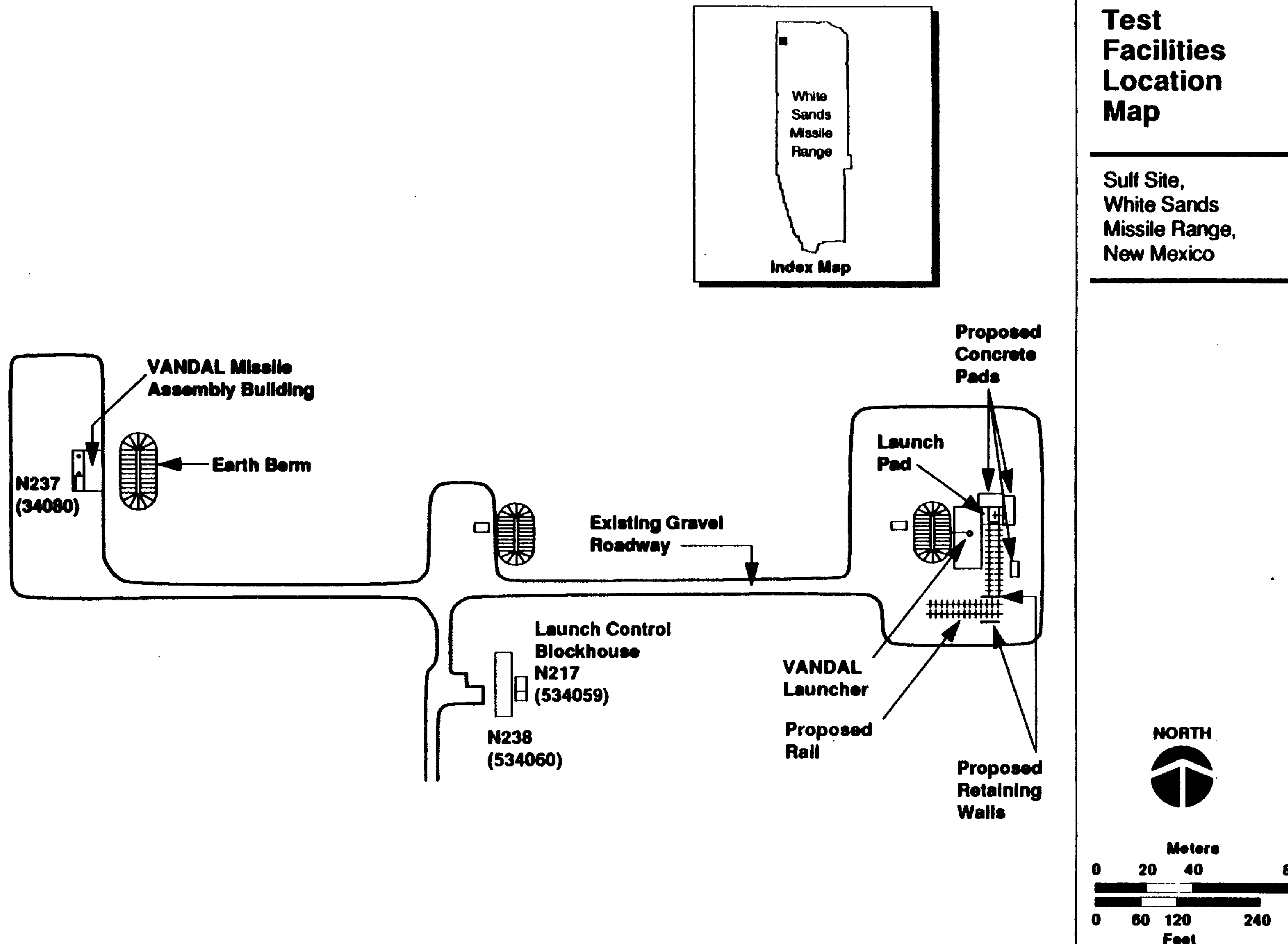
ERINT Ballistic Tactical Missile Target System. The refurbished M57A-1 motors from Hill AFB and the inspected XM-100 motors from Pueblo Depot Activity would be off-loaded into magazines at the south end of WSMR. The ETS ballistic target assembly; guidance, control, and avionics module; interstage assemblies; and aft skirt would be shipped by truck from the target contractor facilities previously described.

Flight preparation activities would use the following facilities at the south end of WSMR:

- Buildings N183 (1864) and N219 (S23511): Inert component storage (e.g., aft skirt)
- Building N220 (23484): Target system storage and assembly
- Building N77 (22872) or N220 (23484): Installation of flight termination system ordnance and aft skirt onto the XM-100 motor. (White Sands Missile Range, 1990b)

These facilities are located at LC 36, except for Building N183, which is in the Post Area (see Figure 1-27a).

Once the first stage is assembled, it would be transported to the Sulf Site (Figure 1-27b). The M57A-1 motor would be transported directly from the magazine to the launch site without any additional assembly. At the Sulf Site,



Source: Naval Ordnance Missile Test Station, 1989a.

Test Facilities Location Map

Sulf Site,
White Sands
Missile Range,
New Mexico

Figure 1-27b

final system checks and propellant borescoping of the assembled stages may be performed in the VANDAL Missile Assembly Building, Building N237 (34080). The two stages, guidance, control, and avionics module and the target would then be built up on the launch pad and enclosed within a movable environmental shelter (White Sands Missile Range, 1990b).

The WSMR Safety Office has determined that the Sulf Site requires facility construction upgrades to eliminate certain safety concerns. The purpose, description, and potential impacts of these activities are discussed in a Record of Environmental Consideration (REC) Control No. REC-007-91 (see Appendix B).

The Sulf Site would require the following facility construction upgrades (Figure 1-27b) in order to be usable as the ETS launch site, or for any similar launch use:

- Three concrete pads, one 39 feet by 14 feet, adjacent to the east side of the launch pad for the missile-carrying truck; another 35 feet by 21 feet, adjacent to the north side of the launch pad for the missile crane; and the third, 10 feet by 20 feet, east of the existing rail tracks for a survey marker to be used in calibrating the missile's internal navigation system
- Approximately 100 feet of new rail, laid at right angles to the existing rail
- Two retaining walls, approximately 20 feet long, parallel to the new rail tracks (Provancha, 1991a; Rocco, 1990d; White Sands Missile Range, 1990b).

All construction activity would occur in a previously disturbed, graded area (White Sands Missile Range, 1990b). Personnel involved in construction activities would be required to wear ear protection.

In addition, a storage building (Building N238 [S34060]) would be renovated (i.e., ceiling replaced, roof repaired, and walls patched) to be usable for equipment storage and as a work space (White Sands Missile Range, 1990b). This building is adjacent to a concrete blockhouse, Building N247(S34059), which would be used as the launch control area (White Sands Missile Range, 1990b). A blast door would be added between these two structures as part of the storage building renovations (White Sands Missile Range, 1990b). A preliminary survey conducted by the Naval Ordnance Missile Test Station (NOMTS) Environmental Office has indicated the presence of asbestos-containing materials in the storage building (White Sands Missile Range, 1991). During building renovations, any asbestos-containing materials (e.g., exterior shingles, acoustic ceiling, insulation) would be repaired, removed, or disposed of in accordance with the WSMR SSOP, *Handling Friable Asbestos* (U.S. Department of the Army, 1989). This SSOP incorporates the asbestos-handling requirements of the EPA National Emission Standards for Hazardous Air Pollutants (NESHAP) (40 CFR 61), OSHA regulations (29 CFR 1910), and guidelines provided by the DOD and the Department of the Army. The NOMTS Environmental Office would prepare an asbestos abatement plan and submit it, through the WSMR Environmental Services Division, to the New Mexico Environmental Division (ED), Air Quality Bureau, for approval (White Sands Missile Range,1991).

Because the Sulf Site has no water and the existing electrical power supply is not considered reliable, portable toilets and generators, and potable water would be brought to the launch site for pre-launch and launch activities. An hour before launch, power would be switched to the generators. (White Sands Missile Range, 1990b) Prior to launch, the environmental shelter would be rolled away from the launch stool and transferred, by use of a dolly, to the new rail tracks in order to be rolled far enough from the missile to avoid launch-related damage. Only essential launch control personnel would remain at the site during launch. They would be in the blockhouse, which is a reinforced building capable of withstanding blast overpressure and provides protection against impact debris. In addition, a ventilation system inside the blockhouse would protect personnel from rocket exhaust.

The chemical simulant would be received from Battelle and stored in the VANDAL Missile Assembly Building at the Sulf Site. For TMDBCE activities, approximately 124 liters (32.8 gallons) of simulant would be incorporated into each target assembly when the ETS ballistic missile is positioned on the launch pad. WSMR personnel would handle the TMDBCE chemical simulant according to safety measures described in the MSDS for TEP, because it is the main simulant component and it does not react with other components in the simulant mixture. A maximum of approximately 820 liters (217 gallons) of simulant would be required for TMDBCE activities and 56 liters (15 gallons) for TMDSCE activities (Strietzel, 1991b).

ETS flight preparation and testing would require 8 existing on-base personnel and a maximum of 12 temporary contractor personnel for each launch.

It has not yet been determined whether the use of solvents and other hazardous materials would be required for these activities. If so, the user must follow WSMR regulations for their safe use and handling. Procedures for storage, handling, and transport of ordnance, and ESQDs of 381 meters (1,250 feet) around facilities where ordnance is stored or handled are established in compliance with AMC-R 385-100 (Richey, 1991c; U.S. Department of the Army, 1985).

Component and assembly checks and launch site activities for the ETS missile would be conducted in accordance with detailed operating procedures that comply with approved WSMR SSOPs.

Air-Breathing Target. The MQM-107 would be sent by truck unassembled to the MICOM Target Office facility at Orogrande Range Camp, WSMR (see Figure 1-27a). The unassembled MQM-107 contains no fuel or ordnance. It would be assembled and fueled with a jet fuel at Orogrande and then towed to the Army Materiel Test and Evaluation Drone Launch Facility in the southern part of WSMR. This facility has been used for preparation of drone launches for over 10 years. The MICOM office conducts approximately 400 air-breathing target launches per year at WSMR. The solid propellant booster that would be used to launch the MQM-107 would be stored in an ammunitions storage area on WSMR prior to being brought to the launch site. ESQDs of 381 meters (1,250 feet) are established around facilities where ordnance is stored or handled. These activities would require approximately 10 existing MICOM personnel and would not involve use of the TMDCFE. Debris impact areas for the MQM-107 will be determined after all details of these flight tests have been specified. Further documentation of these activities will be provided in an addendum to this EA, prior to this portion of the action proceeding, verifying no significant impacts. (Ferguson, 1990; Nuwayhid and Schaffer, 1990; Provancha, 1991c; Richey, 1991b, c)

ERINT Maneuvering Tactical Missile Target System. The PERSHING II re-entry vehicle would be received from either U.S. Army Pueblo Depot Activity or the U.S. Army MICOM. Pre-flight activities and personnel required at the Sulf Site for the maneuvering tactical missile target system would be essentially the same as those for the ballistic tactical missile target system previously described. Upgrades to the Sulf Site would be completed prior to tests involving the maneuvering tactical missile. The TMDSCE would be incorporated in the three maneuvering tactical missile target flight tests. TMDSCE flight tests would involve incorporating 20 to 30 individual canisters of unthickened chemical simulant into the target for each flight. Radio transmitters would be attached to each canister to relay information on the quantity of canisters opened during flight termination or intercept. A photonic hit indicator attached to the target would provide data on the location of intercept for flights ten and eleven. Because complete details are not yet available on these activities, supplemental documentation will be provided at a later date, prior to this portion of the action proceeding, verifying no significant impacts.

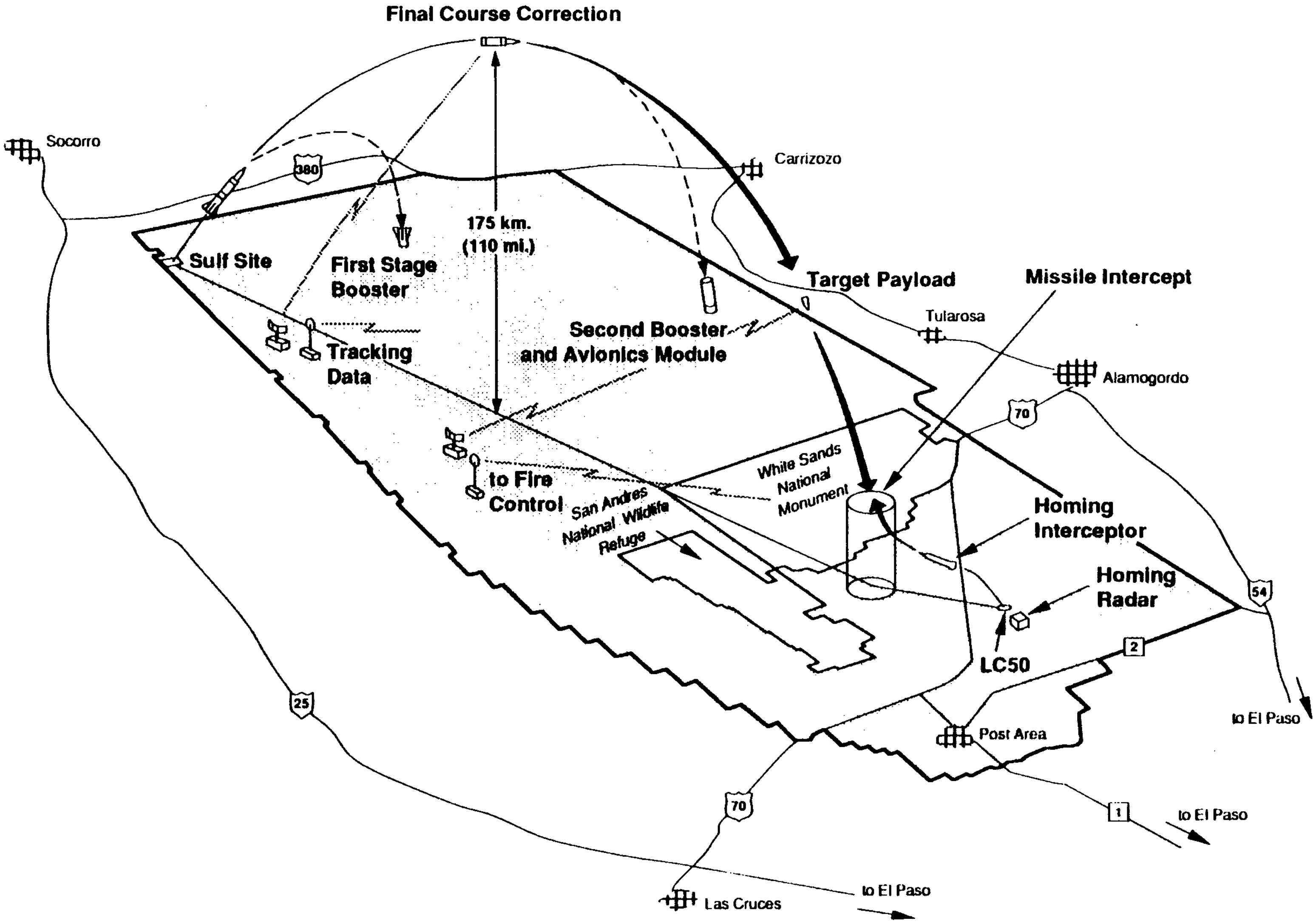
1.3.5 Flight Testing

Flight tests are proposed at WSMR, beginning with a demonstration flight of the ETS ballistic tactical missile in the fourth quarter of calendar year (CY) 1991 (see Table 1-1). The two ERINT-1 control test flight missiles would be launched in the first quarter of CY 1992. The six intercept flights would begin in the second quarter of CY 1992 and flight tests would be completed by the second quarter of CY 1993. Figure 1-28 shows a representative ballistic tactical missile intercept flight test scenario. There would be two demonstration or control flight tests involving the ERINT-1 missile, and six guided flight tests in which the ERINT-1 missile would attempt to intercept the designated target. The scenario shown in Figure 1-28 would be similar for the maneuvering tactical target missile intercept flights (LTV Aerospace and Defense Company, 1990a).

The scenario for the ETS ballistic tactical target missile and maneuvering tactical target missile demonstration flights (flights one and nine) would be similar because they would be terminated in the same approximate engagement area. However, these flights would be terminated by an on-board linear shaped charge, and not by ERINT-1 intercept. The ERINT-1 demonstration flights (flights two and three) would also be detonated by remote control in the same approximate engagement area.

The ERINT-1 missile and target launch operations would be conducted under a common mission operations plan. Flight test plans and data collection and analysis plans would be provided prior to each flight test. Flight test plans and trajectories must be approved by the WSMR Safety Office and the WSMR Master Planning Board.

1.3.5.1 ERINT-1 Flight Test Missile. The ERINT-1 missile would be launched from the LC50 launch site. Prior to launch, the LUCS would compute the missile aim point and launch time. Information from the LUCS would be loaded into the ERINT-1 missile prior to launch. If needed, the LUCS would determine target position for in-flight updates to be transmitted to the ERINT-1 missile after launch. The ERINT-1 missile would fly out using inertial guidance, point the



Source: LTV Aerospace and Defense Company, 1990a.

ERINT Flight Test Functional Concept

White Sands Missile Range, New Mexico

NORTH

NOT TO SCALE

Figure 1-28

radar seeker at the target, and home in on it using its on-board radar and guidance and control system for a hit-to-kill intercept. The attitude control section ACMs would provide rapid response during homing. Just prior to intercept, the LE would be deployed and thrust termination would occur. (LTV Aerospace and Defense Company, 1990a)

If no intercept occurs, and for flight tests one and nine, a linear shaped charge in the ETS target assembly would release the chemical simulant payload before it hits the ground and the target would impact close to the intercept debris impact area. WSMR Flight Safety has the option to terminate each ERINT-1 flight at any time. In control test flights of the ERINT-1, and if no intercept occurs in guided test flights, a preprogrammed trajectory would be flown by the ERINT-1 during which all ACM positions would be fired to expend remaining ACMs. The LE/FTS would then be fired to end the mission over a desired debris deposit area. All debris from the flight tests would impact on WSMR in areas that have been approved by the Range Safety Office and would be recovered in accordance with WSMR Regulation 70-8, *Security, Recovery, and Disposition of Classified and Unclassified Test Material Impacting On-Range and Off-Range* (U.S. Department of the Army, 1991a). (LTV Missiles and Electronics Group, 1991d)

All ERINT flight tests would likely require the temporary evacuation of White Sands National Monument and the closure of Highway 70. These are safety measures routinely taken by WSMR during flight test activities.

Flight debris impact areas for both the control, and guided flight tests for the ERINT-1 are shown in Figure 1-29. Three types of debris areas have been identified for these tests: LE fragments, missile body sections, and low beta (low density) debris.

Critical or hazardous debris would be recovered immediately, whereas nonessential material would be recovered as part of a continuous effort to keep WSMR clear of debris. WSMR would supply a debris recovery team to locate and recover the debris, and, if required, dispose of or destroy contaminated, classified, or hazardous material by explosive ordnance disposal. Hazardous material disposal would be in accordance with hazardous material regulations. If debris should impact in areas inaccessible to ground vehicles, helicopters would be used. Debris craters would be filled in, as necessary, after recovery efforts are completed. (White Sands Missile Range, 1990a)

To minimize possible effects to sensitive species, the following standard WSMR recovery procedures would be followed: minimization of off-road vehicle use, the use of helicopters where possible, and the inclusion of a qualified biologist with each search team engaged in the recovery of project-related debris.

Cultural resources do exist near LC50; however, because launch activities would be confined to existing launch areas, no significant impacts are expected. In addition, an archaeologist will accompany the recovery team on all debris recovery operations. An archaeologist will be contacted 4 weeks prior to firing to arrange for accompaniment with the recovery team. If archaeological or historical sites would be affected, the WSMR Environmental Services Division would be contacted (Dynaspan Services Company, 1986). Applicable WSMR Environmental Services Division procedures would be followed.

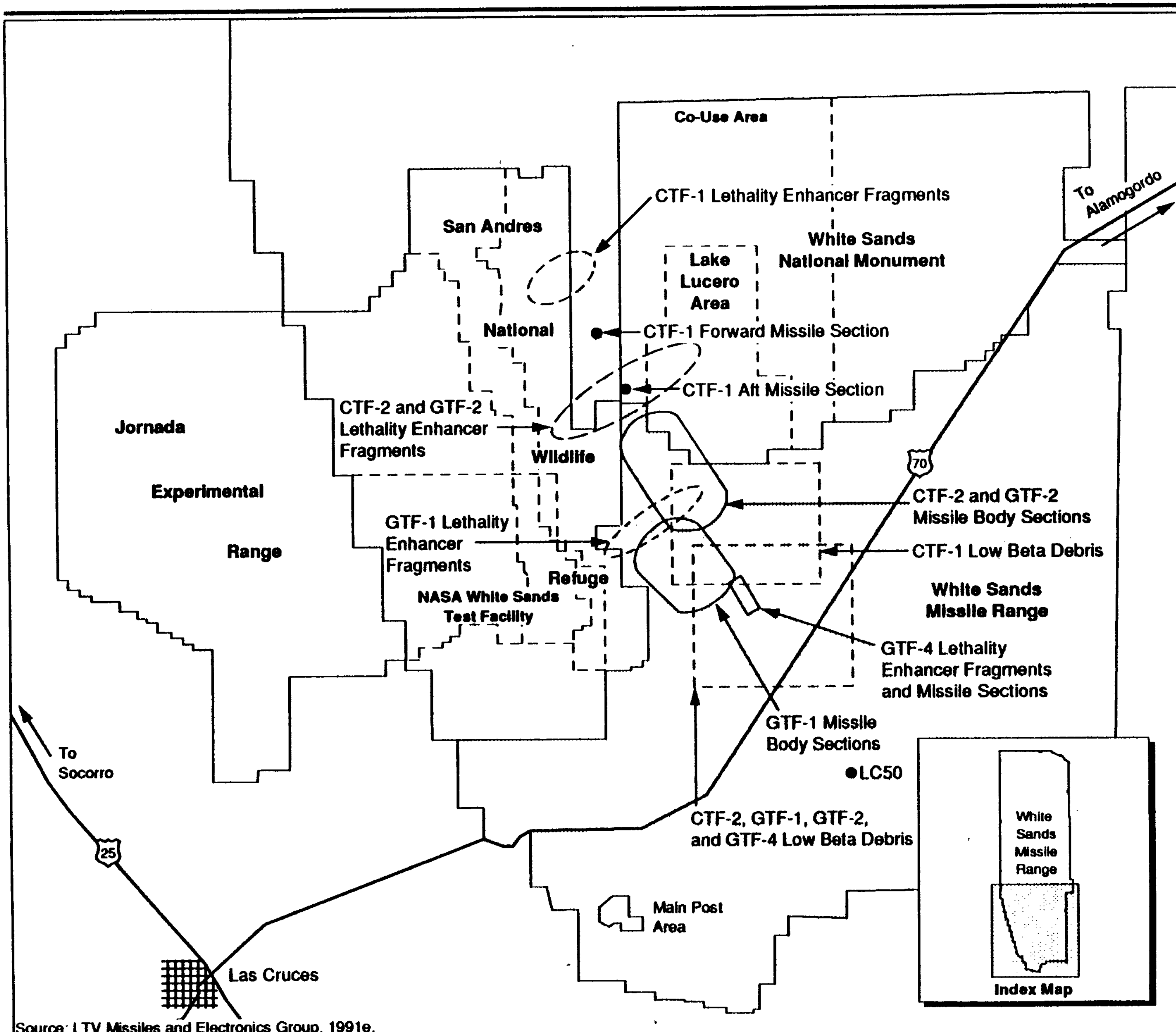
ERINT-1 Debris Impact Areas

White Sands Missile Range, New Mexico

EXPLANATION

CTF = Control Test Flight

GTF = Guided Test Flight



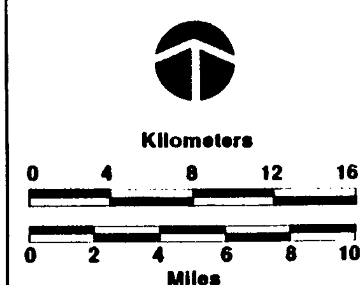


Figure 1-29

1.3.5.2 ERINT Target System (ETS)

ERINT Ballistic Tactical Missile Target System. The ETS ballistic tactical missile would be launched from the Sulf Site along a flight trajectory with an azimuth of approximately 166 degrees (U.S. Army Strategic Defense Command, 1990). After launch, the first-stage motor would burn for approximately 36 seconds and then separate (U.S. Army Strategic Defense Command, 1990). Second-stage motor burn-out would occur at approximately 100 seconds. Shortly after second-stage motor burnout, the second-stage assembly, including avionics module, would separate from the target. The target would reach its apogee of approximately 175 kilometers (110 miles) as it continues toward the engagement area. Both the target and second-stage assembly trajectories would pass over the western portion of White Sands National Monument, but debris would not impact within the Monument boundary. Projected debris impact areas of the ETS ballistic target and second-stage assemblies are shown in Figures 1-30a and 1-30b.

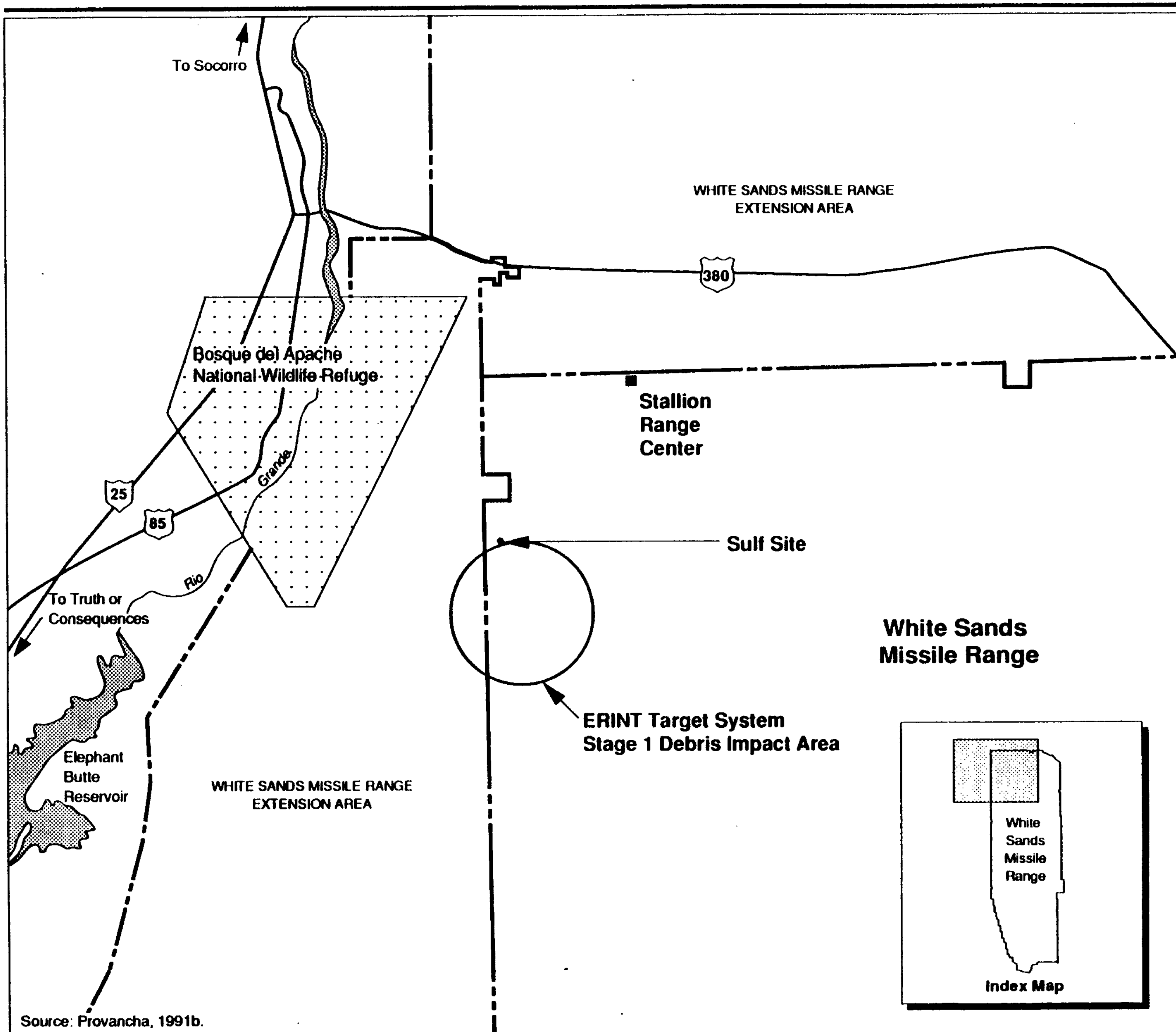
The ETS Stage I debris impact area would include a small part of the WSMR Western Extension Area. Evacuation has been the established and usual procedure for WSMR activities requiring the use of the extension areas. The WSMR Master Plans Branch would be responsible for implementing these procedures. Prior to launch, notices would be sent to all occupants and signs would be posted in the vicinity of the impact area. All people within the area would be evacuated. Prior to launch, the debris impact area would be closed off and military helicopters would fly over to check for any persons who may have entered the area. (Naval Ordnance Missile Test Station, 1989b)

To minimize possible effects to sensitive species, the following standard WSMR recovery procedures would be followed: minimization of off-road vehicle use, the use of helicopters where possible, and the inclusion of a qualified biologist with each search team engaged in the recovery of project-related debris.

Cultural resources do exist near LC50; however, because launch activities would be confined to existing launch areas, no significant impacts are expected. In addition, an archaeologist will accompany the recovery team on all debris recovery operations. An archaeologist will be contacted 4 weeks prior to firing to arrange for accompaniment with the recovery team. If archaeological or historical sites would be affected, the WSMR Environmental Services Division would be contacted (Dynaspan Services Company, 1986). Applicable WSMR Environmental Services Division procedures would be followed.

Up to two AN/MPQ-53 ground control radars would track the target to provide targeting data to the LUCS. WSMR FPS-16 and MPS-36 radars would also be used as backup tracking and instrumentation radars. These are existing radars at WSMR. From these data, the LUCS would determine the ETS trajectory and project the target ahead in time to the intercept point. (LTV Aerospace and Defense Company, 1990a)

Air-Breathing Target. The MQM-107s would be launched from the Army Materiel Test and Evaluation Drone Launch Facility, located in the southern portion of WSMR (Richey, 1991b). This facility has been used for over 10 years for similar launches. The MQM-107s are existing, government-furnished, solid propellant boosters (Ferguson, 1990). MQM-107 flight tests would not involve TMDCFE activities. Two to three launch-essential personnel would be in the



ERINT Target System, Stage 1 Debris Impact Area

White Sands
Missile Range,
New Mexico

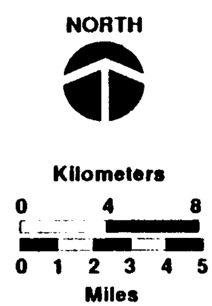
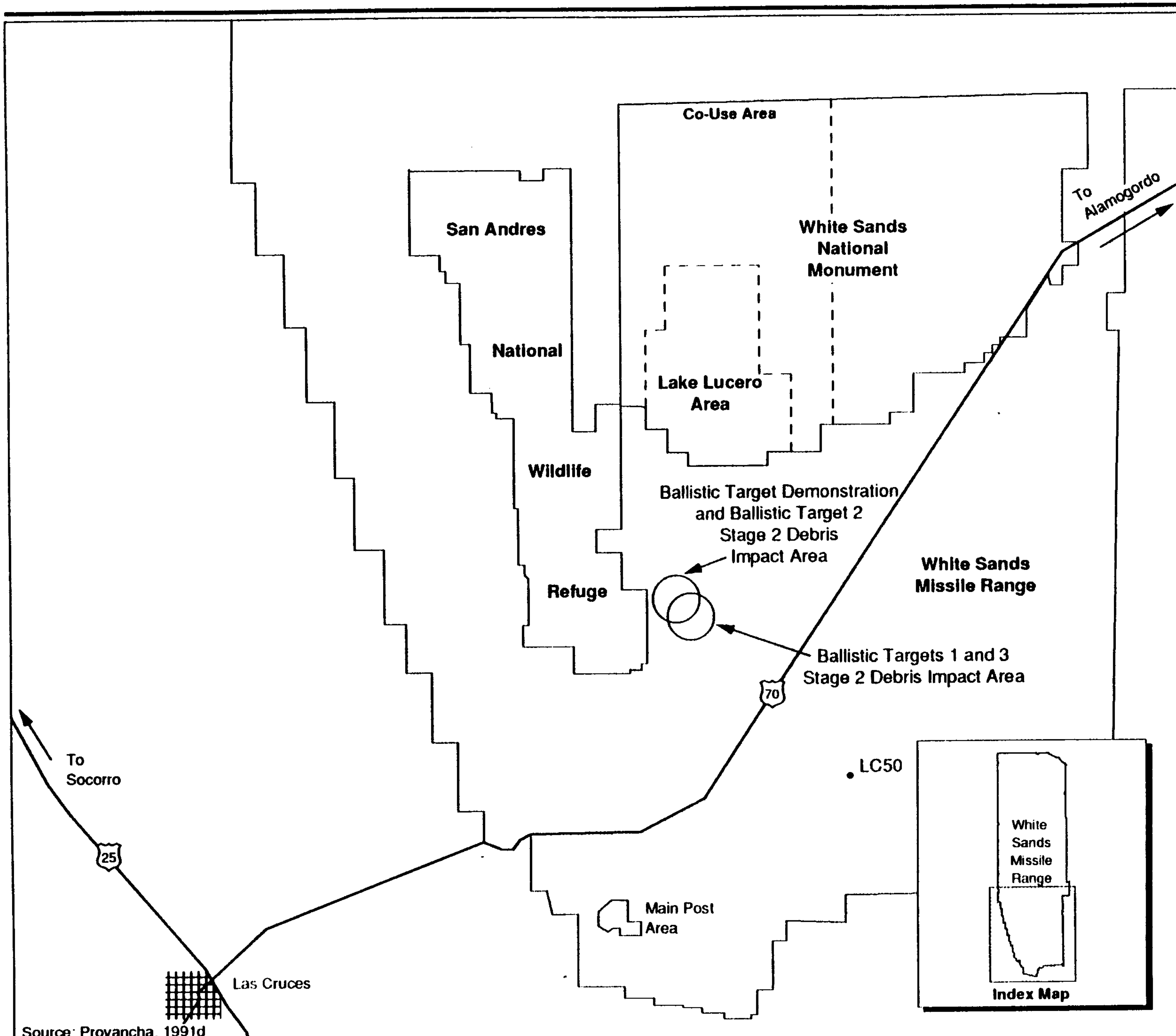


Figure 1-30a



ERINT/051-3

ERINT Target System, Stage 2 Debris Impact Areas

White Sands Missile Range, New Mexico

Figure 1-30b

launch site blockhouse during the launch and the flight would be controlled by WSMR Range Control from Building 300 in the Post Area (see Figure 1-27a) (Nuwayhid and Schaffer, 1990). Debris impact areas for the MQM-107 will be determined after all details of these flight tests have been specified; however, it is planned that any trajectory affecting the White Sands National Monument and the San Andres National Wildlife Refuge will be avoided. Further documentation of these activities will be provided in an addendum to this EA, prior to this portion of the action proceeding, verifying no significant impacts.

ERINT Maneuvering Tactical Missile Target System. The PERSHING II re-entry vehicle would be launched from the Sulf Site. Flight support activities for the maneuvering tactical missile target system would be essentially the same as those for the ballistic tactical target missile system described above. Maneuvering target tests would include the TMDSCE for flight tests nine, ten, and eleven. TMDSCE flight tests would involve incorporating 20 to 30 individual canisters of unthickened chemical simulant into the target for each flight. Radio transmitters would be attached to each canister to relay information on the quantity of canisters opened during flight termination or intercept. A photonic hit indicator attached to the target would provide data on the location of intercept for flights ten and eleven. Debris impact areas for the maneuvering target will be determined after a flight trajectory has been selected; however, it is planned that any trajectory affecting the White Sands National Monument and the San Andres National Wildlife Refuge will be avoided. Further documentation of these activities will be provided in an addendum to this EA, prior to this portion of the action proceeding, verifying no significant impacts. (Kaman Sciences Corporation, 1989; Strietzel, 1991c)

Simulant Dissemination. Proposed activities at WSMR would consist of seven flight tests in which the chemical simulant would be contained within the target bulkhead. Flight tests one, four, five, and six would involve dissemination of the TMDBCE simulant; flights nine, ten, and eleven would be conducted with the TMDSCE simulant.

A Tennessee Valley Authority laboratory in Alabama has conducted studies on the degradation and retention of TEP in WSMR soil samples, and on the toxicity of TEP to plants. The species tested were sorghum sudangrass, tomato, and glossy privet. These tests were being conducted to confirm that use of the chemical simulant, as proposed for ERINT activities, will not have a significant effect on the environment. Results of these laboratory and greenhouse studies have verified that no effect would occur at concentrations up to 400 mg/m^2.

TMDBCE Activities. Intercept or flight termination of the ballistic tactical target missile would cause dissemination of the non-hazardous chemical simulant in a cloud that would disperse and slowly settle, and may result in deposition of simulant on the ground. Modeling to predict the simulant footprint location and ground-level concentrations would be conducted using the ATM NUSSE3 computer model (Strietzel, 1990). The ATM NUSSE3 model simulates an aerosol cloud as it evaporates, diffuses, and travels from a given initial altitude to the ground. Modeling runs can be conducted for various meteorological conditions (e.g., wind speed and direction, and air temperature). Modeling is based on conditions that would result in maximum ground-level concentrations of simulant. It is anticipated that test trials would result in lower ground-level concentrations than those predicted, as a result of expected smaller post-impact droplet sizes (the modeling uses a conservatively large initial droplet size).

It is likely that, because of the high intercept altitude of the tests and the physical characteristics of the chemical simulant, no measurable levels of the simulant will reach the ground (most of the simulant would likely evaporate before deposition). However, at no time will TMDBCE activities be performed under meteorological conditions for which modeling predicts ground deposition of measurable concentrations (greater than approximately 1 milligram [mg]/meter^2[m^2]) of the chemical simulant off range or on sensitive land use areas, such as public access areas (e.g., White Sands National Monument) and wildlife areas (e.g., San Andres National Wildlife Refuge).

Characterization of the cloud of disseminated chemical simulant would include measurements of the cloud spread rate, concentration, and droplet size distribution by remote tracking and, possibly, by direct sampling. Remote cloud characterization would be investigated using a portable lidar to detect atmospheric aerosol droplets. Remote cloud characterization could also be performed using a Fraunhofer Line Discriminator (FLD) camera system, which can measure the fluorescence in the Fraunhofer Lines (i.e., absorption lines in the visible spectrum) produced by the fluorescent dye in the chemical simulant. The remote detection system(s) would scan the cloud to measure its fall rate and also to provide an estimate of its concentration. Droplet size for the leading edge of the cloud would be calculated from the fall rate. Direct sampling of the cloud may also be done using an aircraft. (Strietzel, 1990)

Characterization of any ground deposition produced by the settling of the chemical simulant cloud would consist of measuring the footprint's location, dimensions, and concentration. The FLD camera system, attached to a helicopter flown over the ground footprint area, would be used to measure the dimensions and concentration patterns of the recently settled simulant. The camera-equipped helicopter would be an existing aircraft based at WSMR. All flights would follow WSMR standard flight procedures.

Cloud and ground footprint characterization activities are discussed in more detail in the Theater Missile Defense Bulk Chemical Experiment Environment Assessment (U.S. Army Strategic Defense Command, 1991b).

The lidar that would be used for TMDBCE activities at WSMR is a CO_2 doppler lidar which has long-range capability. This lidar is eyesafe and would be used during any aircraft simulant cloud sampling operations (Strietzel, 1991a). Airspace at WSMR is restricted and controlled by WSMR; therefore, no aircraft should be in the vicinity during TMDBCE testing except those that may be required for simulant sampling.

TMDSCE Activities. Flight tests (specifically, nine, ten, and eleven) involving the maneuvering tactical missile target system would incorporate the TMDSCE simulant. Twenty to thirty containers of unthickened TEP would be carried aboard in the target for each of these flights. During the demonstration flight (test nine), these steel containers are not expected to break open. In flight tests ten and eleven, intercept of the maneuvering target by the ERINT-1 missile would cause most, if not all, of the containers to break open, and allow the release of the simulant. A photonic hit indicator would be imbedded in the target's surface for TMDSCE activities. The photonic hit indicator uses a grid of optical fibers to provide information on the location and damage size of an impact on the target. Radio transmitters attached to each canister would relay information on the number of submunition containers opened by intercept or flight termination. Because a smaller quantity of simulant would be disseminated than in TMDBCE activities, and because the unthickened TEP evaporates more rapidly than thickened TEP, no simulant cloud would be produced during TMDSCE activities; therefore, a lidar would not be required for TMDSCE activities.

Cameras and other portable instrumentation would be used for data collection during all TMDCFE tests at WSMR. These activities would not take place in a sensitive area, and would be coordinated with the WSMR Range Safety Office. These activities would require no more than 10 existing personnel. No excavation or facility construction would be required for these or any other TMDCFE test activities at WSMR.

1.4 ALTERNATIVES CONSIDERED, INCLUDING THE NO-ACTION ALTERNATIVE

WSMR was selected as the location for the proposed ERINT flight test program for two reasons. First, by utilizing a national test range within the bounds of the Continental United States (CONUS), costs can be significantly reduced. Second, WSMR is the only national test range within the CONUS that possesses adequate range space to perform the ERINT flight tests.

Other missile launch locations (i.e., Vandenberg AFB and Cape Canaveral Air Force Station) are unsuitable because flight tests would take place over water. Testing over land is required in order to characterize TMDCFE results and allow recovery of any missile debris for analysis. The U.S. Army Dugway Proving Ground, Utah, which provides chemical testing support for the DOD, is not a suitable location for the proposed ERINT activities because there are no existing missile launch or radar tracking facilities.

Contractor locations (i.e., LTV Missiles and Electronics Group, Aerotherm, Atlantic Research Corporation, Orbital Sciences Corporation, Rockwell International, and L.A. Gauge) were selected as a result of the competitive procurement process, and because these facilities are routinely used for similar fabrication, assembly, and test activities. Battelle was selected for the same reasons, and because of their current contract and ongoing support to U.S. Army Strategic Defense Command programs involving chemical test studies.

Hill AFB and Pueblo Depot Activity were selected as locations for target rocket motor refurbishment and inspection to take advantage of their ongoing programs, and because their facilities are routinely used for these types of activities. Holloman AFB was selected because it is the only installation within the CONUS with the capability of conducting rocket sled tests at the required velocity (Edwards, 1991). No other alternative locations were considered feasible for the proposed action because it was desired to maximize use of existing facilities in order to minimize cost and avoid the potential environmental impacts and time required for completion of new construction.

LC50 was selected from the available launch facilities at WSMR because it has the best existing equipment suitable for the ERINT-1 launches. The blockhouse at LC50 is the only one at WSMR certified to withstand potential impacts (e.g., launch failure, target vehicle flight failure debris, and low beta intercept debris) associated with ERINT-1 launch activities (LTV Missiles and Electronics Group, 1991e). Use of any other launch complex at WSMR could require new construction, presenting the potential for more significant environmental impacts and additional costs than use of LC50 would present. The Sulf Site is the best available launch facility, with sufficient distance from LC50, for ETS purposes. Target (other than MQM-107) launches from other locations would require more extensive site modifications and could present the potential for more significant environmental impacts, as well as increased costs than the use of the Sulf Site would present.

The application of high-strength, low mass beryllium metals in the ERINT-1 missile design is necessary for the development of a lightweight, high-performance missile. Aluminum, magnesium, stainless steel, and beryllium were considered for use in the radar seeker components. Throughout the radar seeker design process these metals were considered for different components based on the ERINT-1 performance requirements. These requirements included weight, size, thermal characteristics, and structural properties (i.e., strength). Magnesium could not be used for several components because it was too heavy and did not have the thermal characteristics required. Aluminum did not have the stiffness required for one of the components, and magnesium and stainless steel were too heavy. Although there are components within the radar seeker made with aluminum, stainless steel, and magnesium, eight components required the use of beryllium because it met the weight, size, thermal, and strength characteristics necessary for ERINT-1 performance standards which none of the other metals could meet. (Kemp, 1991)

Because they have viscoelastic properties and burn characteristics that are similar to actual toxic chemical agents, the following compounds were considered for use as the TMDCFE simulant:

dimethyl methyl phosphonate
diisopropyl methyl phosphonate
diethyl ethyl phosphonate
diethyl phosphonate
dipropyl phosphonate
ethyl isopropyl phosphonate
methyl isopropyl phosphonate
tributyl phosphate
triethyl phosphate
triisopropyl phosphite
tripropyl phosphate.

The list was narrowed to triisopropyl phosphite (TIP) and TEP because they were the only compounds available commercially in the quantities needed for TMDCFE testing, and limited toxicology data were available for the other nine simulants. A literature survey conducted for all 11 compounds revealed data for only five: dimethyl methyl phosphonate, diisopropyl methyl phosphonate, tributyl phosphate, TEP, and TIP. MSDSs were not available for the remaining six compounds because they are not available commercially. In tests in which dimethyl methyl phosphonate was administered orally, the LD_{50} was 8,210 mg/kg (0.132 ounce/pound) for rats. When diisopropyl methyl phosphonate was administered orally to rats, the LD_{50} was 826 mg/kg (0.013 ounce/pound). Dimethyl methyl phosphonate is a tumorigen and a mutagen; diisopropyl methyl phosphonate is a mutagen. The LD_{50} for tributyl phosphate was 3,000 mg/kg (0.048 ounce/pound), when administered orally to rats. Based upon the limited toxicological data for the three compounds described above, potential toxicity associated with them appear to be similar to TEP. However, because they were not available commercially at the quantities needed for TMDCFE testing, they were not considered viable simulant alternatives.

Comparison of toxicological data for TIP and TEP demonstrated that TIP is considerably more toxic to rats than TEP. Tests in which TIP was administered orally to rats resulted in an LD_{50} of 167 mg/kg (0.003 ounce/pound), as compared to an LD_{50} of 1,600 mg/kg for TEP (see Section 1.3.1.1). TEP was determined to be generally less environmentally sensitive based on the data described above. In addition, TEP proved more suitable because its physical properties (e.g., vapor pressure, density, viscosity, and oxygen index) more closely resemble those of highly toxic chemical agents; it poses less of an environmental concern relative to TIP; and it is commercially available in large quantities at relatively inexpensive cost. (Aldrich Chemical Company, 1988; Alexander, 1990a; Alexander, 1991b; National Institute of Occupational Safety and Health, 1991; U.S. Department of Health Services, 1981-82).

Studies have been conducted by the Tennessee Valley Authority in Alabama to determine the effect of TEP on soils and vegetation. They include studies of TEP hydrolysis, greenhouse studies on TEP toxicity to plants, effects of TEP on soil chemistry and microbial activity, and the retention and degradation of TEP in soils from WSMR (Sikora et al., 1991). Results of these laboratory and greenhouse studies have verified that no effect would occur at concentrations up to 400 mg/m^2.

An alternative to the proposed action is to conduct the ERINT flight tests without including TMDCFE activities. Under this scenario, ERINT flight tests without chemical simulant payloads on the ETS would be conducted at WSMR as described in the proposed action. No simulant disseminations would occur and there would be no simulant detection and data collection activities. The ERINT program would, therefore, require no chemical simulant, thus excluding Battelle from the ERINT program activities. The 10 personnel required for TMDCFE activities at WSMR would not be needed.

The implication of not including TMDCFE activities as part of the ERINT flight tests is that there would be no TMD demonstration of the lethality of theater missile defense interception against chemical weapons.

The no-action alternative for the ERINT program would be to continue with current SDIO program activities. The development and flight testing of the ERINT-1 and ETS target system missiles would not occur. The implication of not conducting the proposed ERINT activities is that preprototype missile and launch control system technology for TMD applications would not be developed. The overall objective of the ERINT program, which supports the overall SDIO program and national policy goals, would not be met. Therefore, this alternative is not acceptable, and is not considered in detail in this EA.

2.0 Affected Environment

2.0 AFFECTED ENVIRONMENT

This section describes the affected environment (i.e., the environmental characteristics that may be changed by the proposed action) at the proposed ERINT program installations. The affected environment is succinctly described in order to provide a context for understanding the potential impacts. Those components of the affected environment that are of greater concern relevant to the potential impacts are described in greater detail.

Available literature (such as EAs, environmental impact statements [EISs], and base master plans) was acquired and data gaps (i.e., questions that could not be answered from the literature) were identified. To fill the data gaps and to verify and update available information, installation personnel and federal, state, and local regulatory agencies were contacted. A bibliography of the reviewed literature, telephone interviews, and other appropriate references is presented in Section 7.0.

Because of the extent of test activities involved, site visits to LTV Missiles and Electronics Group, Rockwell International, L.A. Gauge, Holloman AFB, ARC facilities in Virginia and Arkansas, Hill AFB, Orbital Sciences Corporation, Aerotherm, Pueblo Depot Activity, and WSMR were conducted to review existing facilities proposed for test uses and to collect baseline data.

2.1 ENVIRONMENTAL COMPONENTS

Eleven broad environmental components were considered to provide a context for understanding the potential effects of the proposed action and to provide a basis for assessing the significance of potential impacts. The data presented are commensurate with the importance of the potential impacts, with attention focused on the key issues. Several of these environmental components are regulated by federal (see Appendix C) and/or state environmental statutes, many of which set specific guidelines, regulations, and standards. These federal- and/or state-mandated standards provide a benchmark that assists in determining the significance of environmental impacts under the NEPA evaluation process. The status of compliance of each project area/installation with respect to environmental requirements was included in the information collected on the affected environment. The eleven areas of environmental consideration are: air quality, biological resources, cultural resources, hazardous materials and waste, health and safety, infrastructure, land use, noise, physical resources, socioeconomics, and water resources, and are discussed briefly below.

Air Quality - Air quality at all facilities was reviewed, with particular attention paid to background ambient air quality compared to the primary National Ambient Air Quality Standards (NAAQS). In addition, information was obtained on whether the installation was located in an attainment or nonattainment area. Each installation's compliance with air emissions permits for the ERINT program was ascertained by contacting the appropriate regulatory agencies. Compliance with air emissions permits indicates that a facility is not in violation of Clean Air Act requirements (see Appendix C).

Biological Resources - Existing information on plant and animal species and habitat types in the vicinity of each site was reviewed, with particular attention paid to the presence of any protected species and federal- or state-listed threatened or endangered species. Limited field surveys were conducted at the Sulf and LC50 sites.

Cultural Resources - Cultural resources or potential presence of resources eligible for the National Register of Historic Places (NRHP) were reviewed from existing documentation with particular attention paid to properties known to be eligible for or listed on the NRHP.

Hazardous Materials/Waste - Existing hazardous materials/waste management practices and records of compliance were reviewed to determine the installation's capability to handle any additional materials/waste and any potential problems with use, handling, storage, treatment, or disposal. The RCRA permit status at all installations was obtained, and compliance with permit requirements was investigated for LTV, ARC, Holloman AFB, Hill AFB, Pueblo Depot Activity, and WSMR.

Health and Safety - Existing environmental documents were reviewed and installation and regulatory agency personnel were contacted to determine if public and occupational health and safety concerns are an issue at any of the installations. Safety regulations with regard to hazardous materials or ordnance storage, handling, and disposal were also reviewed.

Infrastructure - The capacity and current demands of the following infrastructure elements (i.e., electricity, solid waste, sewage treatment, water supply, and transportation) at all installations were examined to determine if there were any infrastructure constraints to conducting the proposed activities.

Land Use - Base master plans, environmental management plans, and other documentation were reviewed to determine if there are any known conflicts between existing and future facilities and land uses, and proposed test activities.

Noise - Existing environmental documents for WSMR were reviewed and installation and regulatory agency personnel contacted for all test locations to determine if noise concerns are an issue.

Physical Resources - Existing information on topographic, geologic, and soil resources was reviewed at WSMR to determine if there are any physical resources concerns. Physical resource information on the other proposed ERINT facilities was not reviewed because no construction at these locations is required.

Socioeconomics - Area population and existing installation personnel numbers were compared to the personnel requirements for ERINT activities at each location. Because the proposed ERINT activities would not require an increase in personnel at any of the test locations, except for 30 temporary contractor personnel at WSMR, 7 temporary LTV personnel at Holloman AFB, and 3 temporary duty Air Force personnel at Pueblo Depot Activity, there should be no potential consequences of increased population, expenditures, or employment. Therefore, key socioeconomic indicators (housing, employment, and income data) for the supporting regions were not examined.

Water Resources - Existing information on ground and surface water quality and supply was reviewed to determine if there are any water resource concerns at any of the installations. Each installation's record of wastewater discharge permits and compliance was also examined.

The following sections present a brief description of each location where ERINT activities are proposed, followed by a description of the potentially affected environment.

2.2 TEST SITE DESCRIPTIONS

2.2.1 LTV Missiles and Electronics Group, Texas

LTV Missiles and Electronics Group is a commercial/industrial operation with two locations in Grand Prairie, Texas, approximately 32 kilometers (20 miles) southwest of Dallas. Approximately 9,000 people are employed at the two facilities, of whom about 140 would be involved in ERINT activities (LTV Missiles and Electronics Group, 1991c). ERINT activities would take place in existing facilities that would require no construction or significant modification.

LTV complies with federal standards for water quality and air quality, although it is located within a nonattainment area for ozone (Baig, 1990; Cummings, 1990). There are no known historic or archaeological sites at the facility and no federal- or state-listed threatened or endangered species are known to frequent the area (LTV Missiles and Electronics Group, 1991c). Facility infrastructure is supported by adjacent communities and demand is within capacity. There are no known noise issues at the LTV facilities (LTV Missiles and Electronics Group, 1991d). The population of Grand Prairie is approximately 100,000 (Cook, 1990).

Although the proposed flight test missile development activities would be routine activities at LTV, the use of small quantities of solvents and photo-etching fluids and solid propellants presents potential hazardous materials/waste impacts, and the use of explosive materials presents potential health and safety impacts. Both of these potentially affected environmental components are discussed in more detail below.

Hazardous Materials/Waste - All hazardous materials are stored and handled in compliance with procedures described in MSDSs and safety measures required by DOD and DOT, as referenced in Section 1.3.1.1. LTV has submitted an application for an RCRA permit for storage of hazardous waste at the Jefferson Street facility (Barrett, 1991). Both the Jefferson Street and Marshall Drive facilities have EPA permits for the disposal of small quantities of hazardous wastes.

Health and Safety - No significant health and safety issues have been identified at LTV. All hazardous materials are stored and handled in compliance with procedures described in MSDSs and safety measures required by DOD and DOT, as referenced in Section 1.3.1.1. A Standard Operating Procedure, *General Procedures for Ordnance Testing* (LTV Missiles and Electronic Group, 1988a), is followed in Building 191 at the Jefferson Street facility for the handling of explosive materials.

2.2.2 Rockwell International, California

Rockwell International is a commercial/industrial operation located in Anaheim, California, approximately 36 kilometers (58 miles) southeast of downtown Los Angeles. Approximately 8,500 people are employed at the facility, of whom about 40 would be involved in ERINT activities. ERINT activities would take place in existing facilities that would require no construction or modifications. (Rockwell International, 1991)

There are no known historic or archaeological sites at the facility and no federal- or state-listed threatened or endangered species are known to frequent the area (Rockwell International, 1991). Facility infrastructure is supported by adjacent communities and demand is within capacity. There are no known noise issues, or physical or water resource concerns at the facility (Rockwell International, 1991). The population of Anaheim is approximately 266,000 (Schiefen, 1991).

Although the proposed beryllium missile component development activities would be routine activities at Rockwell International, the use of beryllium in the fabrication of missile components presents potential air quality, hazardous materials/waste, and health and safety impacts. These potentially affected environmental components are discussed in more detail below.

Air Quality – Rockwell International is located in an area of nonattainment for ozone, nitrogen dioxide, carbon monoxide, and particulates (Molina, 1991).

The facility has three air emissions permits issued by the South Coast Air Quality Management District (SCAQMD). Each permit covers several pieces of equipment, including grinders, lathes, mills, and exhaust systems used for beryllium component fabrication activities. During the beryllium component fabrication process, vacuum collection systems are used for each individual piece of equipment, all ducted together to a common two-stage control device consisting of a cyclone to remove larger particulates, followed by high efficiency particulate filters capable of removing 99.97 percent of the remaining particles. Rockwell International is currently in compliance with permit requirements (Quizon, 1991). Although Freon is used at the facility, it would not be needed for ERINT activities. (Rockwell International, 1991)

Hazardous Materials/Waste – Rockwell International has an EPA permit for the generation of hazardous wastes. In addition to the use of beryllium, typical solvents and coolants are used for fabrication activities. Large pieces of beryllium remaining after the fabrication process are sold for reclamation, as part of the Surplus Redemption Program. Rockwell International has implemented hazardous waste handling and labeling procedures required by the RCRA, under 40 CFR 260-65 and 49 CFR 172, in the *Autonetics Operating Manual Procedure, Autonetics Electronics Systems, Hazardous Waste* (Rockwell International, 1989).

Health and Safety – All personnel involved with beryllium component fabrication activities are required to attend beryllium training courses and have physical examinations on an annual basis. Within beryllium machining areas, personnel wear protective clothing and safety glasses. Safety procedures recommended on the MSDS for beryllium are followed, and Rockwell International has implemented safety procedure manuals specifically for the handling of beryllium. These procedures are described in *Operating Procedure - Anaheim Autonetics Electronic Systems; Beryllium Materials, Acquisition, and Control* (Rockwell International, 1988), and *Safety and Environmental Health Requirements for the Machining and Handling of Beryllium Metal, Alloys, and Compounds* (Rockwell International, 1982).

2.2.3 L.A. Gauge, California

L.A. Gauge is an industrial operation located in Sun Valley, California, approximately 20 kilometers (32 miles) north of downtown Los Angeles. Approximately 56 people are employed at the facility, of whom 10 to 15 would be involved in ERINT activities (L.A. Gauge, 1991). ERINT activities would take place in existing facilities that would require no construction or modifications.

There are no known historic or archaeological sites at the facility and no federal- or state-listed threatened or endangered species are known to frequent the area (L.A. Gauge, 1991). Facility infrastructure is supported by adjacent communities and demand is within capacity. There are no known noise issues at the facility (L.A. Gauge, 1991). No physical resource concerns have been identified. The population of Sun Valley is approximately 70,000 (Hughes, 1991).

The L.A. Gauge facility is located within a CERCLA National Priorities Listing (NPL) (Superfund) site which includes the Hollywood-Burbank Airport and Lockheed. Soil contamination, caused by a leaking clarifier, extends to approximately 24 meters (80 feet) beneath the facility; groundwater level is at approximately 72 meters (235 feet). The soil is separated from groundwater by a clay barrier at 34 meters (110 feet) below the surface. L.A. Gauge will begin remediation efforts (i.e., vapor extraction) in the fall of 1991. This process is being monitored by the U.S. EPA Region 9 and the California Water Quality Control Board. The facility meets federal drinking water standards and there are no supply constraints.

Although the proposed beryllium missile component development activities would be routine activities at L.A. Gauge, the use of beryllium in the fabrication of missile components presents potential air quality, hazardous materials/waste, and health and safety impacts. These potentially affected environmental components are discussed in more detail below.

Air Quality – L. A. Gauge is located in a nonattainment area for ozone, nitrogen dioxide, carbon monoxide, and particulates. L.A. Gauge has been issued a temporary permit to operate its beryllium machining equipment through the SCAQMD, and is currently in compliance with permit requirements (Quizon, 1991). Air monitoring is conducted on a monthly basis through a private contractor. During the beryllium component fabrication process, vacuum collection systems, as described above for Rockwell International, are used. Although Freon is used at the facility, ERINT activities do not require its use. L.A. Gauge follows the specifications provided by each client for the use of any solvents and hazardous materials (L.A. Gauge, 1991).

Hazardous Materials/Waste – L.A. Gauge has an EPA permit for the generation of hazardous wastes. Large pieces of beryllium remaining after the fabrication process are sold for reclamation. Smaller pieces are disposed of through the vacuum collection system (L.A. Gauge, 1991).

Health and Safety – All personnel working with beryllium must attend a beryllium training course and have physical examinations on an annual basis. A Hazard Communication Program has been implemented by the facility, and a safety procedures manual is currently being developed (L.A. Gauge, 1991).

2.2.4 Holloman Air Force Base, New Mexico

Holloman AFB is approximately 10 kilometers (6 miles) west of Alamogordo in Otero County, New Mexico. Alamogordo has a population of approximately 31,900 and the surrounding county has a total population of approximately 50,800 (Shore, 1990). The installation supports a work force of approximately 6,500 (Schotter, 1991).

The 20,639-hectare (50,999-acre) installation is a tactical air command base. Facilities include the Air Force Geophysics Laboratory and a High Speed Test Track. Major base organizations include the 6585th Test Group, whose mission is to test and evaluate aircraft and missile systems, and the 833rd Air Division which consists of the 49th Tactical Fighter Wing and the 479th Tactical Training Group (Holloman Air Force Base, 1991).

The High Speed Test Track, which would be used for ERINT flight test development activities, is located approximately 24 kilometers (15 miles) west of Alamogordo, along the eastern edge of WSMR, and is oriented north-south (Figure 1-8). To the north, south, and west are uninhabited areas which extend up to 80 kilometers (50 miles) from the track.

Holloman AFB land use is in accordance with the base master plan and there are no known conflicts between the base and off-base land uses. Installation infrastructure is generally adequate, however, a problem exists with water flow to the test track area. This has not been identified as a constraint to test track activities, and ERINT sled test activities would not involve the use of large quantities of water. The aquifer underlying the base is not potable. Base water is supplied by off-base wells and a reservoir. Wetland areas exist that have been created by sewage lagoons and seasonal overflows, but they have not been delineated using the methods described in the Federal Manual for Identifying and Delineating Jurisdictional Wetlands. There are several candidate sites for the NRHP, and four cultural sites have been identified near the north end of the sled test track. No physical resource concerns have been identified on the installation. (Federal Interagency Committee for Wetland Delineation, 1989; Holloman Air Force Base, 1991)

Although the proposed rocket sled test activities would be routine activities at Holloman AFB, the rocket exhaust products present potential air quality impacts, the use of propellants presents potential hazardous materials/waste and health and safety impacts, and sled test operations present potential biological resource and noise impacts. These potentially affected environmental components are discussed in more detail below.

Air Quality – Holloman AFB is located in an area of attainment for all NAAQS. Air quality monitoring is conducted at a station in Alamogordo by the New Mexico ED. The base currently has one air permit for a tank farm, and is in compliance with permit requirements (Shively, 1991a). There are no PSD I areas in the region (Moore, 1991). No air emission permits are required for mobile emission sources, including sled test activities (Holloman Air Force Base, 1991; Schotter, 1991; Shively, 1991b).

Biological Resources – The federally listed endangered American peregrine falcon (*Falco peregrinus anatum*) hunts on the base, but nests in cliffs off base. The bald eagle (*Haliaeetus leucocephalus*) is also known to occur in the area (U.S. Fish and Wildlife Service, 1990). The state-listed White Sands pupfish (*Cyprinodon tularosa*) has one habitat on the installation. (Holloman Air Force Base, 1991)

Hazardous Materials/Waste – Holloman AFB has an RCRA Part B permit for treatment, storage, and disposal on site of government-owned wastes, and is currently in compliance with this permit. There are two thermal treatment units for the on-site disposal of small quantities of ordnance and one RCRA facility. There are approximately 51 identified Installation Restoration Program (IRP) sites;

remediation efforts are overseen by the New Mexico ED and the EPA (Holloman Air Force Base, 1991; Schotter, 1991; Swanton, 1991).

Health and Safety – Health and safety issues related to the High Speed Test Track involve the handling and storage of explosives and pyrotechnic devices. All personnel directly involved with the set-up and conduct of the sled tests are certified in accordance with the requirements set forth in the 6585th Test Group's Division Operating Instructions and Track Branch Operating Instructions which implement the requirements of AFR 127-100 (Holloman Air Force Base, 1991; LTV Missiles and Electronics Group, 1991a).

Noise – Holloman AFB is predominantly surrounded by vacant desert land. Noise levels are consistent with base operations and were addressed in the 1976 Air Installation Compatible Use Zone study (revised in 1988). The primary noise generators at the base are flight and ground run-up operations from aircraft and rocket sled tests.

2.2.5 Atlantic Research Corporation, Virginia and Arkansas

ARC is a commercial/industrial rocket motor design, fabrication, and assembly operation with three locations that would be used for ERINT activities. Two of the facilities are located in Virginia, one in Gainesville and the other in Orange County, and one facility is located in Camden, Arkansas. The three ARC facilities are described below.

Gainesville, Virginia. ARC's Gainesville, Virginia facility encompasses approximately 170 hectares (415 acres) in Prince William County, 56 kilometers (35 miles) southwest of Washington, DC. The population of Prince William County is approximately 240,000 (Prince William County - Greater Manassas Chamber of Commerce, 1989). Approximately 900 people are employed at this ARC location, about 15 of whom would be involved in ERINT activities (Atlantic Research Corporation, 1991b).

ARC's Gainesville facility is governed by the Virginia Air Pollution Control Board and is located in an area that is currently in nonattainment for ozone. Hydrocarbon emissions are generated by paint spray booths (Holden, 1991a). All air emission sources at this facility are grandfathered (the activities were occurring before laws were enacted regulating their use, and these sources are exempt from permit requirements). The only air emission permit at this location is for the Beryllium Rocket Test Facility, which would not be used for ERINT activities. ARC submits an emissions inventory to the Air Pollution Control Board with changes and additions annually. Air quality permit exists for the test firing facility (Khalilzadeh, 1990). Infrastructure at the ARC Gainesville location is more than adequate with no constraints. Electricity is provided by the Northern Virginia Electric Cooperative and the sewage system is operated by Prince William County. ARC has an industrial user's permit to discharge its wastes to the Upper Occoquan Sewage Authority and a wastewater permit is in place (Bennett, 1990). ARC's Gainesville facility has a self-imposed 79 decibel (dB) noise limit 30 meters (100 feet) from their property line; levels cannot exceed 80 dB at the property line as imposed by a Prince William County ordinance.

Water is supplied by a redundant plant well system which will be connected to public water service sometime during 1991. Both shallow and deep groundwater (contained within the area beneath the facility) is contaminated with volatile organic compounds and heavy metals (e.g., Tetra-chloroethylene;

1,1-Dichloroethylene; TCA; zinc; and lead), but a groundwater remediation/monitoring program approved by the EPA is in force, and drinking water currently contains contaminants at non-detectable or acceptable levels (Atlantic Research Corporation, 1991a,b; Haynes, 1990).

No federally listed endangered or threatened species occur at the Gainesville facility, however the Virginia state listed American vetch (*Vicia americana*) is a very rare plant species which thrives on the site. Wetland areas associated with ponds, seep/springs, and streams have been identified at this facility. Although the Manassas National Battlefield Park is located only 6 kilometers (4 miles) to the northeast, there are no cultural resources known to exist at the Gainesville facility. No physical resource concerns have been identified.

Although the proposed rocket motor development activities would be routine activities at the ARC Gainesville facility, the use of small quantities of paints, solvents, and propellants presents potential hazardous materials/waste impacts, and the use of propellants presents potential health and safety impacts. Both of these potentially affected environmental components are discussed in more detail below.

Hazardous Materials/Waste - The Gainesville facility currently has an RCRA Part A permit to operate under interim status for the open burning of waste explosives and waste rocket propellants; a RCRA Part B permit application has been submitted. This location also operates under a Prince William County Special Use Permit for storage, handling, and use of hazardous materials, including propellants. (Atlantic Research Corporation, 1991b)

Health and Safety - Guidelines for safety procedures at ARC's Gainesville location are provided by DOD 4145.26M and by the Virginia OSHA. All personnel in facilities where explosives are handled must wear eye protection, flame resistant clothing, and non-sparking safety shoes and/or leg stats. Facilities where explosives are handled have run-through escape panels and there is an on-site volunteer fire department located in Building 36. In response to a request from the Upper Occoquan Sewage Authority, a Spill Prevention Control and Countermeasure Plan has been developed. (Atlantic Research Corporation, 1991a,b)

Orange County, Virginia. ARC's Orange County, Virginia facility encompasses approximately 990 hectares (2,450 acres), about 24 kilometers (15 miles) south of Culpeper and 105 kilometers (65 miles) southwest of Washington, DC. The population of Orange County is approximately 21,400 (Witherspoon, 1991). Approximately 45 people are employed at this location, about 10 of whom would be involved in ERINT activities (Atlantic Research Corporation, 1991b).

Infrastructure at ARC's 2-year-old Orange County facility is adequate with no constraints. The former Virginia Route 602, a dirt road now closed to the public, crosses the facility near the test bay (Dunwell, 1991; Holden, 1991b). This road has been replaced by the new, paved Virginia Route 602, which is located beyond the ESQD for the test bay (Atlantic Research Corporation, 1991b). Electricity is provided by the Northern Virginia Electric Cooperative and the facility uses a septic tank system. Wastewater is held in tanks and shipped to an off-site licensed wastewater treatment facility. Water is supplied by a redundant plant well system which will be connected to public water service sometime during 1991 and there are no constraints on quantity or quality.

There are no known federal- or state-listed threatened or endangered species at the Orange County facility. Civil War campsites are located at this location; however, there is an informal agreement with the Orange County Historical Society to not disturb the sites. No physical resource concerns have been identified.

Although the proposed rocket motor development and static test activities would be routine activities at the ARC Orange County facility, static rocket motor tests present potential air quality impacts. The use of small quantities of solvents, paints, and propellants presents potential hazardous materials/waste impacts, the use of explosive materials presents potential health and safety impacts, and static rocket motor testing presents potential noise impacts. These potentially affected environmental components are discussed in more detail below.

Air Quality - ARC's Orange County facility is governed by the Virginia Air Pollution Control Board and is located in an area that is currently in attainment for all NAAQS (McCoy, 1991). This location has a permit for open burning of waste rocket propellants and is in the process of registering other sources with the Virginia Department of Air Pollution Control (Atlantic Research Corporation, 1991a,b). Air permits for rocket motor tests and/or portable generators are not needed for mobile emission sources (McCoy, 1991).

Hazardous Materials/Waste - ARC's Orange County location has an EPA Research, Development, and Demonstration permit to conduct open burning of waste propellants on site. The permit requires monitoring of air, soil, surface water, and groundwater after each burn to measure pollutant levels. (Atlantic Research Corporation, 1991b; Humphreys, 1991)

Health and Safety - As at the Gainesville facility, guidelines for safety procedures at the Orange County facility are provided by DOD 4145.26M and by the Virginia OSHA. All personnel in facilities where explosives are handled must wear eye protection, flame resistant clothing, and non-sparking safety shoes and/or leg stats. (Atlantic Research Corporation, 1991a,b)

Noise - ARC's Orange County facility cannot exceed 80 db at the installation boundary, set by the requirements of its Orange County Special Use Permit. The distance from the property line to the Orange County test firing bay is approximately 730 meters (2,400 feet). There have been no complaints about noise levels from the public; therefore, noise monitoring has not been conducted. (Atlantic Research Corporation, 1991a,b; Blankenship, 1991)

Camden, Arkansas. ARC's Camden, Arkansas facility encompasses approximately 405 hectares (1,000 acres) in the Highland Industrial Park in Calhoun County, about 8 kilometers (5 miles) east of East Camden and 161 kilometers (100 miles) south of Little Rock. The population of East Camden is approximately 780 (Phillips, 1991), and the population of Calhoun County is approximately 5,800 (Gurnsey, 1991). Approximately 530 people are employed at this location, about 10 of whom would be involved in ERINT activities (Atlantic Research Corporation, 1991c). ERINT activities would take place in existing facilities that would require no construction or modification.

Infrastructure at the Camden facility is adequate with no constraints. Electricity is provided by the Ouachita Electric Cooperative with no constraints. Water and sewer services are provided by the Shumaker Public Service Corporation. (Atlantic Research Corporation, 1991c)

There are no known federal- or state-listed threatened or endangered species at the Camden facility. No cultural or physical resource concerns have been identified (Atlantic Research Corporation, 1991c).

The Camden facility has an EPA permit for hazardous waste thermal treatment, issued by the Arkansas Department of Pollution Control and Ecology. The facility is currently operating under a consent order from the state of Arkansas to correct their actions regarding hazardous waste handling procedures. Routine inspections by the state are conducted to ensure compliance with the consent order. Results of these inspections have not been published. Because no hazardous materials, other than propellants, would be used in support of ERINT activities, the status of this consent order would not be affected. (Alison, 1991; Atlantic Research Corporation, 1991c)

Although the proposed static test activities would be routine activities at the ARC Camden facility, static motor tests present potential air quality, health and safety, and noise impacts. These potentially affected environmental components are discussed in more detail below.

Air Quality - ARC's Camden facility is located in an area of attainment for all NAAQS. This facility has a permit through the Arkansas Department of Pollution Control and Ecology for several stationary air emissions sources, including their explosive test facility, and is currently in compliance with permit requirements. (McClanahan, 1991)

Hazardous Materials/Waste - Other than the solid propellant used in the SRM, no hazardous materials would be used for ERINT activities. The Camden facility would return the spent SRM to the Gainesville facility for disposal by open burning.

Health and Safety - At the Camden facility, guidelines for safety procedures are provided by DOD 4145.26M and the U.S. OSHA. During x-ray of the SRM, safety procedures followed are based on the *MK-104 Chamber Assembly, Loaded Radiographic Criteria, Procedure No. CEX-2008*. All personnel in facilities where energetic materials are handled or processed must wear eye protection, flame resistant clothing, and non-sparking shoes and/or leg stats. An ESQD of 4,840 meters (1,475 feet) extends off ARC property to the east of the test stand. (Atlantic Research Corporation, 1991c)

Noise - There are no environmental noise standards which are applicable in this area (Holyfield, 1991). The distance from the property line to the Camden facility test firing bay is approximately 396 meters (1,300 feet). (Atlantic Research Corporation, 1991c).

2.2.6 Aerotherm, California

Aerotherm is a commercial/industrial operation in Mountain View, California, approximately 145 kilometers (90 miles) southeast of San Francisco and 32 kilometers (20 miles) northwest of San Jose. Approximately 185 people are employed at the facility, 5 to 10 of whom would be involved in ERINT activities (Rocco, 1990c). ERINT activities would take place in existing facilities that would require no construction or significant modification.

Aerotherm complies with federal standards for water quality and air quality, although it is located within a nonattainment area for ozone and carbon monoxide (Libretti, 1990). Carbon monoxide (from a gas fired boiler) and hydrocarbons (from the use of solvents) emissions are generated at the facility (Delano, 1991a). Freon has not been used at the facility in over 2 years, and there are no plans for its use in future programs. No air quality or wastewater permits are required for the facility (Acurex Corporation, 1991). There are no known historic or archaeological sites at the facility, and no federal- or state-listed threatened or endangered species are known to frequent the area (Acurex Corporation, 1991). Noise is not an issue at the facility. Facility infrastructure is supported by adjacent communities and demand is within capacity. No physical resource concerns have been identified. The population of Mountain View is approximately 65,000 (Walters, 1990).

Although the proposed target development activities would be routine activities at Aerotherm, the use of small quantities of solvents presents potential hazardous materials/waste impacts, and the use of quartz fibers and microballoons and explosive materials presents potential health and safety impacts. Both of these potentially affected environmental components are discussed in more detail below.

Hazardous Materials/Waste - The Aerotherm facility is a conditionally exempt, small-quantity generator of hazardous wastes (i.e., produces less than 100 kilograms [220 pounds] per month) under EPA regulations for identification and listing of hazardous waste (40 CFR 261) (Acurex Corporation, 1991). Aerotherm is in compliance with its EPA permit for disposal of any hazardous wastes that are produced on site. All materials are handled in compliance with manufacturer's recommendations on the MSDSs. Accidental spill clean-up procedures, as regulated by the Mountain View City Code (City of Mountain View, 1990), are followed (Acurex Corporation, 1991).

Health and Safety - No significant health and safety issues have been identified at Aerotherm. All materials are stored and handled in compliance with procedures recommended in MSDSs and with the company *Occupational Health and Safety Manual and Injury and Illness Prevention Program* (Aerotherm Corporation, 1991). Accidental spill clean-up procedures, as regulated by the Mountain View City Code (City of Mountain View, 1990), are followed. (Acurex Corporation, 1991)

2.2.7 Orbital Sciences Corporation, Arizona

Orbital Sciences Corporation, Space Data Division, is a commercial/industrial operation in Chandler, Arizona, approximately 32 kilometers (20 miles) southeast of Phoenix. Approximately 660 people are employed at the installation, of whom about 15 would be involved in ERINT activities (Genest, 1990). ERINT activities would take place in existing facilities that would require no modification or refurbishment (Genest, 1990).

Orbital Sciences complies with federal standards for water quality and air quality, although it is located within a nonattainment area for ozone, carbon monoxide, and particulates (Crisafulli, 1990). Emissions of hydrocarbons result from the use of two permitted paint spray booths, and particulate emissions occur from a new battery manufacturing process. Particulate emissions are controlled with a filter system coupled to the process ventilation exhaust system (Genest, 1991). There are no known historic or archaeological sites at the facility and no federal- or state-listed threatened or endangered species are known to frequent the area (Genest, 1990). Noise is not an issue at the facility (Genest, 1990). Facility infrastructure is supported by adjacent communities and demand is within capacity. The population of Chandler is approximately 86,500 (Arizona Department of Commerce, 1990).

Although the proposed target development activities would be routine activities at Orbital Sciences, the use of small quantities of solvents presents potential hazardous materials/waste and health and safety impacts. These potentially affected environmental components are discussed in more detail below.

Hazardous Materials/Waste - All hazardous materials are stored and handled in compliance with procedures recommended on MSDSs and any applicable federal, state, or local regulations (Genest, 1990).

Health and Safety - No significant health and safety issues have been identified at Orbital Sciences. All materials are stored and handled in compliance with procedures recommended in MSDSs (Genest, 1990).

2.2.8 Hill Air Force Base, Utah

Hill AFB is 8 kilometers (5 miles) south of Ogden, Utah, and about 48 kilometers (30 miles) north of Salt Lake City. The 2,692-hectare (6,654-acre) base is headquarters to the Ogden ALC. It also manages the Utah Test and Training Range.

The Ogden ALC provides logistics and system management for MINUTEMAN, PEACEKEEPER, and Small ICBM missiles, Maverick air-to-ground missiles, laser and electro-optical guided bombs, F-4 and F-16 aircraft, air munitions, aircraft landing gear, and photographic and aerospace training equipment (U.S. Air Force Association, 1989).

Hill AFB complies with federal standards for water quality and air quality, although it is located within a nonattainment area for ozone and carbon monoxide (Dalley, 1988; Taylor, 1988, 1989a). Emissions of hydrocarbons are emitted from paint booths, boilers, organic liquid storage tanks, and general space heating. Carbon monoxide emissions are generated from boiler firing and general space heating. On-going mitigations to lower these emissions include use of paints which generate less hydrocarbon emissions and natural gas fired boilers (Graziano, 1991a). Two federally listed endangered species, the peregrine falcon and the bald eagle, occur in the area. Although both species have been sighted at the base, neither are residents (U.S. Department of the Air Force, 1991). No known cultural resources exist on the installation (Taylor, 1988). Facility infrastructure is generally adequate (Taylor, 1987, 1988), and land use is in accordance with the Base Master Plan (Ogden ALC, 1984). Noise levels are consistent with air base operations with specified attenuation goals (Ogden ALC, 1984; Pierson, 1987). The surrounding communities in Davis and Weber counties have a combined population of approximately 340,000 (U.S. Bureau of the Census, 1988).

Although the proposed ETS rocket motor refurbishment activities would be routine activities at Hill AFB, the use of small quantities of solvents, hydraulic fluids, paints, and solid propellants presents potential hazardous materials/waste impacts, and the use of explosive materials presents potential health and safety impacts. Both of these potentially affected environmental components are discussed in more detail below.

Hazardous Materials/Waste - Hill AFB is on the CERCLA NPL (Superfund). This listing was first proposed in October 1984 (Stites, 1990). The base is participating in the IRP, a program that identifies and cleans up contaminated DOD facilities (Taylor, 1989b; U.S. Army Strategic Defense Command, 1989). Currently 39 IRP sites exist on base, although none of these sites is located near any of the buildings to be used for ERINT activities (Hill Air Force Base, 1991). The EPA is preparing to initiate negotiations for a Federal Facilities Agreement, in which Utah and the EPA will work with Hill AFB to set up a CERCLA clean-up framework (Johnson, 1990). Hill AFB is currently in compliance with its RCRA hazardous waste storage facility permit (Moore, 1990). The Utah Department of Health, Bureau of Solid and Hazardous Waste, monitors RCRA waste handling at Hill AFB, and all facilities are currently in compliance (Maulding, 1990). Although Freon is used at Hill AFB, it would not be used for ERINT activities; after 1995, Hill AFB will not use Freon for any test activities (Vlaardingerbroek, 1991). All hazardous materials are stored and handled in compliance with procedures described on MSDSs and any applicable federal regulations.

Health and Safety - Health and safety issues at Hill AFB include radiation from X-ray machines and the storage and handling of ordnance. Hill AFB follows safety procedures for all M57A-1 rocket motor refurbishment activities, including x-raying, as described in *Technical Order 2K-SRM57-3, Technical Manual, Overhaul Instructions with Maintenance Parts List, M57A-1 MINUTEMAN Third Stage Rocket Motor, Part No. 01A00063* (McCarty, 1991; U.S. Department of the Air Force, 1990a; Vlaardingerbroek, 1991). The non-destructive inspection facilities at Hill AFB are fully shielded enclosures. During irradiation, measured exposure rates outside the facilities (Buildings 985 and 2113) are below 2 milliroentgen per hour, classifying them as non-radiation areas. Workers in the radiation facility wear dosimeters to measure radiation exposure; these dosimeters are checked monthly (Hill Air Force Base, 1991). Additionally, both facilities are equipped with appropriate safety systems (audible and visible warning devices and safety interlocks). Hill AFB has established ESQDs of 381 meters (1,250 feet) around facilities where routine activities involve handling of propellants. No significant health and safety issues have been identified at Hill AFB (Graziano, 1991b; Taylor, 1989b; U.S. Army Strategic Defense Command, 1989).

2.2.9 Pueblo Depot Activity, Colorado

The U.S. Army Pueblo Depot Activity covers approximately 9,310 hectares (23,000 acres) in Pueblo County, Colorado, about 22 kilometers (14 miles) east of Pueblo.

Pueblo Depot Activity complies with federal standards for water quality and air quality, and is within an area of attainment for all NAAQS (Hance, 1990). Three species of birds federally listed as threatened or endangered, the bald eagle, peregrine falcon, and whooping crane (*Grus americana*), could potentially occur near Pueblo Depot Activity as migrants. The black-footed ferret (*Mustela nigripes*), a federally listed species, could also potentially occur in the area (Carlson, 1990). No known cultural resources exist on the installation. Facility infrastructure is within capacity. There are no known noise issues at the facility (Bird, 1991). The population of Pueblo County is approximately 130,000 (Pueblo Chamber of Commerce, 1989).

Pueblo Depot Activity has a work force of approximately 640, about 7 of whom would be involved in ERINT activities (Pueblo Depot Activity, 1991).

Although the proposed booster motor inspection activities would be routine activities at Pueblo Depot Activity, the use of radiation facilities and the handling of propellant present potential hazardous materials/waste and health and safety impacts. These potentially affected environmental components are discussed in more detail below.

Hazardous Materials/Waste - Pueblo Depot Activity has RCRA Part A, Part B, and Subpart X permits for the storage, treatment, and disposal of hazardous wastes (Bird, 1991). The facility is participating in the IRP; 64 IRP sites are located on base, and 13 are under Correction Measure Implementation (Bird, 1991). Hazardous materials are handled according to procedures specified in *Pueblo Depot Activity, Hazardous Waste Management Plan* (U.S. Army Corps of Engineers, 1991). However, no hazardous materials would be used for ERINT activities (Pueblo Depot Activity, 1991).

Health and Safety - Health and safety issues at Pueblo Depot Activity include radiation from X-ray machines and the storage and handling of ordnance. Workers in the radiation facility wear dosimeters to measure radiation exposure (Glendenning, 1990b); a monitoring system checks for radiation leaks. Regulations followed for rocket motor inspection activities include AR 385-64, *Ammunition and Explosives Safety Standards* (U.S. Department of the Army, 1987), and DOT regulations, as discussed in Section 1.3.1.1.

2.2.10 Battelle, Ohio

Battelle's West Jefferson site is approximately 24 kilometers (15 miles) west of Columbus, in Madison County, Ohio. The site consists mainly of research laboratories in a semi-rural location. Approximately 150 personnel work at this site (Alexander, 1990e). Madison County has a population of approximately 35,000 (Parks, 1990).

Simulant preparation for use in ERINT activities would take place in Building JS-3. This facility is within an area in attainment of all NAAQS (Burroughs, 1990; Gorman, 1990a). Because simulant preparation would not generate any wastewater effluent, ERINT activities would not affect wastewater permit status (Ingalls, 1991c). There are no recorded historic or archaeological sites and there are no federal- or state-listed threatened or endangered species on the installation. Installation infrastructure is supported by adjacent municipalities and demand is within capacity. Noise levels are not a problem (Gorman, 1990b, c).

Although the proposed simulant preparation activities would be routine activities at Battelle, the use of the simulant chemicals presents potential hazardous materials/waste and health and safety impacts. Both of these potentially affected environmental components are discussed in more detail below.

Hazardous Materials/Waste - Battelle's West Jefferson site is a conditionally exempt, small-quantity generator of hazardous waste (i.e., produces less than 100 kilograms per month) under EPA regulations for identification and listing of hazardous waste (40 CFR 261) (Ingalls, 1991b). The site is in compliance with Ohio regulations regarding disposal of the small quantities of hazardous wastes (mainly waste solvents from laboratories) that are produced on site (Hille, 1990). All materials are handled in compliance with federal, state, and local regulations and manufacturers' instructions. Accidental spills and cleanup procedures are described in Battelle's *Emergency Plan, Battelle West Jefferson Site* (Battelle, 1990).

Health and Safety - No significant health and safety issues have been identified at Battelle (Morrison, 1990). All materials are stored and handled in compliance with procedures described in MSDSs (see Section 1.3.3.1 and Appendix A) and applicable federal (Appendix C), state, and local safety regulations. Accidental spill cleanup procedures are described in Battelle's *Emergency Plan, Battelle West Jefferson Site* (Battelle, 1990).

2.2.11 White Sands Missile Range, New Mexico

WSMR is located in the Tularosa Basin of south-central New Mexico. The headquarters is approximately 72 kilometers (45 miles) north of El Paso, Texas, and approximately 43 kilometers (27 miles) east of Las Cruces, New Mexico. The main range encompasses about 8,163 square kilometers (3,152 square miles); however, WSMR has access to leased co-use areas, increasing the total area available for use to more than 16,968 square kilometers (6,552 square miles). Fort Bliss borders WSMR to the south.

WSMR is a national range that supports missile development and test programs for the Army, Navy, Air Force, the National Aeronautics and Space Administration (NASA), and foreign governments. The installation is equipped with a network of highly accurate optical and electronic data-gathering instruments that are essential for valid testing. WSMR has more than 1,000 precisely surveyed instrumentation sites and approximately 700 of the most advanced types of optical and electronics instrument systems, including long-range cameras, tracking telescopes, ballistic cameras, radars, and telemetry.

Facility infrastructure is within capacity. The estimated population of the five-county area containing WSMR is 216,400 (Shore, 1990). WSMR has a base population of approximately 980 and a work force of approximately 7,550 military, civilian, and contractor personnel (Richey, 1991a).

Rocket motor exhaust products and the use of the TMDCFE simulant and beryllium missile components present potential air quality impacts. Launch noise and debris present potential biological resources impacts, and launch debris presents potential cultural resource impacts. Beryllium components and other launch debris and the use of propellants and the TMDCFE simulant present potential hazardous materials/waste and health and safety impacts. The temporary evacuation of White Sands National Monument and closure of Highway 70 during flight tests present potential land use impacts. Missile launches and debris recovery activities present potential noise impacts, and the use of beryllium missile components and the TMDCFE simulant presents potential water resource impacts. These potentially affected environmental components are discussed in more detail below.

Air Quality - The counties that contain WSMR are all in attainment of NAAQS (Rinaldi, 1990). High levels of particulates from natural sources (i.e., blowing dust) may occur temporarily during periods of high winds. Pollutants produced by range activities are readily dispersed by the wind, with average speeds of 16 kilometers (10 miles) per hour (Dynaspan Services Company, 1986).

Prevailing winds are from the west, except during the summer when they become southeasterly. The westerly winds are strongest immediately to the east of the Organ-San Andres Mountains. The highest winds generally occur in April. High winds are also associated with thunderstorms.

Biological Resources - WSMR is located in the northern Chihuahuan Desert, and features a diversity of biotic communities comprising grasslands, shrublands, and woodlands. The area encompassed by the debris impact areas, Sulf Site, and LC50 (Figures 1-29, 1-30a, and 1-30b) includes several major physiographic features (Figure 2-1) (U.S. Department of Agriculture, Soil Conservation Service, 1976). The Sulf Site and the ETS stage 1 debris impact area are located in the Jornada del Muerto, a basin with drainage to the Rio Grande. In addition, parts of the Control Test Flight (CTF)-1 (Flight Test 2) and CTF-2 (Flight Test 3), and the Guided Test Flight (GTF)-1 (Flight Test 4) and GTF-2 (Flight Test 5) LE fragment debris areas are in the San Andres Mountains. LC50, the low beta, LE fragment, missile body sections, and the Ballistic Target demonstration (Flight Test 1), and Ballistic Target 1, 2, and 3 (Flight Tests 4, 5, and 6) stage 2 debris areas are in the Tularosa Basin. Runoff from the San Andres drains to a playa system in the interior basin. Soils and groundwater in the basin are high in gypsum content. Large surface crystalline gypsum deposits are present at Lake Lucero on White Sands National Monument.

The vegetation, wildlife, threatened and endangered species, and sensitive and unique habitats of the predicted debris impact areas are discussed below.

- **Vegetation.** Twelve vegetation groups were identified in the WSMR soil survey (U.S. Department of Agriculture, Soil Conservation Service, 1976), but more recent studies by the U.S. Army Construction Engineering Research Lab (USACERL) indicate that 19 or more distinct soil/vegetation groups may be present (Broska, 1990). The Sulf Site is located in an area of sandy loam soils supporting a mixed grassland/shrubland. The dominant shrubs are sand sage (*Artemesia filifolia*), mesquite (*Prosopis glandulosa*), and soaptree yucca (*Yucca elata*). Black grama (*Bouteloua eriopoda*) and mesa dropseed (*Sporobolus flexuosus*) are the most abundant grasses.

  The southwestern corner of the GTF-2 and CTF-2 LE fragment debris areas include a portion of the Jornada Experimental Range (JER), an area designated for research since 1912 (Conley and Conley, 1984) (Figure 1-29). However, this area has not been used by the JER for approximately 40 years (Havstad, 1991). This region is a mesquite coppice duneland, a soil/vegetation type that has replaced many grasslands in southern New Mexico, following droughts and overgrazing during the last 50 to 80 years (Buffington and Herbel, 1965; Hennessy, et al., 1983). In this habitat, the large dunes are stabilized by extensive mesquite "clumps", with largely barren soil surfaces between the dunes. The area of LC50 is also a mesquite duneland, although the dunes are relatively small, and four-wing saltbush (*Atriplex canescens*) and mesa dropseed are also abundant.

  The eastern and western edges of the San Andres Mountains feature a series of belt-like soil/vegetation zones associated with increasing elevation. Along the western edge of the Tularosa Basin and the eastern edge of the Jornada Basin are scattered grasslands associated with clay loam soils that receive runoff from the mountain slopes. Higher up in elevation, piedmont slopes feature a distinctive vegetation zone consisting almost entirely of creosote bush (*Larrea tridentata*) on coarse sand and gravel soils. Within the mountains, the highest elevations are composed of exposed rock cliffs with thin, stony soils in crevices and alluvial slopes. Scattered pinyon pine (*Pinus edulis*) and alligator juniper (*Juniperus*

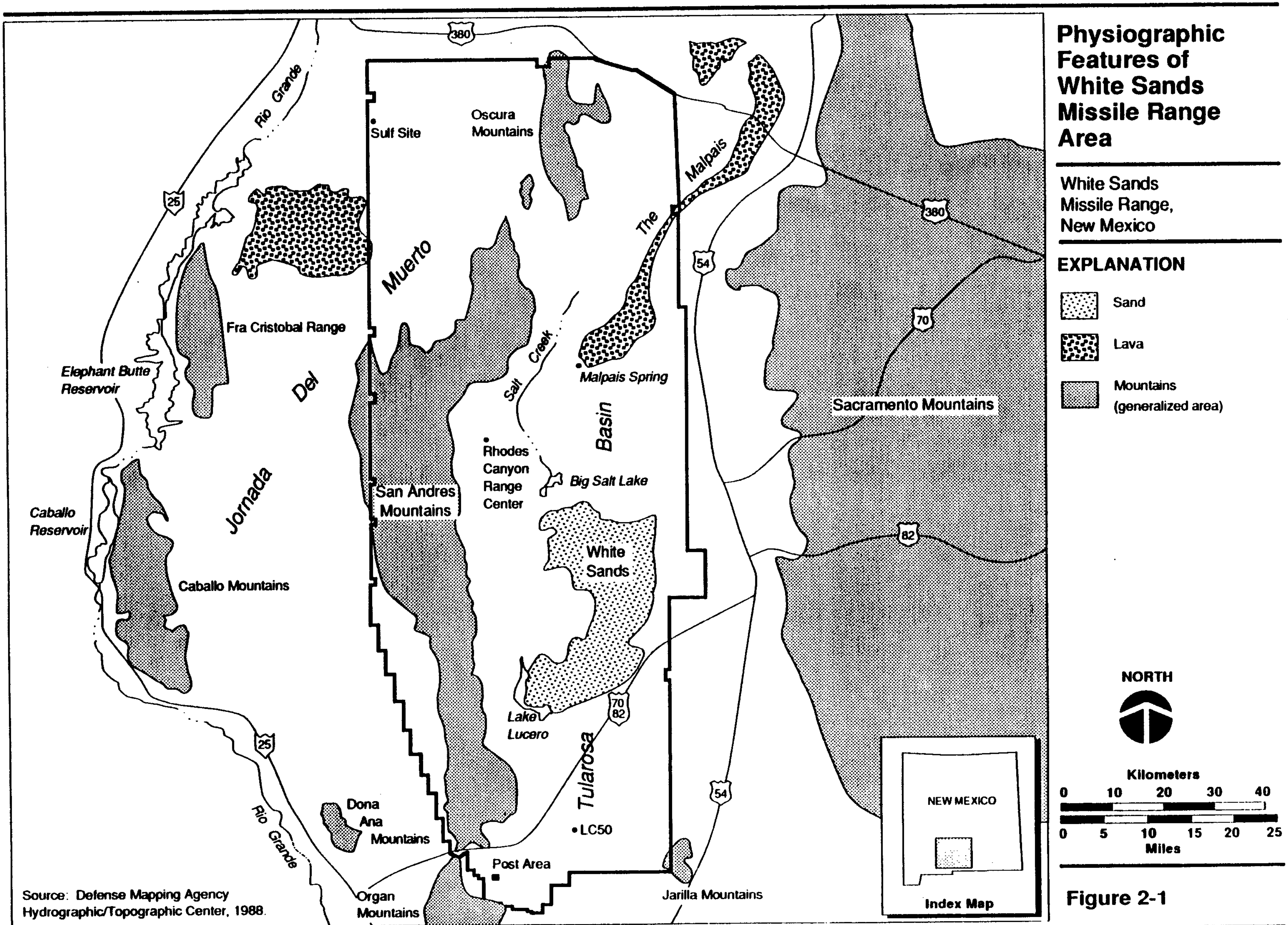


Figure 2-1

Source: Defense Mapping Agency Hydrographic/Topographic Center, 1988.

ERINT/047-4

deppeana) are present, with ground cover of a variety of grama grasses (*Bouteloua* spp.). Oak (*Quercus gambelii*) thickets and many species of small shrubs also occur on some high mountain slopes. Associated with the canyon springs are dense growths of vegetation, including oak, cottonwood (*Populus fremontii*), and velvet ash (*Fraxinum pennsylvanica*), as well as the non-native salt cedar (*Tamarix gallica*). On the lower slopes within the mountains the thin, stony soil supports sparse grasses and a variety of shrubs and cacti.

- **Wildlife.** More than 200 species of birds have been observed at WSMR, although less than half of the species are known as regular residents (U.S. Department of the Army, 1983). Many species of migratory waterfowl and shorebirds are winter occupants of wastewater ponds, ephemeral playas, and spring-fed streams in the Tularosa Basin. However, none of these major basin water resources are located within the predicted debris impact areas (Figure 1-29). A variety of raptors are common in mountain and basin areas, including Swainson's hawk (*Buteo swainsoni*), red-tailed hawk (*Buteo jamaicensis*), northern harrier (*Circus cyaneus*), American kestrel (*Falco sparverius*), prairie falcon (*Falco mexicanus*), golden eagle (*Aquila chrysaetos*), great horned owl (*Bubo virginianus*), and burrowing owl (*Speotyto cunicularia*). Mourning dove (*Zenaida macroura*), Gambel's quail (*Lophortyx gambelii*), and scaled quail (*Callipepla squamata*) are the most abundant game birds present at WSMR.

  Recent field surveys and literature reviews in association with the USACERL Land Condition Trend Analysis program (Conley, 1989; 1990) have documented the presence of 79 mammal species at WSMR. The primary native large mammals present within the Tularosa Basin are mule deer (*Odocoileus hemionus*) and pronghorn antelope (*Antilocapra americana*), and a remnant population of desert bighorn sheep (*Ovis canadensis mexicanus*). Introduced African oryx (*Oryx gazella*) occur throughout the Tularosa Basin, with large concentrations of these animals in the basin areas east of the San Andres Mountains. Hunting of mule deer, pronghorn antelope, and oryx is permitted at WSMR. Feral horses (*Equus caballus*) are also present in the basin areas. Year-round habitat is located primarily east and north of Rhodes Canyon Range Center. Common predatory mammals of the area include coyote (*Canis latrans*), mountain lion (*Felis concolor*), bobcat (*Lynx rufus*), and badger (*Taxidea taxus*). The mountain lion population of the San Andres Mountains is the subject of an ongoing, long-term study funded by the New Mexico Department of Game and Fish. The small mammal communities include 15 common species of rodents and 2 rabbit species that occur in various vegetative zones (Conley, 1989; 1990).

- **Threatened and Endangered Species.** Threatened and endangered species in the predicted debris impact areas include plants listed as threatened or endangered by the New Mexico Natural Energy, Minerals, and Resources Department, animals listed as threatened, endangered, or candidates for listing by the New Mexico Department of Game and Fish, and plants and animals listed by the U.S. Fish and Wildlife Service as threatened, endangered, or as category 1 or 2 candidates. Listings of threatened, endangered, and sensitive species at WSMR are presented in Appendix D.

  The Texas horned lizard (*Phrynosoma cornutum*), a Category 2 federal candidate, and desert bighorn sheep, a state group 1 endangered species, are known to be current residents within some of the debris impact areas at WSMR. The Texas horned lizard could occur in all of the predicted debris impact areas. The Texas horned lizard occurs commonly throughout the Tularosa and Jornada basins, primarily in association with shrublands and grasslands on sandy and sandy/gravelly soils (Price, 1990). Bighorn sheep may be present in portions of the GTF-1 and GTF-2, CTF-1 and CTF-2 LE fragment debris impact areas. Desert bighorn sheep occupy the upper reaches of the San Andres Mountains, appearing as lone individuals or in scattered small bands. The population has remained stable at 20 to 30 animals during the last 8 years, and appears highly susceptible to disturbance from human intrusion (Hoban, 1991).

Other threatened and endangered animal species are known to occur as seasonal inhabitants at WSMR, and could use areas potentially affected by the ERINT project, based on known habitat associations of the species. These include Baird's sparrow (*Ammodramus bairdii*), peregrine falcon, Bell's vireo (*Vireo bellii*), gray vireo (*Vireo vicinior*), and varied bunting (*Passerina versicolor*). Baird's sparrow is a group 2 state endangered species that has been observed as a fall migrant in grassland habitats of southern New Mexico (New Mexico Department of Game and Fish, 1985). Seasonal temporary presence of this species in the grasslands of WSMR is highly probable. The rock-walled canyons and cliff faces of the San Andres Mountains offer extensive potential habitat for the peregrine falcon (Skaggs et al., 1986), a federal endangered species. Bell's vireo and varied bunting, both state group 2 endangered species, are potential inhabitants of the canyon stream areas. Gray vireo, a state group 2 endangered species, may be expected to occur in the pinyon-juniper and oak woodlands of the mountain slopes (New Mexico Department of Game and Fish, 1985).

Todsen's pennyroyal (*Hedeoma todsenii*) is a federal endangered plant species that occurs in only three known populations, all within the San Andres Mountains on WSMR (U.S. Fish and Wildlife Service, 1988). The localities of these known populations are outside areas potentially affected by the ERINT program, but the presence of additional undiscovered populations within the San Andres Mountains is possible. Three state endangered plant species that are also known to be present within the San Andres Mountains are the Alamo penstemon (*Penstemon alamoensis*) (also a federal Category 2 candidate), Mescalero milkwort (*Polygala rimulicola mescalerum*), and Sandberg's pincushion cactus (*Coryphantha sneedii sandbergii*). Suitable habitat for these species may be present at WSMR. Other state endangered plants that are known to occur within or near WSMR include grama grass cactus (*Toumeya papyracantha*), night blooming cereus (*Cereus greggi*), nodding cliff daisy (*Perityle cernua*), button cactus (*Epithelantha micromeria*), pineapple cactus (*Neoloydia intertextus*), Scheer's pincushion cactus (*Coryphantha scheeri*), and Wright's fishhook cactus (*Mammillaria wrightii*).

- **Sensitive and Unique Habitats.** Because of high wind and water erosion potential on barren surfaces, any grassland area of WSMR is sensitive to soil disturbance. This is also true of vegetation on the thin rocky soils of the San Andres Mountains.

  The spring systems within the mountains are particularly sensitive habitats because they provide the water that is a limiting resource for most of the mountain wildlife species, as well as supporting isolated patches of riparian vegetation that provide additional habitat for certain bird species. Minor disturbances to the springs can alter the pattern of accumulation and runoff of water, making it inaccessible for use by wildlife. Habitat supporting threatened and endangered plant and animal species should also be considered sensitive.

Cultural Resources - Many prehistoric and historic sites exist on WSMR, although no comprehensive studies have been done for the entire WSMR area. Cultural resources on WSMR include sites and artifacts used by prehistoric Indians to historic sites dating to the ranching and mining period. The two National Historic Landmarks on WSMR are from the World War II and post-World War period of U.S. Government testing activity. These are the Trinity Site where the first nuclear bomb was detonated in 1945, and Launch Complex 33 from which captured V-2 rockets were launched and where the early development of the U.S. space program originated. The Trinity Site is listed on the NRHP, and several sites are on the State of New Mexico Register of Cultural Properties. (Naval Ordnance Missile Test Station, 1989b; White Sands Missile Range, 1985)

WSMR has a programmatic Memorandum of Agreement with the Advisory Council on Historic Preservation and the New Mexico SHPO implementing the provisions of the National Historic Preservation Act and addressing the protection and management of historic and prehistoric properties on the range. Under the terms of the programmatic Memorandum of Agreement, WSMR has prepared a *Historic Preservation Plan* (White Sands Missile Range, 1988), to provide an overview of requirements and procedures for compliance with federal and state statutes associated with the National Historic Preservation Act.

Hazardous Materials/Waste - WSMR currently has a Part B RCRA permit for storage of hazardous waste (Andreoli, 1990). No compliance issues exist in reference to this permit (Morgan, 1990). WSMR Regulation 200-1, *Environmental Hazardous Waste Management* (U.S. Department of the Army, 1991b), provides guidelines for the handling and management of hazardous waste and ensures compliance with all federal, state, and local laws regulating generation, handling, treatment, storage, and disposal of hazardous wastes. Each range user is responsible for disposal of hazardous waste from its own activities (White Sands Missile Range, 1990b).

The Range Services Branch of the National Range Operations Directorate provides teams to recover debris (White Sands Missile Range, 1990a). Recovery operations are conducted for most test objects impacting on the range (White Sands Missile Range, 1990a). Critical or hazardous material is recovered immediately after impact; nonessential material is recovered as part of a continuous effort to keep the range clear of debris (White Sands Missile Range, 1990a). Any debris containing beryllium must be managed as a hazardous waste under the RCRA.

Explosive ordnance disposal (EOD) is part of the recovery team's responsibilities. EOD may be required to dispose of or destroy contaminated, classified, or hazardous material. The range user or program sponsor must brief the recovery team explaining the recovery needs of each test. (White Sands Missile Range, 1990a)

Classified material is disposed of according to AR 380-5, *Department of the Army Information Security Program* (U.S. Department of the Army, 1988a); unclassified material according to WSMR 755-3, *Disposition of Scrap Material* (U.S. Department of the Army, 1972). (White Sands Missile Range, 1990a)

Health and Safety - At WSMR, fires, noise, potential exposure to ionizing radiation, and radio frequency radiation have been identified as health and safety issues (U.S. Department of the Army, 1985). Any user planning to conduct test operations that may present a hazard to personnel or material must prepare and submit an SSOP for approval. Hazardous operations are defined as, but not limited to, those operations involving explosives, ammunition, highly flammable or toxic products, radioactive material, high-pressure gases, microwave radiation, or lasers. The SSOP must contain detailed operating instructions for each operation and describe all necessary safety measures. These safety measures include, but are not limited to, protective clothing and equipment, monitoring devices, requirements for static grounding, special handling and disposition requirements, or any other safety requirement peculiar to the operation (White Sands Missile Range, 1990a).

Land Use - WSMR has access to co-use extension areas to the north and west that are leased from 40 to 50 individual landowners, including the Bureau of Land Management. These are used as impact areas for missiles launched from WSMR. All residents of these areas are evacuated during missile missions requiring use of these areas. The 55,726-hectare (142,639-acre) White Sands National Monument and the 23,148-hectare (57,200-acre) San Andres National Wildlife Refuge, both operated by the Department of the Interior, are within the WSMR Main Range boundary. A 33,994-hectare (84,000-acre) portion of the U.S. Department of Agriculture's JER is under a co-use agreement with WSMR (see Figure 1-26). (U.S. Department of the Army, 1985)

U.S. Highway 70, which crosses the southern part of WSMR, is in the hazard area for flight tests originating in south WSMR. For this reason, Highway 70 is temporarily closed during flight test activities on a routine basis.

WSMR is permitted to use the western portion of White Sands National Monument for overflight, impact, and recovery. Recovery operations are conducted in accordance with environmental guidelines established by the National Park Service (Dynaspan Services Company, 1986). The National Monument may be temporarily evacuated if it is determined to be in the hazard area for flight tests on WSMR.

Numerous missile launch sites are located throughout the range and missile impact areas have been designated, although almost any area of the northern range can be used for missile impact (Dynaspan Services Company, 1986).

Noise - There are many testing operations at WSMR that generate noise; however, they are not continuous and occur for very short time periods. The range experiences noise from Army tank cannon test firings, bombings, explosion/detonation tests, low-flying aircraft, jet aircraft, and missile launches and intercepts. As a result of some of these activities, sonic booms are heard throughout the range. Continuous motor vehicle traffic noise is experienced at certain parts of the range, such as the Main Post Area, Orogrande Range Camp, Small Missile Range, Stallion Site, and along U.S. Highway 70 (Naval Ordnance Missile Test Station, 1989b).

Water Resources - Much of the natural surface water that occurs in the Tularosa Basin is nonpotable because it is highly saline. Standing water remains nearly year-round after heavy rains in Lake Lucero, near the White Sands National Monument, and the Big Salt Lake, east of Rhodes Canyon. Salt Creek, the only perennial stream on WSMR, provides a significant amount of surface water and adds to the water that collects in the Big Salt Lake where the creek drains. The Malpais Spring supplies water to a number of man-made ditches and waterholes downstream from the spring. A number of large pools of water can be found throughout WSMR where water collects after heavy rainfall. When they retain their water for long periods of time, dense vegetation thrives and provides sources of water and cover for wildlife (Naval Ordnance Missile Test Station, 1989b).

The source of essentially all the groundwater in the WSMR area is precipitation. Annual precipitation at WSMR varies from 18 centimeters (7 inches) to 29 centimeters (11 inches). More than half of the annual precipitation occurs in heavy rain showers during the summer. WSMR has an average of 43 thunderstorms per year. Snow cover usually does not last more than 1 to 2 days (Naval Ordnance Missile Test Station, 1989b). The fraction that reaches the zone of saturation is very small, ranging from perhaps as much as 25 percent where the surface materials are very permeable along the margins of the basins, to practically none in the playa areas where the surface is underlain by impermeable clay and silt. Limited quantities of fresh water are known to be present in alluvial fan deposits along the basin margins. Much larger quantities of highly saline water are present in thick deposits of fine-grained sediments in the central part of the basin.

The potable water supply comes from gravel-packed wells drilled into the alluvial fan area beside the Organ Mountains near the post area. Potable water service is extended by pipeline eastward from the post area to Orogrande Range Camp near the southeastern boundary of WSMR, and to several other activity sites south of White Sands National Monument. Because groundwater under the floor of the Tularosa Basin is saline, it is generally necessary to transport potable water in containers for personnel working at remote sites on the range, including the Sulf Site. Existing water facilities at the Sulf Site include an 18,930-liter (5,000-gallon) tank for potable water.

3.0 Environmental Consequences and Mitigations

3.0 ENVIRONMENTAL CONSEQUENCES AND MITIGATIONS

Section 3.1 of this EA describes the methodological approach of assessing the potential environmental consequences of the proposed ERINT program activities. This approach assesses potential impacts by comparing proposed program activities with potentially affected environmental components. Section 3.2 provides a discussion of the potential environmental consequences for each proposed ERINT activity. The amount of detail presented in this section is proportional to the potential for impacts. Sections 3.3 through 3.10 provide discussions of the following with regard to proposed ERINT activities: environmental consequences of the no-action alternative; any conflicts with federal, regional, state, local, or Indian tribe land-use plans, policies, and controls; energy requirements and conservation potential; natural or depletable resource requirements; adverse environmental effects that cannot be avoided; the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity; irreversible or irretrievable commitment of resources; and conditions normally requiring an EIS.

3.1 METHODOLOGICAL APPROACH

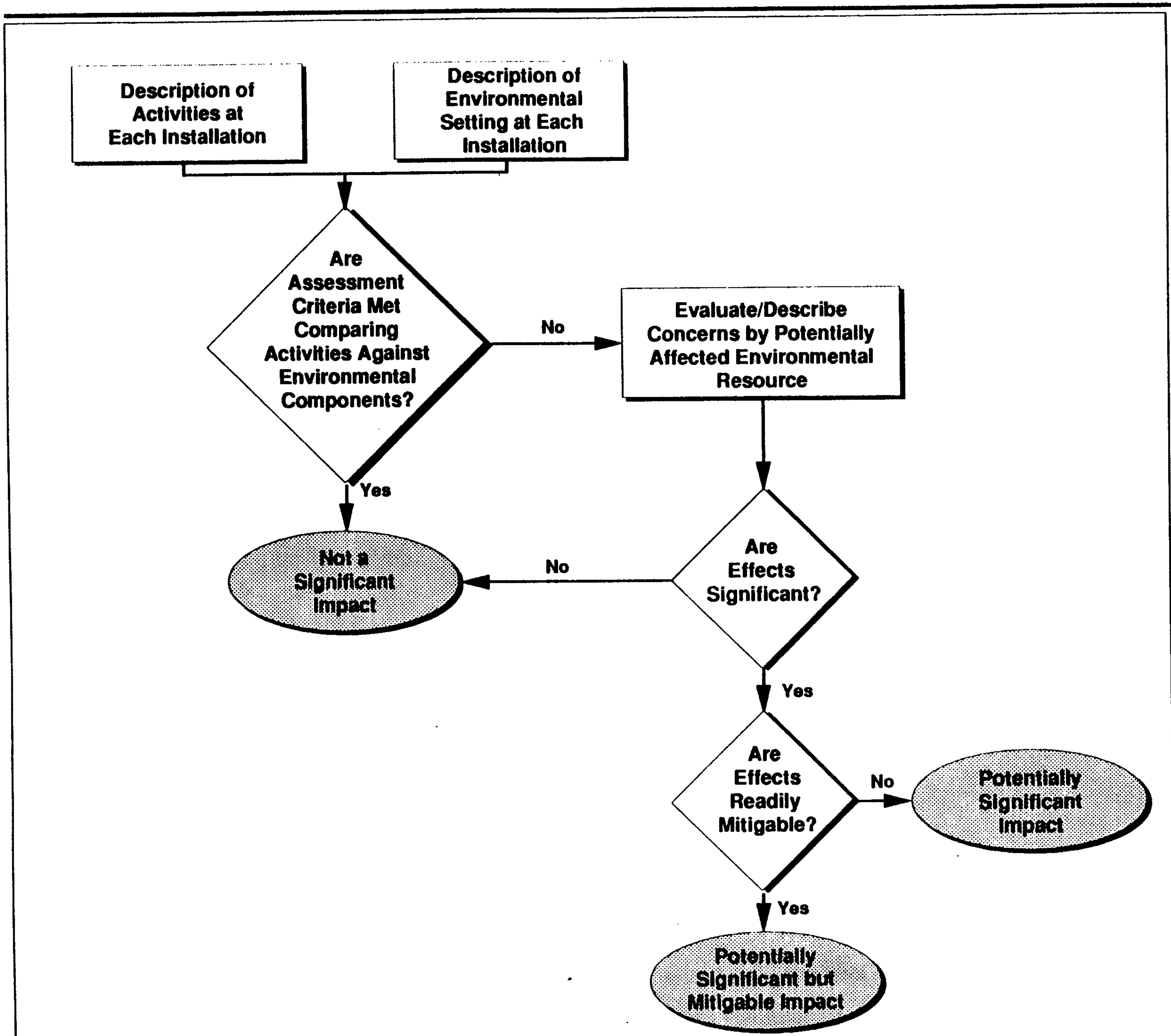
This section assesses the significance of potential environmental impacts of the proposed ERINT program activities. Any environmental documentation that addresses the types of activities proposed for each installation is incorporated by reference.

To assess the potential for and significance of environmental impacts from the proposed ERINT activities, the approach illustrated in Figure 3-1 was utilized. First, a list of activities necessary to accomplish the proposed action was developed (Section 1.0). Second, the environmental setting at each affected installation was described, with emphasis on any special environmental sensitivities (Section 2.0). Next, the program activities were compared with the potentially affected environmental components to determine which of the identified program activities have no potential for significant environmental consequences, and which, if any, present a potential for significant impact.

Federal, state, and local environmental laws and regulations were reviewed to assist in determining the significance of environmental impacts (if any) in fulfillment of NEPA requirements. Appendix C provides a description of the federal laws and regulations for each relevant environmental component. Proposed activities were evaluated to determine their potential to cause significant environmental consequences using an approach based on the interpretation of "significantly" outlined in the CEQ Regulations for Implementing the Procedural Provisions of the NEPA (40 CFR 1500-1508). In order to provide a brief and concise explanation of the significance evaluation, the wording from the CEQ regulations has been slightly modified for inclusion in this assessment.

Evaluations of significance used in this EA include an assessment of the intensity and extent of potential impacts. Intensity is based on relative changes:

- To the unique characteristics of the area (visual quality, prime agricultural land, paleontological resources, archaeological sites, wetlands, ecologically critical areas, etc.)



Approach for Assessing Impact Significance

Figure 3-1

ERN1/011

- Likely to be controversial (examples of impacts considered to be controversial include those impacts for which there is a likelihood of a substantial dispute, those impacts about which segments of the public indicate substantial concern, or those impacts that have been found to be controversial on other projects)
- In cumulative impact
- Likely to adversely affect threatened, endangered, or otherwise unique species
- In public health and safety
- Which may establish a precedent for future actions or represent a decision in principle about a future consideration
- In compliance with federal, state, and local environmental laws or regulations
- In resources considered to be important or valuable from the perspective of scientific opinion and management agency concerns
- Involving uncertain, unique, or unknown risks.

Extent is related to:

- The area/quantity of a resource affected relative to the area/quantity of a resource available
- The potential for change in reproductive success and maintenance of a plant or animal population at pre-project levels
- The period of time during which recovery will occur.

The determination of significance for a particular impact may be based on one or more of the intensity (severity) or extent criteria and the context in which the impact occurs. The significance of an action is also evaluated in the context of society as a whole (e.g., human, national), affected interests, the affected region, and locality.

In addition, for this EA the proposed activities at a site were determined to have no potential for significant environmental effects if:

- The installation and its associated infrastructure were determined to be adequate for the proposed activities (i.e., the test can be conducted without new construction, excluding minor modifications)
- The current installation staffing is adequate to conduct the test(s), excluding minor staff-level adjustments
- The resources of the surrounding community are adequate to accommodate the proposed testing.

If a proposed program activity was determined to present a potential for impact, i.e., if one or more of the above criteria are not met or uncertainty exists, the potential for the proposed activities to cause significant impacts was evaluated in greater depth. The further evaluation was made by considering the relative changes in intensity, extent, and context in which the impact would occur.

As a result of that evaluation, impacts were categorized as not significant, potentially significant but mitigable, or potentially significant. Environmental impacts were determined to be **not significant** if, in the judgment of the preparers of this document or as concluded in existing environmental documentation of similar actions, no potential for significant environmental impacts exists. Impacts were deemed **potentially significant but mitigable** if concerns exist but it was determined that all potential consequences could be readily mitigated through standard procedures or by measures recommended in this and previous environmental documentation. Mitigation measures considered for impacts from the testing activities proposed in this EA include: avoiding the impact altogether by not taking action or parts of an action; minimizing impacts by limiting the degree or magnitude of the action and its implementation; rectifying the impact by repairing, rehabilitating, or restoring the affected environment; reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; or compensating for the impact by replacing or providing suitable resources or environments. If the predicted impacts could not be readily mitigated, the activity was determined to present **potentially significant** environmental impacts.

Proposed ERINT activities were also reviewed against existing environmental documentation on current and planned actions and information on anticipated future projects at each of the sites to determine the potential for cumulative impacts. Cumulative effects were evaluated using the same criteria as the direct and indirect effects.

A risk analysis was not conducted for TMDCFE testing activities. Simulant dissemination would take place only under test conditions for which modeling predicts that measurable simulant deposition will occur only within WSMR's boundaries. In addition, existing data indicate that the chemical simulant is less toxic than the other compounds considered (see Section 1.4). For these reasons, a specific risk analysis of TMDCFE test activities was not considered necessary.

The project, its components, and potential impacts were evaluated to determine if they met the AR 200-2, *Environmental Effects of Army Actions* (U.S. Department of the Army, 1988b), criteria for actions that normally require an EIS. The evaluation indicated that the project did not meet these criteria.

3.2 ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION

3.2.1 ERINT-1 Flight Test Missile

The proposed ERINT-1 flight test missile development activities would be conducted at the LTV Missiles and Electronics Group facilities in Grand Prairie, Texas; Rockwell International and L.A. Gauge, California; Holloman AFB, New Mexico; and at the ARC facilities in Virginia and Arkansas, as discussed in Section 1.3.1.

3.2.1.1 Flight Test Missile Development. The proposed flight test missile development activities at LTV Missiles and Electronics Group, Grand Prairie, Texas, are described in Section 1.3.1.1. These activities would use existing personnel working in facilities routinely used for these types of activities. These facilities would be operating at a level and intensity similar to current conditions.

No new construction or significant modification of existing facilities would be required. For these reasons, these activities present no significant impacts to biological and cultural resources, infrastructure, land use, physical resources, or socioeconomics. These activities would produce no significant air quality, water resource, or noise impacts.

Flight test missile development would, however, present potential hazardous materials/waste and health and safety impacts. These environmental components and appropriate mitigations are discussed in more detail below.

Hazardous Materials/Waste - ERINT-1 missile development activities would involve use of solid propellants, thermal and nickel-cadmium batteries, pre-fabricated beryllium components, solvents, and graphite/epoxy composites. Chemicals used in circuit board development processes include solder flux, sodium chlorite, sodium hydroxide, cupric chloride dihydrate, sodium carbonate monohydrate, and AL-CHELATE. All hazardous materials would be stored and handled in compliance with procedures described on MSDSs and safety measures required by the DOD and DOT, as referenced in Section 1.3.1.1. No significant hazardous materials and waste impacts are expected.

Because hazardous materials/waste activities would follow applicable regulations and procedures, no cumulative impacts would be expected.

Health and Safety - The handling and storage of solid propellants and ordnance would pose potential health and safety impacts. All hazardous materials would be stored and handled in compliance with procedures described on MSDSs and safety measures required by the DOD and DOT, as referenced in Section 1.3.1.1. A *Standard Operating Procedure, General Procedures for Ordnance Testing* (LTV Missiles and Electronics Group, 1988a), would be followed in Building 191 at the Jefferson Street facility. In addition, LTV has established these other standard operating procedures, *Explosives Control* (LTV Missiles and Electronics Group, 1989a) and *Supplement to Standard Operating Procedures, General Procedures for Ordnance Test Area* (LTV Missiles and Electronics Group, 1988b). No significant impacts to health and safety are expected.

Potential cumulative impacts to health and safety would be minimized by using established safety procedures, developed for similar operations at this facility.

ERINT flight test missile development activities would not represent a significant increase in current activities, and no cumulative impacts were identified.

Based on the above conclusions, all of the assessment criteria for a determination of no significant impact are met for ERINT-1 flight test missile development activities at LTV.

Beryllium Contractors. Beryllium missile components would be fabricated in Rockwell International and L.A. Gauge facilities in California. These activities are discussed below.

Rockwell International - Activities involved in the fabrication of beryllium missile components at Rockwell International's Anaheim facility are described in Section 1.3.1.1. These activities would use existing personnel working in facilities routinely used for these types of activities. These facilities would be operating at a level and intensity similar to current conditions. No new construction or significant modification of existing facilities would be required. For these reasons, these activities present no significant impacts to biological and cultural resources, infrastructure, land use, physical resources, or socioeconomics. These activities would produce no significant water resource or noise impacts.

Fabrication of beryllium missile components would present potential air quality, hazardous materials/waste, and health and safety impacts. These potentially affected environmental components and appropriate mitigations are discussed in more detail below.

Air Quality – Fabrication of beryllium missile components would present potential air quality impacts. Beryllium is listed as a hazardous air pollutant by the EPA's NESHAP (40 CFR 61). The EPA emission standard for beryllium is 10 grams (0.4 ounce) over a 24-hour period for constant emissions (e.g., at a machine shop or factory). Rockwell International's facility in Anaheim would utilize control equipment to maintain emissions of dust and vapors from beryllium below EPA standards for the ERINT program. Control equipment consists of vacuum collection systems for each piece of equipment (grinders, lathes, etc.), all ducted together to a common two-stage control device. This system consists of a cyclone to remove larger particles, followed by high efficiency particulate filters capable of removing virtually all remaining particles (99.97 percent) with effective aerodynamic diameters of 0.3 micron and above. The vacuum collection systems are checked weekly to ensure they are operating effectively (Rockwell International, 1991). Because of the small quantity (approximately 1.23 kilograms) of beryllium to be used, and the safety precautions to limit air quality exposure, no significant air quality impacts are expected from ERINT activities at Rockwell International.

Because work stations contain vacuum collection systems which would effectively collect dust and vapors of beryllium, no cumulative air quality impacts from beryllium would occur.

Hazardous Materials/Waste - During fabrication activities, there is the potential for hazardous materials impacts. However, beryllium components and bench stock materials would be handled in accordance with Rockwell's Beryllium Materials Acquisition and Control Procedures (Rockwell International, 1988), MSDSs, and EPA regulations regarding hazardous materials, as administered by the California Department of Health Services.

All scrap beryllium pieces would be collected and sold to a recycling firm for incorporation in alloys requiring beryllium. Shipment of these materials would be accomplished in approved packaging by truck. Solvents utilized in the manufacturing process would be purchased, packaged, and stored using established hazardous materials practices. Hazardous materials usage associated directly with ERINT would be minimal, and would represent only a small fraction of the company's total annual use of such materials. Waste generated at the facility would be accumulated on-site for no more than 90 days in appropriately labeled containers, and shipped out by a certified waste hauler for disposal in compliance with the facility's EPA permit. Impacts from hazardous materials usage associated with beryllium component fabrication would not be significant.

Because hazardous materials/waste activities would follow applicable regulations and procedures, no cumulative impacts would be expected.

Health and Safety - During the handling and use of beryllium there is the potential for health and safety impacts to workers coming in contact with the material. However, fabrication activities would be performed following recommendations on the MSDS and with equipment utilizing effective engineering controls to minimize potential worker exposures, backed up by on-going sampling programs to assess exposures, on-going medical monitoring, and effective annual training requirements. In addition, Rockwell has established procedures for the handling of beryllium in their *Safety and Environmental Health Requirements for the Machining and Handling of Beryllium Metal, Alloys and Compounds* (Rockwell International, 1982), and in the *Operating Procedure - Anaheim Autonetics Electronics Systems, Beryllium Materials, Acquisition and Control* (Rockwell International, 1988). Emissions of air contaminants would be controlled through the use of pollution control devices which eliminate hazardous releases, thus preventing exposures to the public. Handling of waste materials and hazardous waste would be accomplished in accordance with the facility's EPA permit requirements, with scrap being sold for reclamation. Because of the above safety procedures, impacts to health and safety from beryllium would not be significant.

Potential cumulative impacts to health and safety would be minimized by using established safety procedures developed for similar operations at this facility.

ERINT beryllium activities would not represent a significant increase in current operations, and no cumulative impacts were identified.

Based on the above conclusions, all of the assessment criteria for a determination of no significant impact are met for beryllium component fabrication activities at Rockwell International.

L.A. Gauge - Activities involved in the fabrication of beryllium missile components at the L.A. Gauge facility are described in Section 1.3.1.1. These activities would use existing personnel working in facilities routinely used for these types of activities. These facilities would be operating at a level and intensity similar to current conditions. No new construction or significant modification of existing facilities would be required. For these reasons, these activities present no significant impacts to biological and cultural resources, infrastructure, land use, physical resources, or socioeconomics. These activities would produce no significant water resource or noise impacts.

Fabrication of beryllium missile components would present potential air quality, hazardous materials/waste, and health and safety impacts. These potentially affected environmental components and appropriate mitigations are discussed in more detail below.

Air Quality - Fabrication of beryllium missile components would present potential air quality impacts. Beryllium is listed as a hazardous air pollutant by the EPA's NESHAP (40 CFR 61). The EPA emission standard for beryllium is 10 grams (0.4 ounces) over a 24-hour period for constant emissions (e.g., at a machine shop or factory). However L.A. Gauge's facility in Sun Valley utilizes control equipment to maintain emissions of dust and vapors from beryllium below EPA standards. Control equipment consists of vacuum collection systems for each piece of equipment (grinders, lathes, etc.), all ducted together to a common two-stage control device. This system consists of a cyclone to remove larger particles, followed by high efficiency particulate filters, capable of removing virtually all remaining particles (99.97 percent) with effective aerodynamic diameters of 0.3 micron and above. The vacuum collection systems would be checked weekly to ensure they are operating effectively (Rockwell International, 1991). Because of the above safety precautions to limit air quality exposure of beryllium and small quantities of beryllium to be used, impacts to air quality would not be significant.

Because work stations contain vacuum collection systems which would effectively collect dust and vapors of beryllium, no cumulative air quality impacts from beryllium would occur.

Hazardous Materials/Waste - During fabrication activities, there is the potential for hazardous materials impacts. However, beryllium components and bench stock materials are handled in accordance with MSDSs and EPA regulations regarding hazardous materials, as administered by the California Department of Health Services.

All scrap beryllium pieces would be collected and sold to a recycling firm for incorporation in alloys requiring beryllium. Shipment of these materials would be accomplished in approved packaging by truck. Solvents utilized in the manufacturing process would be purchased, packaged, and stored using established hazardous materials practices. Hazardous materials usage associated directly with ERINT would be minimal, and would represent only a small fraction of the company's total annual use of such materials. Waste generated at the facility would be accumulated on site for no more than 90 days in appropriately labeled containers, and shipped out by certified waste hauler for disposal in compliance with their EPA permit. Overall, impacts from hazardous materials usage associated with beryllium component fabrication would not be significant.

Because hazardous materials/waste activities would follow applicable regulations and procedures, no cumulative impacts would be expected.

Health and Safety - During the handling and use of beryllium there is the potential for health and safety impacts to workers coming in contact with the material. However, fabrication activities would be performed following procedures on the MSDS and with equipment utilizing effective engineering controls to minimize potential, worker exposures, backed up by on-going sampling programs to assess exposures, on-going medical monitoring, and effective annual training requirements. Emissions of air contaminants would be controlled through the use of pollution control devices which eliminate hazardous releases, thus preventing exposures to the public. Handling of waste materials and hazardous waste is accomplished in accordance with federal, state, and local regulations, with scrap being sold for reclamation. Because of the above safety procedures, impacts to health and safety from beryllium would not be significant.

Potential cumulative impacts to health and safety would be minimized by using established safety procedures developed for similar operations at this facility.

ERINT beryllium activities would not represent a significant increase in current operations, and no cumulative impacts were identified.

Based on the above conclusions, all of the assessment criteria for a determination of no significant impact are met for beryllium component fabrication activities at L.A. Gauge.

Holloman AFB. Proposed rocket sled tests at Holloman AFB are described in Section 1.3.1.1. These activities would use existing personnel working in facilities routinely used for these types of facilities. These facilities would be operating at a level and intensity similar to current conditions. No new construction or modification of existing facilities would be required. For these reasons, these activities present no significant impacts to cultural resources, infrastructure, land use, physical resources, or socioeconomics. These activities would present no significant water resource impacts.

Sled test activities would, however, present potential air quality, biological resource, hazardous materials/waste, health and safety, and noise impacts. These environmental components and appropriate mitigations are discussed in more detail below.

Air Quality - Combinations of HVAR, Little John, and MLRS rocket motors would be used as sled boosters in the performance of these tests. These motors have been used on dozens of tests in the recent past at Holloman AFB (Haden, 1991a). Potential impacts to air quality from the rocket sled tests were obtained from emission product data in Tables 3-1, 3-2, and 3-3 for HVAR, Little John, and MLRS rocket engines. The emission concentration rates are shown in Tables 3-4, 3-5, and 3-6 for these systems, and indicate no significant impacts to air quality. Values are well below the standards for the 8-hour threshold limit value (TLV) for carbon monoxide and carbon dioxide. Impacts to air quality would be short-term and localized, and should not be significant.

Rocket sled tests for the ERINT program would not create cumulative impacts because of the limited quantity, and the prompt dispersion of exhaust products.

TABLE 3-1. HVAR AIR EMISSION PRODUCTS

Emission	Weight	
Carbon Dioxide (CO_2)	3.3 kg	(7.2 lbs)
Carbon Monoxide (CO)	3.8 kg	(8.3 lbs)
Hydrogen (H)	0.05 kg	(0.12 lbs)
Nitrogen (N)	1.6 kg	(3.6 lbs)
Water (H_2O)	2.0 kg	(4.4 lbs)

kg = kilogram
lbs = pounds
Source: Haden, 1991b

TABLE 3-2. LITTLE JOHN AIR EMISSION PRODUCTS

Emission	Weight	
Carbon Dioxide (CO_2)	25.8 kg	(56.8 lbs)
Carbon Monoxide (CO)	50.0 kg	(110.2 lbs)
Hydrogen (H)	1.13 kg	(2.5 lbs)
Nitrogen (N)	14.9 kg	(32.8 lbs)
Water (H_2O)	18.4 kg	(40.5 lbs)

kg = kilogram
lbs = pounds
Source: Haden, 1991b

TABLE 3-3. MLRS AIR EMISSION PRODUCTS

Emission	Weight	
Aluminum Oxide (Al_2O_3)	33.28 kg	(73.36 lbs)
Carbon Monoxide (CO)	21.52 kg	(47.44 lbs)
Carbon Dioxide (CO_2)	2.78 kg	(6.13 lbs)
Hydrogen Chloride (HCL)	19.84 kg	(43.74 lbs)
Nitrogen Dioxide (N_2)	8.06 kg	(17.79 lbs)
Water (H_2O)	8.62 kg	(19.00 lbs)

kg = kilogram
lbs = pounds
Source: Butler, 1991

TABLE 3-4. HVAR EMISSION RATES AND CONCENTRATIONS

Emission	Emission Rate kg/sec	(lbs/sec)	8-Hour Average Concentrations at 2000 Meters* (mg/m^3)	Standard 8 Hour TLV mg/m^3
CO_2	3.3	(7.2)	2.3×10^{-2}	9000.0
CO	3.8	(8.3)	5.7×10^{-1}	5.7

* Winds at 16 km/hr (10 mi/hr)
hr = hour m = meter
kg = kilogram mg = milligram
km = kilometers mi = mile
lbs = pounds sec = second
Source: Trinity Consultants, Inc., 1990

TABLE 3-5. LITTLE JOHN EMISSION RATES AND CONCENTRATIONS

Emission	Emission Rate kg/sec	(lbs/sec)	8-Hour Average Concentrations at 2000 Meters* (mg/m^3)	Standard 8 Hour TLV mg/m^3
CO_2	17.2	(37.9)	1.8×10^{-1}	9000.0
CO	33.3	(73.5)	3.5×10^{-1}	5.7

* Winds at 16 km/hr (10 mi/hr)
hr = hour m = meter
kg = kilogram mg = milligram
km = kilometers mi = mile
lbs = pounds sec = second
Source: Trinity Consultants, Inc., 1990

TABLE 3-6. MLRS EMISSION RATES AND CONCENTRATIONS

Emission	Emission Rate kg/sec	(lbs/sec)	8-Hour Average Concentrations at 2000 Meters* (mg/m^3)	Standard 8 Hour TLV mg/m^3
Al_2O_3	21.06	(46.49)	2.3×10^{-1}	10.0
CO	13.62	(30.07)	1.5×10^{-1}	5.7
CO_2	1.76	(3.89)	2.0×10^{-2}	9000.0
HCl	12.56	(27.73)	1.4×10^{-1}	7.5

* Winds at 16 km/hr (10 mi/hr)
hr = hour   m = meter
kg = kilogram   mg = milligram
km = kilometers   mi = mile
lbs = pounds   sec = second
Source: Trinity Consultants, Inc., 1990

Biological Resources - No significant impacts to biological resources from air emissions or noise have been identified from past sled test operations. The ERINT sled tests would be conducted at dusk to minimize the possibility of the rocket powered sled hitting birds which tend to roost on the rail during daylight hours. A slight concern exists in the event of a spill or other type of accident that hazardous materials are used in or generated by test track operations could potentially enter surface waters where the White Sands pupfish live. Because most test operations do not use or generate hazardous materials and because the distance from any potential accident site at the test track to the surface waters where the pupfish live is more than 1.6 kilometers (1 mile), this possibility is considered remote. ERINT activities at the test track do not involve or generate any hazardous materials that could potentially affect the pupfish. No significant impacts to biological resources are expected. (Holloman Air Force Base, 1991)

Hazardous Materials/Waste - Except for the use of solid propellants, the ERINT sled tests would not involve the use or generation of hazardous materials or waste. The sled tests would use existing surplus solid propellant rocket motors that would not require any additional processing (e.g., no fueling, cleaning, or painting) (Holloman Air Force Base, 1991). After completion of the tests, a flame thrower is routinely used to burn any residual propellant in the rocket motors (Holloman Air Force Base, 1991). No hazardous wastes would be generated. No significant hazardous materials/waste impacts are expected.

Because hazardous materials/waste activities would follow applicable regulations and procedures, no cumulative impacts would be expected.

Health and Safety - All personnel involved with sled test activities would be certified in the handling and storage of explosives in accordance with the requirements set forth in the 6585th Test Group's Division Operation Instructions and Track Branch Operating Instructions which implement the requirements of AFR 127-100 for the handling of explosives. An ESQD of 305 meters (1,000 feet) would be established around the test track; no personnel would be within the ESQD during the test. No significant health and safety impacts are expected.

Potential cumulative impacts to health and safety would be minimized by using established safety procedures, developed for similar operations at this facility.

Noise - Sound pressure magnitude is measured and quantified in terms of a level scale in units of dB. Because the human hearing system is not equally sensitive to sound at all frequencies, a frequency-dependent adjustment called the A-weighting has been developed so that sound may be measured in a manner similar to the way the human hearing system responds. The use of the A-weighted sound level is indicated by the abbreviation "dBA" for expressing the units of sound level quantities. Typical A-weighted sound levels measured for various sources are provided in Table 3-7.

The MLRS, HVAR, and Little John rocket motors would be used in the performance of the required sled tests. These motors have been used numerous times in recent years at Holloman AFB. Standard operating procedures would be used during the three ERINT sled tests. Noise impacts would be brief (less than 3 seconds) during motor firings and should be similar to past conditions.

The noise hazard during sled tests would be mitigated by designating off limit zones to personnel. Entry into these zones would be prohibited except to mission personnel who must enter these zones in support of the mission and they would be required to wear hearing protection. The nearest residential area to the track is the Holloman AFB post area, 8 kilometers (5 miles) to the southeast. The nearest off-base residential areas are in Tularosa, approximately 14 kilometers (9 miles) to the northeast, and Alamogordo, 18 kilometers (11 miles) to the east.

Because sled tests are short term events, and tests would not be simultaneous, no cumulative noise impacts were identified.

ERINT activities would not represent a significant increase in current operations, and no cumulative impacts were identified.

Based on the above conclusions, all of the assessment criteria for a determination of no significant impact are met for sled test activities at Holloman AFB.

3.2.1.2 Rocket Motor Development. The proposed SRM and ACM development activities for the ERINT-1 flight test missile at ARC, Gainesville, Virginia, SRM development and static test activities at Orange County, Virginia, and static test activities at Camden, Arkansas, are described in Section 1.3.1.2.

Gainesville Facility. The SRM and ACM development activities would use existing personnel working in facilities routinely used for these types of activities. These facilities would be operating at a level and intensity similar to current conditions. No new construction or modification of existing facilities would be required. For these reasons, these activities present no significant impacts to biological and cultural resources, infrastructure, land use, physical resources, or socioeconomics. These activities would produce no significant air emissions, wastewater discharges, or noise levels, and therefore no significant impacts are expected in these areas.

Rocket motor development activities would, however, present potential hazardous materials/waste and health and safety impacts. Both of these potentially affected environmental components and appropriate mitigations are discussed in more detail below.

Table 3-7. Typical Noise Levels of Familiar Noise Sources and Public Responses

Public Response	dBA	Noise Source
Physically Painful	140	Sonic Boom
Extremely Loud	135	
	130	EPA/USAF Aerospace Medical Research Laboratory - "No Serious Health Problems"
Threshold of Physical Discomfort	120	Jet Takeoff (Near Runway)
	110	Rock Music Band (Near Stage)
	105	
	100	Piledriver at 50 feet
	95	Freight Train at 50 feet; Ambulance Siren at 100 feet
Hearing Damage Criteria for 8-Hour Workday	90	
	85	Inside Boiler Room or Printing Press Plant
Most Residents Highly Annoyed	80	Garbage Disposal in Home at 3 feet
	75	Inside Sports Car at 50 MPH
	70	Freight Train at 100 feet
Acceptability Limit for Residential Development	65	Considered Acceptable for Residential Land Use; Average Urban Area
Goal for Urban Areas	55	Inside Department Store
	50	Typical Day Time Suburban Background
	40	Typical Bird Calls; Normal Levels Inside Home
	35	Typical Library
No Community Annoyance	30	Quiet Rural Area
	20	Inside Recording Studio
	10	Leaves Rustling
Threshold of Hearing	0	

Sources: U.S. Department of the Air Force, 1987; 1989.

Hazardous Materials/Waste - ERINT activities would involve the use of small quantities of solvents (i.e., Freon, 1,2 - dichloroethane, methylene chloride, and methyl ethyl ketone), chemlok 205 and 252, and graphite/epoxy composites. These materials would be handled according to recommendations on the MSDS for each. Waste propellant would be disposed of by thermal treatment (i.e., open burning) under a RCRA interim status permit. ARC is currently in compliance with this RCRA permit. No significant hazardous materials/waste impacts are expected.

Because hazardous materials/waste activities would follow applicable regulations and procedures, no cumulative impacts would be expected.

Health and Safety - ESQDs of 381 meters (1,250 feet) are established around propellant handling and mixing facilities, and around rocket motor storage facilities. All personnel working with or in the vicinity of explosives would be required to wear non-sparking safety shoes or leg stats, eye protection, and flame-resistant clothing. Hazardous materials would be handled according to the recommendations on the MSDS for each. No significant health and safety impacts are expected.

Potential cumulative impacts to health and safety would be minimized by using established procedures, developed for similar operations at this facility.

ERINT activities would not represent a significant increase in current operations, and no cumulative impacts were identified.

Based on the above conclusions, all of the assessment criteria for a determination of no significant impact are met for ERINT-1 rocket motor development activities at the ARC Gainesville facility.

Orange County Facility. The SRM development and static testing activities would use existing personnel working in facilities routinely used for these types of activities. These facilities would be operating at a level and intensity similar to current conditions. No new construction or modification of existing facilities would be required. For these reasons, these activities present no significant impacts to biological and cultural resources, infrastructure, land use, physical resources, or socioeconomics. These activities would produce no significant wastewater discharge and there are no water quality or quantity constraints; therefore, no significant impacts to water resources are expected.

Rocket motor development activities would, however, present potential air quality, hazardous materials/waste, health and safety, and noise impacts. These potentially affected environmental components and appropriate mitigations are discussed in more detail below.

Air Quality - Static fire testing of the SRM would present potential air quality impacts. The facility has a permit for its test fire operations. The proposed testing would be similar to past and ongoing activities at the facility, and the frequency of tests for the ERINT program should not represent a significant increase in the number of tests normally conducted at the facility. Any impacts to air quality would be short term and localized, and should not be significant.

Hazardous Materials/Waste - Waste propellant would be disposed of by thermal treatment (open burning) under an EPA Research, Development, and

Demonstration permit. No significant hazardous materials/waste impacts are expected.

Because hazardous materials/waste activities would follow applicable regulations and procedures, no cumulative impacts would be expected.

Health and Safety - All personnel working with or in the vicinity of propellants would be required to wear non-sparking safety shoes or leg stats, eye protection, and flame-resistant clothing. ESQDs are established around rocket motor storage and static test facilities. During static fire testing, a 381-meter (1,250-foot) ESQD would be cleared of all nonessential personnel. Electronic control features would prevent accidental fire-up of the SRM and it would be grounded at all times. A fire truck is available on the installation. For these reasons, no significant health and safety impacts are expected.

Potential cumulative impacts to health and safety would be minimized by using established safety procedures, developed for similar operations at this facility.

Noise - Static fire testing of the SRM would present potential noise impacts. Because a 381-meter ESQD around the static test location will be cleared, no personnel would be in the immediate area during testing. Static fire testing will take place only between 7:00 a.m. and 7:00 p.m., and noise levels would not exceed 80 dB at the facility property line (see Table 3-7). Therefore, no significant impacts from noise are expected.

Because static tests are short-term events, and tests would not be simultaneous, no cumulative noise impacts were identified.

Based on the above conclusions, all of the assessment criteria for a determination of no significant impact are met for ERINT-1 rocket motor development and static testing activities at the ARC Orange County facility.

Camden Facility. The flight test missile static testing activities at the Camden facility are discussed in Section 1.3.1.1. These activities would use existing personnel working in facilities routinely used for these types of activities. These facilities would be operating at a level and intensity similar to current conditions. No new construction or modification of existing facilities would be required. For these reasons, no significant impacts to biological and cultural resources, infrastructure, land use, physical resources, or socioeconomics are expected. These activities would produce no significant wastewater discharge and there are no water quality or quantity constraints; therefore, no significant water resource impacts are expected.

Static testing activities would present potential air quality, hazardous materials/waste, health and safety, and noise impacts. These potentially affected environmental components and appropriate mitigations are discussed in more detail below.

Air Quality - The ARC Camden facility has a permit for ongoing test fire operations. The proposed testing would be similar to past and ongoing activities at the facility, and the frequency of tests for the ERINT program should not represent a significant increase in the number of tests normally conducted at the facility. Any impacts to air quality would be short term and localized, and should not be significant.

Increased static fire test from ERINT activities would not create cumulative impacts because of the limited quantity, and the prompt dispersion of exhaust products.

Hazardous Materials/Waste - Other than the solid propellant used in the SRM, no hazardous materials would be used in support of ERINT activities. The spent SRM would be returned to the Gainesville facility for disposal by open burning.

Because hazardous materials/waste activities would follow applicable regulations and procedures, no cumulative noise impacts would be expected.

Health and Safety - All personnel working with or in the vicinity of explosives would be required to wear non-sparking safety shoes or leg stats, eye protection, and flame-resistant clothing. During static fire testing, a 450-meter (1,475-foot) ESQD would be cleared of all nonessential personnel. For these reasons, no significant health and safety impacts are expected.

Potential cumulative impacts to health and safety would be minimized by using established safety procedures, developed for similar operations at this facility.

Noise - Static fire testing of the SRM would present potential noise impacts. Because a 450-meter ESQD around the test area would be cleared, no personnel would be in the immediate area during testing. Therefore, no significant noise impacts are expected.

Because static tests are short-term events, and tests would not be simultaneous, no cumulative noise impacts were identified.

ERINT activities would not represent a significant increase in current operations, and no cumulative impacts were identified.

Based on the above conclusions, all of the assessment criteria for a determination of no significant impact are met for ERINT-1 static testing activities at the ARC Camden facility.

3.2.2 ERINT Target System (ETS)

The proposed ERINT target system development activities would be conducted at Aerotherm, Mountain View, California; Orbital Sciences Corporation, Chandler, Arizona; Hill AFB, Utah; and Pueblo Depot Activity, Colorado. These activities are described in Section 1.3.2.

3.2.2.1 Ballistic Target Assembly Development. The proposed development activities at Aerotherm, Mountain View, California, are described in Section 1.3.2.1. These activities would use existing personnel working in facilities routinely used for these types of activities. These facilities would be operating at a level and intensity similar to current conditions. No new construction or significant modification of existing facilities would be required. For these reasons, these activities present no significant impacts to biological and cultural resources, infrastructure, land use, physical resources, or socioeconomics. These activities would produce no significant air quality, water resource, or noise impacts.

Target development would, however, present potential hazardous materials/ waste and health and safety impacts. These environmental components and appropriate mitigations are discussed in more detail below.

Hazardous Materials/Waste - All hazardous materials would be handled and stored according to manufacturer's procedures described on the MSDSs, and the Mountain View City Code (City of Mountain View, 1990). Procedures in the company *Occupational Health and Safety Manual and Injury and Illness Prevention Program* (Aerotherm Corporation, 1991) would be utilized for the storage, handling, and use of ordnance and other hazardous materials. No significant hazardous materials and waste impacts are expected.

Because hazardous materials/waste activities would follow applicable regulations and procedures, no cumulative impacts would be expected.

Health and Safety - ERINT target fabrication activities would present potential impacts to health and safety. Safety procedures at Aerotherm would include use of personal protective equipment (e.g., dust masks) and general ventilation consistent with procedures specified on the MSDS for each material. The completed hardware would not present a public health and safety issue. Potential impacts to health and safety would not be significant (Delano, 1990).

Potential cumulative impacts to health and safety would be minimized by using established safety procedures, developed for similar operations at this facility.

ERINT activities would not represent a significant increase in current operations, and no cumulative impacts were identified.

Based on the above conclusions, all of the assessment criteria for a determination of no significant impact are met for the ERINT target development activities at Aerotherm.

3.2.2.2 Target System Missile Development. The proposed target system missile development activities at Orbital Sciences, Space Data Division, Chandler, Arizona, are described in Section 1.3.2.2. These activities would use existing personnel working in facilities routinely used for these types of activities. These facilities would be operating at a level and intensity similar to current conditions. No new construction or significant modification of existing facilities would be required. For these reasons, these activities present no significant impacts to biological and cultural resources, infrastructure, land use, physical resources, or socioeconomics. These activities would produce no significant air quality, water resource, or noise impacts.

Target system missile development would, however, present potential hazardous materials/waste and health and safety impacts. These environmental components and appropriate mitigations are discussed in more detail below.

Hazardous Materials/Waste - Chemical filming activities and the use of solvents present potential hazardous materials and waste impacts. All hazardous materials would be disposed of according to the facility's *Hazardous Materials Management Plan* (Space Data Division, 1990a). Orbital Sciences has developed a system safety plan for the ERINT program to implement Military Standard-882B and to outline steps to ensure system and personnel safety

(Space Data Corporation, 1990). No significant hazardous materials and waste impacts are expected.

Because hazardous materials/waste activities would follow applicable regulations and procedures, no cumulative impacts would be expected.

Health and Safety - Use of chemical filming materials and solvents presents a potential health and safety issue; however, these materials would be used according to the recommendations on the MSDSs. Orbital Sciences has developed a system safety plan for the ERINT program to implement Military Standard-882B and to outline steps to ensure system and personnel safety (Space Data Corporation, 1990). A *Hazard Communication Program Plan* has been implemented at the facility (Space Data Division, 1990b). Therefore, no significant impacts to health and safety are expected.

Potential cumulative impacts to health and safety would be minimized by using established safety procedures developed for similar operations at this facility.

ERINT activities would not represent a significant increase in current operations, and no cumulative impacts were identified.

Based on the above conclusions, all of the assessment criteria for a determination of no significant impact are met for ERINT target system missile development activities at Orbital Sciences.

3.2.2.3 Rocket Motor Refurbishment/Inspection

M57A-1. The proposed rocket motor refurbishment activities at Hill AFB, Utah, are described in Section 1.3.2.3. These activities would use existing personnel working in facilities routinely use for these types of activities. These facilities would be operating at a level and intensity similar to current conditions. No new construction or modification of existing facilities would be required. For these reasons, these activities present no significant impacts to biological and cultural resources, infrastructure, land use, physical resources, or socioeconomics. These activities would produce no significant air quality, water resource, or noise impacts.

Rocket motor refurbishment would, however, present potential hazardous materials/waste and health and safety impacts. These environmental components and appropriate mitigations are discussed in more detail below.

Hazardous Materials/Waste - Proposed ERINT rocket motor refurbishment activities at Hill AFB, Utah, would involve small quantities of the cleaning solvent TCA, hydraulic fluids (petroleum products), and small amounts of paint to label each rocket motor with identification numbers. These materials are routinely used in these facilities, and all Hill AFB facilities are currently in compliance with the RCRA (Maulding, 1990). All hazardous materials/wastes are handled and disposed of in accordance with RCRA permit requirements; therefore, no significant hazardous materials/waste impacts are expected.

Because hazardous materials/waste activities would follow applicable regulations and procedures, no cumulative impacts would be expected.

Health and Safety - Rocket motor refurbishment activities would involve the use of propellants; however, ESQDs of a minimum of 381 meters (1,250 feet) have been established around the rocket motor storage and maintenance area based on requirements described in AFR 127-100 (Graziano, 1991b). Hill AFB would use safety measures for all M57A-1 refurbishment activities x-raying the motor, as described in Technical Order 2K-SRM57-3, *Technical Manual, Overhaul Instructions with Maintenance Parts List, M57A-1 MINUTEMAN Third Stage Rocket Motor Part No. 01A00063* (U.S. Department of the Air Force, 1990a) (McCarty, 1991; Vlaardingerbroek, 1991). These activities are routine at Hill AFB; therefore, no significant health and safety impacts are expected.

Potential cumulative impacts to health and safety would be minimized by using established safety procedures, developed for similar operations at this facility.

ERINT activities would not represent a significant increase in current operations, and no cumulative impacts were identified.

Based on the above conclusions, all of the assessment criteria for a determination of no significant impact are met for ERINT rocket motor refurbishment activities at Hill AFB.

XM-100. The proposed rocket motor inspection activities at Pueblo Depot Activity, Colorado, are described in Section 1.3.2.3.

These activities would use existing personnel working in facilities routinely used for these types of activities. These facilities would be operating at a level and intensity similar to current conditions. No new construction or significant modification of existing facilities would be required. For these reasons, these activities present no significant impacts to biological and cultural resources, infrastructure, land use, physical resources, or socioeconomics. These activities would produce no significant air quality, water resource, or noise impacts.

Rocket motor inspection activities would, however, present potential hazardous materials/waste and health and safety impact. These environmental components and appropriate mitigations are discussed in more detail below.

Hazardous Materials/Waste - Other than propellants, no hazardous materials would be required for ERINT activities. Pueblo Depot Activity would follow the facility's *Hazardous Waste Management Plan* (U.S. Army Corps of Engineers, 1991) requirements for the handling of any hazardous materials. These activities would be routine at the facility; therefore, no significant hazardous materials/waste impacts are expected.

Because hazardous materials/waste activities would follow applicable regulations and procedures, no cumulative impacts would be expected.

Health and Safety - Proposed ERINT rocket motor inspection activities would involve the use of propellants; however, ESQDs of approximately 1.6 kilometers have been established around the rocket motor storage and maintenance areas. Pueblo Depot Activity would use safety measures required by the DOD and DOT, and as referenced in Section 1.3.1.1. A Standard Operating Procedure, based on AMC-R 700-107, *Preparation of Standard Operating Procedures for Ammunition Operations* (U.S. Army Materiel Command, 1986), for the radiographic inspection of the SERGEANT booster would be followed. These activities would be routine at Pueblo Depot Activity; therefore, no significant health and safety impacts are expected.

Potential cumulative impacts to health and safety would be minimized by using established safety procedures, developed for similar operations at this facility.

ERINT activities would not represent a significant increase in current operations, and no cumulative impacts were identified.

Based on the above conclusions, all of the assessment criteria for a determination of no significant impact are met for ERINT rocket motor inspection activities at Pueblo Depot Activity.

3.2.3 Theater Missile Defense Chemical Flight Experiment Activities

3.2.3.1 Simulant Preparation. Proposed simulant preparation activities at Battelle's West Jefferson site are described in Section 1.3.3.2. Of the approximately 150 personnel at this location, two would be involved in these activities. All TMDCFE program activities at Battelle would be conducted in existing facilities routinely used for these types of activities; these facilities would be operating at a level and intensity similar to current conditions. No new construction or modification of existing facilities would be required. For these reasons, these activities present no significant biological, cultural resource, infrastructure, land use, physical resources, or socioeconomics impacts.

These activities would produce no significant air emissions, wastewater discharges, or noise levels, and therefore no significant impacts are expected in these areas.

Simulant preparation would, however, present potential hazardous materials and waste, and health and safety impacts. These environmental components and appropriate mitigations are discussed below for both the TMDBCE and TMDSCE.

<u>TMDBCE Simulant Processing</u>

Hazardous Materials/Waste - The characteristics of TEP, PMMA, and the fluorescent dye that constitute the chemical simulant are described in Section 1.3.3.1. These materials are routinely handled at Battelle. Each material would be transported, handled, and stored according to instructions on the MSDS for that substance (see Appendix A). Accidental spills and leaks would also be handled according to MSDS instructions (Alexander, 1990c) and according to procedures described in Battelle's *Emergency Plan, Battelle West Jefferson Site* (Battelle, 1990).

The simulant would be processed, transported, and stored in the original TEP industrial containers (Dugas, 1990). Except for the small samples of processed simulant withdrawn for viscosity characterization, no TEP would be transferred from the original containers for processing. Little or no chemical waste is anticipated.

None of the simulant components is listed as a hazardous substance by CERCLA (Engrum, 1990; Jacobs, 1990). Therefore, no significant hazardous materials/waste impacts are expected from the use of these substances. However, caution would be used when handling the simulant, as recommended on the MSDSs, and in keeping with standard operating procedures at the facility.

Because hazardous materials/waste activities would follow applicable regulations and procedures, no cumulative impacts would be expected.

Health and Safety - Each simulant component would be transported, stored, and handled according to instructions on the MSDS for that chemical substance (Alexander, 1990c). Accidental spills and leaks would also be handled according to MSDS instructions (Alexander, 1990c) and according to procedures described in Battelle's *Emergency Procedures, Battelle West Jefferson Site* (Battelle, 1990). Because TEP is the main simulant component, and it does not react with the other components in the simulant mixture (Alexander, 1990h), the simulant will be handled as TEP. Although TEP can cause eye irritation, it has a low hazard potential for inhalation and skin exposure. However, protective gloves, clothing, and eyewear would be worn by personnel handling the simulant, as recommended in the MSDSs (Eastman Kodak Company, 1986).

Although general room ventilation is considered adequate when handling TEP, Battelle's standard operating procedures require that the containers of TEP be opened under ventilating hoods (Dugas, 1990). Because these materials will be handled according to the manufacturers' instructions on the MSDSs, no significant health and safety impacts are expected from these activities.

Potential cumulative impacts to health and safety would be minimized by using established safety procedures, developed for similar operations at this facility.

ERINT activities would not represent a significant increase in current operations, and no cumulative impacts were identified.

Based on the above conclusions, all of the assessment criteria for a determination of no significant impact are met for TMDBCE simulant processing activities at Battelle.

<u>TMDSCE Simulant Preparation</u>

Hazardous Materials/Waste - The TMDSCE would consist entirely of TEP. TEP is not listed as a hazardous material by the CERCLA. Handling procedures would follow recommendations on the MSDS for TEP, and procedures described in Battelle's *Emergency Plan, Battelle West Jefferson Site* (Battelle, 1990).

Other than the TEP transferred to the individual canisters, no TEP would be removed from the original shipping container. Procedures described for the handling of TEP for TMDBCE simulant processing would be followed. No significant hazardous materials/waste impacts are expected.

Because hazardous materials/waste activities would follow applicable regulations and procedures, no cumulative impacts would be expected.

Health and Safety - Procedures for the safe handling of TEP described for the TMDBCE simulant would be followed. No significant health and safety impacts are expected.

Potential cumulative impacts to health and safety would be minimized by using established safety procedures, developed for similar operations at this facility.

ERINT activities would not represent a significant increase in current operations, and no cumulative impacts were identified.

Based on the above conclusions, all of the assessment criteria for a determination of no significant impact are met for simulant preparation activities at Battelle.

3.2.4 Flight Preparation

The proposed ERINT flight preparation activities would be conducted at WSMR. These activities are described in Section 1.3.4.

3.2.4.1 ERINT-1 Flight Test Missile. Inspection, assembly, and testing of the flight test missile components at WSMR are described in Section 1.3.4.1. These activities would be conducted in existing facilities routinely used for these types of activities and these facilities would be operating at a level and intensity similar to current conditions. No new construction or modification of existing facilities would be required. For these reasons, these activities present no significant impacts to biological and cultural resources, infrastructure, land use, and physical resources. These activities would require a maximum of 30 temporary contractor personnel, in addition to the 5 existing post personnel. Because approximately 7,550 people currently work at WSMR, these personnel requirements should present no significant socioeconomic impact. These activities would present no significant air quality, water resource, or noise impacts.

ERINT-1 flight preparation activities would, however, present potential hazardous materials/waste and health and safety impacts. These environmental components and appropriate mitigations are discussed below.

Hazardous Materials and Waste - It has not yet been determined whether use of paints and solvents during ETS assembly activities would be required. If so, WSMR regulations for the use and handling of any hazardous materials must be followed. The range user is responsible for any hazardous materials brought on range and is responsible for their disposal (White Sands Missile Range, 1990b).

Because hazardous materials/waste activities would follow applicable regulations and procedures, no cumulative impacts would be expected.

Health and Safety - ESQDs of 381 meters (1,250 feet) are established around locations where missile ordnance would be stored or handled. Explosives would be handled and stored in accordance with safety measures described in AR 385-64, *Ammunition and Explosives Safety Standards* (U.S. Department of the Army, 1987). The radar Doppler test would be conducted in accordance with the guidelines of Technical Guide Number 153, *Guidelines for Controlling Potential Health Hazards from Radiofrequency Radiation* (U.S. Environmental Hygiene Agency, 1987) which presents the Surgeon General's guidelines for controlling potential health hazards from radiofrequency radiation, and implements DOD instructions for protecting personnel from exposure to radiofrequency radiation. (Blevins, 1991; Richey, 1991d)

Potential cumulative impacts to health and safety would be minimized by using established safety procedures, developed for similar operations at WSMR.

ERINT activities would not represent a significant increase in current operations, and no cumulative impacts were identified.

Based on the above conclusions, all of the assessment criteria for a determination of no significant impact are met for flight preparation activities at LC50.

3.2.4.2 ERINT Target System (ETS)

ERINT Ballistic Tactical Missile Target System. Inspection, assembly, and testing of the target system components are described in Section 1.3.4.2. Modifications to the Sulf Site would be required. The potential impacts of these activities are discussed in the REC described in Section 1.3.4.2 (see Appendix B). This document does not include the renovation at Building N238 (S34060). A maximum of 12 contractor personnel for each launch would be required, in addition to the 8 existing post personnel. WSMR currently has a work force of approximately 7,550; therefore, these personnel requirements present no significant socioeconomic impact. Modifications to the Sulf Site would take place in a previously disturbed area, and would not alter the use of the site, which is to support rocket and missile launches. These activities would produce no significant infrastructure, land use, physical resource, or water resource impacts.

These activities would present potential air quality, biological and cultural resource, hazardous materials/waste, health and safety, and noise impacts. These environmental components and appropriate mitigations are discussed in more detail below.

Air Quality - Construction activities at the Sulf Site may result in pollutants from construction equipment exhaust and dust from vehicular traffic on unpaved roads. Because these would not be continuous emissions and because of the good atmospheric dispersion characteristics of the area, no significant impacts to air quality are expected. The REC for the Sulf Site modification states that this activity would present no change to the potential to cause air pollution.

Biological Resources - The Sulf Site modification activities would take place entirely within a pre-disturbed, graded area. The area has been cleared and it contains no vegetation. Surveys conducted by the WSMR Environmental Services Division indicate that no threatened or endangered species are present at the Sulf Site (Naval Ordnance Missile Test Station, 1989b). Since the area has been cleared, and no sensitive species are present, no significant impacts to biological resources are expected. These findings have been confirmed in the REC for the Sulf Site modifications.

The REC for the Sulf Site modification indicates that because activity related to construction and operations of the ERINT tests would occur on previously disturbed soil and within the Sulf Site launch complex, they would present no change to the potential for impacts to protected species or their habitats.

ERINT Sulf Site upgrades would not create cumulative biological impacts because activities would take place entirely within a pre-disturbed area.

Cultural Resources - The Sulf Site modification activities would take place entirely in an area previously impacted by grading operations. The WSMR Environmental Services Division conducted an archaeological survey which showed that no cultural resources exist at the Sulf Site (Naval Ordnance Missile Test Station, 1989b). These findings have been confirmed in the REC for the Sulf Site modifications. As specified in the REC for the Sulf Site, and verified by the findings of the WSMR Environmental Services Division survey, proposed ERINT activities would present no adverse affects to cultural resources either eligible for inclusion or listed on the NRHP.

Because no cultural resources are located at the Sulf Site, no cumulative impacts are expected.

Hazardous Materials/Waste - It has not yet been determined whether use of paints and solvents during ETS assembly activities would be required. If so, WSMR regulations for the use and handling of any hazardous materials must be followed. The range user is responsible for any hazardous materials brought on range and is responsible for their disposal (White Sands Missile Range, 1990b).

The renovation of Building N238 (S34060) may present an asbestos problem. A preliminary survey conducted by the Naval Ordnance Missile Test Station (NOMTS) Environmental Office has indicated the presence of asbestos-containing materials in the storage building (White Sands Missile Range, 1991). During building renovations, any asbestos-containing materials (e.g., exterior shingles, acoustic ceiling, insulation) will be repaired, removed, or disposed of in accordance with the WSMR SSOP for Handling Friable Asbestos (U.S. Department of the Army, 1989). This SSOP incorporates the asbestos handling requirements of the EPA NESHAP (40 CFR 61), OSHA regulations (29 CFR 1910), and guidelines provided by the DOD and the Department of the Army. The NOMTS Environmental Office would prepare an asbestos abatement plan and submit it, through the WSMR Environmental Services Division, to the New Mexico ED, Air Quality Bureau, for approval (White Sands Missile Range,1991).

The TMDBCE processed simulant would be transported, stored, and handled according to the safety measures described on the TEP MSDS because TEP is the main simulant component and it does not react with the other components. Handling procedures for the TMDSCE simulant would also follow the recommendations on the TEP MSDS. The simulant would be stored in the VANDAL Missile Assembly Building at the Sulf Site, and would be incorporated into the target on the launch pad.

Because hazardous materials/waste activities would follow applicable regulations and procedures, no cumulative impacts would be expected.

Health and Safety - ESQDs of 381 meters (1,250 feet) are established around locations where missile ordnance would be stored or handled. Explosives would be handled and stored in accordance with safety measures described in AR 385-64, *Ammunition and Explosives Safety Standards* (U.S. Department of the Army, 1987). The renovation of Building N238 (S34060) may present an asbestos problem, as discussed above.

The TMDBCE processed simulant would be transported, stored, and handled according to the safety measures described on the TEP MSDS, because TEP is the main simulant component and it does not react with the other components. Handling procedures for the TMDSCE simulant would also follow the recommendations on the TEP MSDS. The simulant would be stored in the VANDAL Missile Assembly Building at the Sulf Site. The TMDCFE would be incorporated into the target on the launch pad.

Potential cumulative impacts to health and safety would be minimized by using established safety procedures, developed for similar operations at WSMR.

Noise - Construction equipment at the Sulf Site would generate noise. Appropriate ear protection would be worn by all personnel as required. The REC for the Sulf Site modification states that this activity would present no change to the potential to violate a noise standard. No significant noise impacts are expected.

Because proper ear protection would be used by construction personnel during modification activities, no cumulative impacts are expected.

Based on the above conclusions, all of the assessment criteria for a determination of no significant impact are met for flight preparation activities at the Sulf Site.

Air-Breathing Target. Flight preparation activities for the MQM-107 are discussed in Section 1.3.4.2. These activities would be conducted in existing facilities at the Army Materiel Test and Evaluation Drone Launch Facility routinely used for these types of activities and these facilities would be operating at a level and intensity similar to current conditions. No new construction or modification of existing facilities would be required. For these reasons, these activities present no significant impacts to biological and cultural resources, infrastructure, land use, and physical resources. These activities would require 10 existing MICOM personnel. These personnel requirements would present no significant socioeconomic impact. These activities would present no significant air quality, water resource, or noise impacts.

These activities would, however, present potential hazardous materials/waste and health and safety impacts. These environmental components and appropriate mitigations are discussed below.

Hazardous Materials/Waste - It has not yet been determined whether use of paints and solvents during these activities would be required. If so, WSMR regulations for the use and handling of any hazardous materials must be followed. The range user is responsible for any hazardous materials brought on range and is responsible for their disposal (White Sands Missile Range, 1990b).

Because hazardous materials/waste activities would follow applicable regulations and procedures, no cumulative impacts would be expected.

Health and Safety - ESQDs of 381 meters (1,250 feet) are established around locations where missile ordnance would be stored or handled. Explosives would be handled and stored in accordance with safety measures described in AR 385-64, *Ammunition and Explosives Safety Standards* (U.S. Department of the Army, 1987).

Potential cumulative impacts to health and safety would be minimized by using established safety procedures, developed for similar operations at WSMR.

ERINT activities would not represent a significant increase in current operations, and no cumulative impacts were identified.

Based on the above conclusions, all of the assessment criteria for a determination of no significant impact are met for flight preparation activities at the Drone Launch Facility.

ERINT Maneuvering Tactical Missile Target System. Flight preparation activities for the ERINT maneuvering tactical missile target system are essentially the same as those described for the ballistic tactical missile target system in Section 1.3.4.2. Potential impacts from these activities are the same as those described for the ETS ballistic tactical target missile, except that upgrades to the Sulf Site would be completed prior to these activities. Because complete details are not yet available on these activities, supplemental documentation will be provided at a later date, prior to this portion of the action proceeding, verifying no significant impacts.

3.2.5 Flight Testing

The proposed flight tests at WSMR would include ERINT-1 missile launches from LC50; ETS ballistic and maneuvering target missile launches from the Sulf Site; MQM-107 launches from the Army Materiel Test and Evaluation Drone Facility; and missile-target intercepts. These activities are described in Section 1.3.5.

3.2.5.1 ERINT-1 Flight Test Missile. ERINT-1 flight testing activities are described in Section 1.3.5.1. These activities would involve approximately 5 existing and 30 temporary personnel. Because approximately 7,550 personnel currently work at WSMR, the number of people required for these activities would not pose any significant infrastructure or socioeconomic impacts. No physical resource impacts have been identified.

These activities do present potential air quality, biological and cultural resources, hazardous materials and waste, health and safety, land use, noise, and water resource impacts. These environmental components and appropriate mitigations are discussed in more detail below.

Air Quality - Missile launches would produce air emissions. Emission products from the ERINT-1 motor are shown in Table 3-8. Using the emission products data, 8-hour average concentrations were calculated and are presented in Table 3-9. The results indicate no significant impact to air quality because of the short burn time of the motor (5 seconds) and small amounts of exhaust products. Values are well below the standards for the 8-hour threshold limit values for aluminum oxide, carbon monoxide, carbon dioxide, and hydrogen chloride.

The favorable wind conditions that exist at WSMR would result in dispersal of combustion products over large areas and therefore there should be no

TABLE 3-8. ERINT-1 AIR EMISSION PRODUCTS

Emission	Weight	
Aluminum Oxide (Al_2O_3)	40.7 kg	(89.7 lbs)
Carbon Monoxide (CO)	26.1 kg	(57.6 lbs)
Carbon Dioxide (CO_2)	2.7 kg	(5.9 lbs)
Hydrogen (H_2)	2.7 kg	(5.9 lbs)
Hydrogen Chloride (HCl)	23.5 kg	(51.8 lbs)
Water (H_2O)	7.6 kg	(16.8 lbs)
Nitrogen (N_2)	9.9 kg	(21.9 lbs)

kg = kilogram
lbs = pounds
Source: Boychuk, 1991b

TABLE 3-9. ERINT-1 EMISSION RATES AND CONCENTRATIONS

Emission	Emission Rate kg/sec	(lbs/sec)	8-Hour Average Concentrations at 2000 Meters* (mg/m^3)	Standard 8 Hour TLV mg/m^3
Al_2O_3	8.2	(17.9)	6.8×10^{-19}	10.0
CO	5.2	(11.5)	4.3×10^{-19}	5.7
CO_2	0.5	(1.2)	4.2×10^{-20}	9000.0
HCl	4.7	(10.4)	3.9×10^{-19}	7.5

* Winds at 16 km/hr (10 mi/hr)
hr = hour; m = meter
kg = kilogram; mg = milligram
km = kilometers; mi = mile
lbs = pounds; sec = second
Source: Boychuk, 1991b

significant impact on the environment (U.S. Army White Sands Missile Range, 1989).

The ERINT-1 radar section and mid-section assembly contain beryllium components and internal missile structure items for mounting these components. Beryllium is listed as a hazardous air pollutant. The EPA emission standard for beryllium is 10 grams over a 24-hour period. These standards were established with constant emissions in mind, such as at a machine shop or factory. Beryllium is a hepatotoxin and prolonged exposure may cause respiratory problems. It is also an animal carcinogen. However, the beryllium components are solid masses and there is no possibility that they will become part of the vehicle's emissions (Dynaspan Services Company, 1986). For ERINT-1 flight tests, during intercept or flight termination, break up of beryllium components may occur. However, production of respirable size particulates is unlikely, due to the physical properties of beryllium. Because of the high altitude of these tests, particulates would be dispersed, and would not reach ground level in significant concentrations.

If it is necessary to terminate a flight of the ERINT-1 missile, the command destruct system would be activated by range safety. As a result of this action, debris would be generated from rocket motor and payload material fragmentation. The solid propellant would burn intensely, allowing the exhaust gas products to disperse in all directions. The prevailing winds would increase the atmospheric dispersion of the exhaust products, further reducing their concentrations. Some hazardous materials, such as lithium (batteries) and beryllium (radar seeker components), would most likely fragment into small pieces and fall within the debris impact zones. These fragments would then be recovered and disposed of in accordance with established WSMR recovery procedures. The debris impact zone would be within the flight hazard corridor established by range safety and cleared of personnel prior to launch activities.

Air dispersion concentrations were calculated for the ERINT-1 in the event of a launch failure on the pad. These values appear in Table 3-10. Values are well below the standards for the 8-hour threshold for aluminum oxide, carbon monoxide, carbon dioxide, and hydrogen chloride. The assumption for this calculation was that all propellant would be burned, contributing to the maximum possible amount of emissions. This results in a highly conservative estimate, since this event would most likely not occur.

TABLE 3-10. ERINT-1 EMISSION RATES AND CONCENTRATIONS FOR A LAUNCH FAILURE

Emission	Emission Rate kg/sec	(lbs/sec)	8-Hour Average Concentrations at 2000 Meters* (mg/m^3)	Standard 8 Hour TLV mg/m^3
Al_2O_3	8.2	(17.9)	2.8×10^{-1}	10.0
CO	5.2	(11.5)	1.8×10^{-1}	5.7
CO_2	0.5	(1.2)	1.8×10^{-2}	9000.0
HCl	4.7	(10.4)	1.6×10^{-1}	7.5

* Wind at 16 km/hr (10 mi/hr)
hr = hour, m = meter
kg = kilogram, mg = milligram
km = kilometers, mi = mile
lbs = pounds, sec = second
Source: Trinity Consultants, Inc., 1990.

Biological Resources - Potential impacts to biological resources from debris impacts and noise are discussed below.

Proposed project activities would result in widely scattered debris hitting the ground. This could result in disturbance of the ground surface and the loss of some plants or animals in the area near where the impact occurs. Such events would occur in the LE fragment areas, impact areas for the missile body parts, and low-beta impact areas (see Figure 1-29). Information on the distribution of sensitive species in these areas is limited. However, these sensitive species tend to be widely scattered and occupy small surface areas. Because of this, the chance of individuals of sensitive species being struck by falling debris is expected to be remote and impacts are not expected to be significant. Therefore, extensive surveys to determine the location of sensitive species in these areas are not appropriate.

The Texas horned lizard is known to be present at WSMR. Baird's sparrow, peregrine falcon, Bell's vireo, and gray vireo are not known to occur in any of the debris impact areas. Known populations of Todsen's pennyroyal are outside areas potentially affected by ERINT flight tests. The chance that an individual of any of these species would be impacted by falling debris is remote. Therefore, it is expected that the proposed action would not have a significant impact on these species.

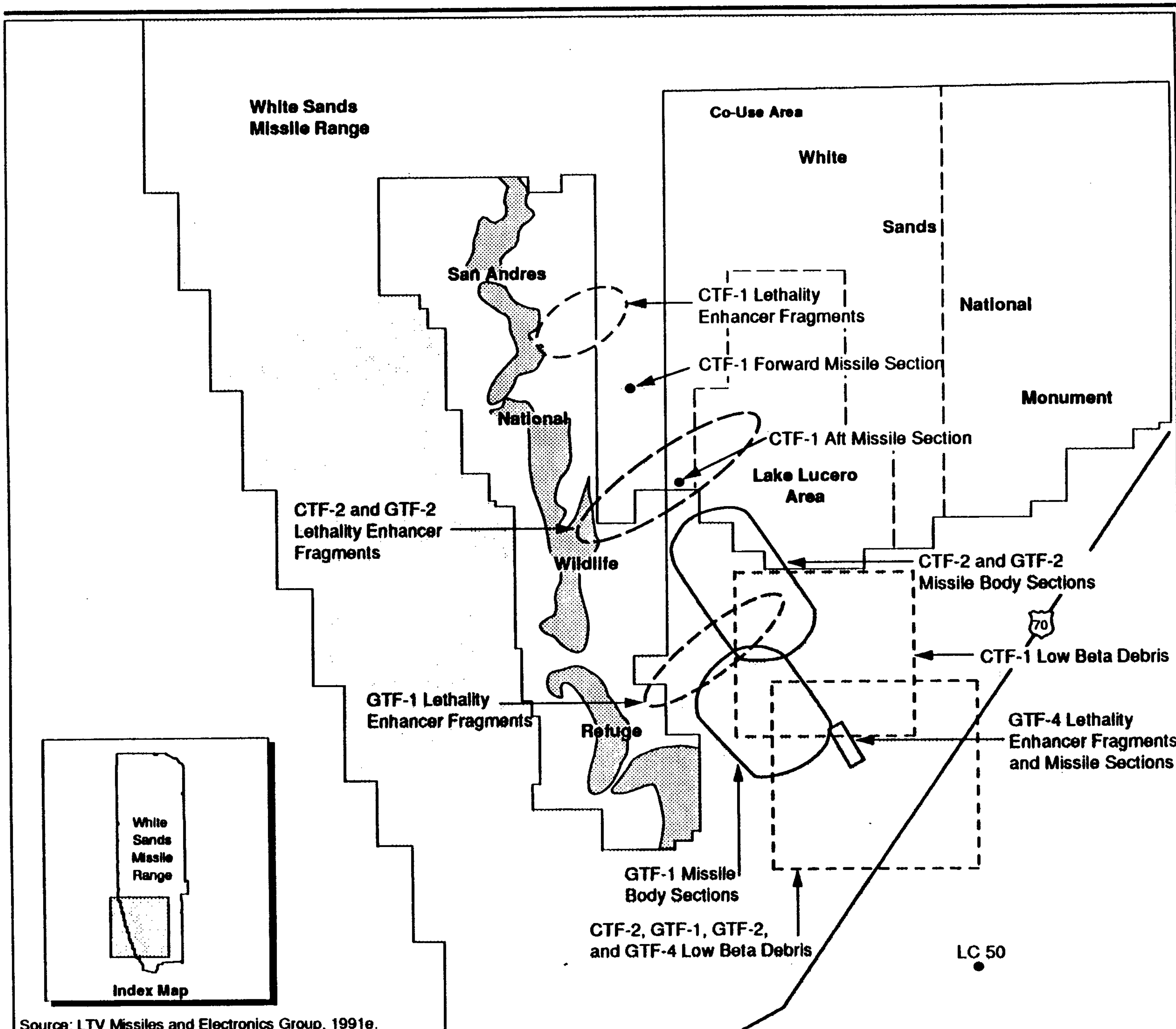
ERINT-1 flight trajectories have been adjusted to minimize debris impact in the San Andres National Wildlife Refuge and other sensitive areas, as well as adhere to requirements of the agreement between the National Parks Service and WSMR with regard to debris impact in the White Sands National Monument. The predicted LE fragment impact areas do, however, include desert bighorn sheep habitat. A risk analysis was performed to determine the probability of a bighorn sheep being hit by LE fragments. The LE fragment impact zone is ellipsoidal in shape and a portion of this zone is within the refuge (Figure 3-2). The results of the analysis estimated the probability of an LE fragment hitting a bighorn sheep to be in the order of magnitude of 10^{-8} (or one in one-hundred-million). In comparison, the probability of being hit by lightning which results in death to a person is in the order of magnitude of 10^{-7} (Knief, 1981). These results show that the potential for a bighorn sheep to be hit by an LE fragment is remote, and therefore is not considered significant.

The two areas that may be affected most by potentially elevated sound levels associated with the proposed ERINT project are the launch area and portions of the test range near the debris areas. Noise associated with post-flight test debris recovery operations may also affect wildlife in the debris impact areas.

The reaction of bighorn sheep to loud, sudden noises such as jets, sonic booms, and artillery fire is variable (Monson and Sumner, 1980). In some cases they are startled and in others they may pay little or no attention. The inability of an animal to cope with relatively natural stresses may increase due to increased stress levels from aircraft noise resulting in death or reduced reproduction (Oak Ridge National Laboratory, 1988). Desert bighorn ewes with lambs show a stronger response than do groups of only rams, only ewes, or mixed groups of adults (Miller and Smith, 1985). While all startle events may affect desert bighorns, those occurring during the lambing period (February-April) would represent the highest probability of causing harm.

The ERINT-1 flight test missile would be launched from LC50. Sound levels during the launches would reach approximately 80 dBA at the launch site and will last less than 20 seconds (Figure 3-3). The expected sound level would decrease with distance from the launch site and would be approximately 46 dBA at 8 miles from LC50. The sound pressure levels that would be associated with the launch of the ERINT-1 flight test missile are not expected to cause startle reactions in bighorn sheep or other sensitive wildlife species. Because the southeastern portion of the San Andres National Wildlife Refuge is located approximately 16 kilometers (10 miles) from LC50, launch-related sound levels within the refuge are expected to be low, and no significant impacts to desert bighorn sheep or other wildlife species are expected.

After each of the eight ERINT-1 missile test flights, hazardous debris, if any, would be recovered as quickly as possible. This would involve the use of the UH-1N Huey light-lift utility helicopter in rough terrain. The helicopter produces a continuous noise level of approximately 92.6 dBA on-board and 94 dBA at a distance of 61 meters (200 feet). The expected noise level would decrease in intensity with increased distance from the source. The debris recovery activities are of short duration and are expected to last less than one day for each flight

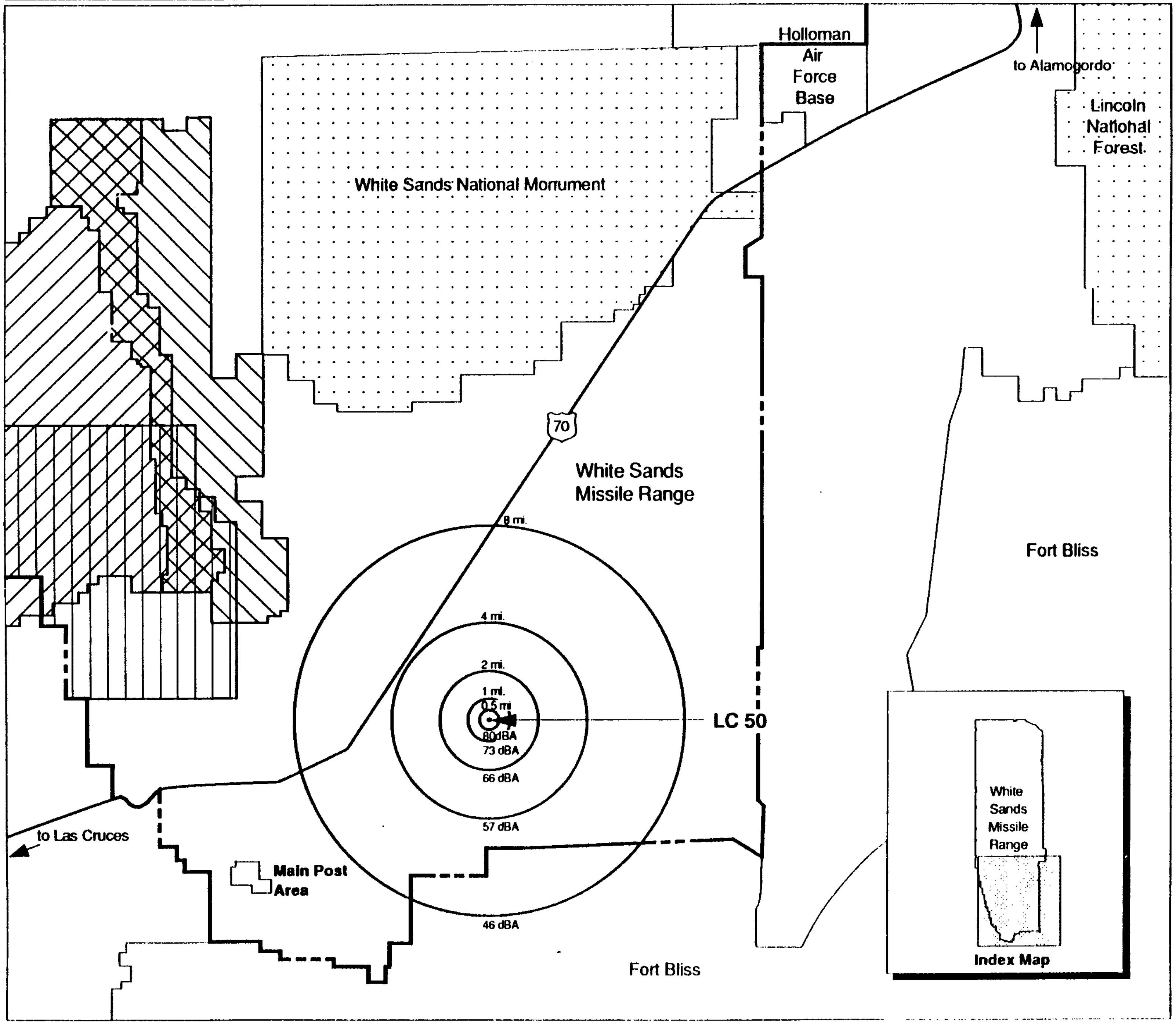


Source: LTV Missiles and Electronics Group, 1991e.

Impact Zone Relationship to Bighorn Sheep Herd Areas

White Sands Missile Range, New Mexico

Figure 3-2



ERINT-1 Rocket Motor Noise Level Contours (Approximate)

South Range, White Sands Missile Range, New Mexico

EXPLANATION:

- NASA White Sands Test Facility
- Jornada Experimental Range
- San Andres National Wildlife Refuge

NORTH

Kilometers 0 4 8

0 1 2 3 4 5 Miles

Figure 3-3

ERINT/055-1

test. Because debris recovery activities within sensitive areas (e.g., San Andres National Wildlife Refuge) potentially present a more significant disturbance to the bighorn sheep than the impact of LE fragments would, and because the LE fragments are not considered hazardous debris, LE fragments would not be recovered.

Low-altitude helicopter flights are known to cause panic reactions in various wildlife species (Oak Ridge National Laboratory, 1988). No sensitive species that would be affected by the helicopter flights are known to occur in the debris recovery areas. Because LE fragments are not considered hazardous or critical debris, no recovery activities are planned within the San Andres National Wildlife Refuge. No significant impacts to sensitive wildlife species are anticipated due to low-level helicopter flights.

Potential impacts to plants and animals would be minimized, and LE fragments associated with ERINT-1 flight tests would not contribute significantly to cumulative impacts, due to the small number of tests proposed. Debris recovery is a continuous effort at WSMR, and a biologist would accompany the debris recovery team. No cumulative biological impacts are expected.

Cultural Resources - Although cultural sites exist near LC50, the debris recovery team would keep off-road travel to a minimum. An archaeologist will accompany the recovery team on all debris recovery operations. An archaeologist will be contacted 4 weeks prior to firing to arrange for accompaniment with the recovery team. If archaeological or historical sites would be affected, the WSMR Environmental Services Division would be contacted (Dynaspan Services Company, 1986).

Hazardous Materials/Waste - Debris from flight tests would be recovered by the debris recovery team as soon as possible. Critical or hazardous material, if any, would be recovered immediately after impact. EOD personnel would dispose of or destroy contaminated or hazardous material. Management and control of hazardous materials would be subject to specific Safety Standard Operating Procedure and Recovery Guidelines for the ERINT program. Debris craters would be filled in, as necessary (White Sands Missile Range, 1990a).

Because hazardous materials/waste activities would follow applicable regulations and procedures, no cumulative impacts would be expected.

Health and Safety - All flight plans and trajectories must be approved by the WSMR Flight Safety Office. All debris would impact in areas approved by the WSMR Range Safety Office. Debris recovery operations would be in accordance with WSMR Regulation 70-8, *Security, Recovery, and Disposition of Classified and Unclassified Test Material Impacting On-Range and Off-Range* (U.S. Department of the Army, 1991a). Hazardous debris, if any, would be recovered immediately after impact.

Potential cumulative impacts to health and safety would be minimized by using established safety procedures, developed for similar operations at WSMR.

Land Use - ERINT-1 flight testing would require the temporary evacuation of White Sands National Monument and the closure of Highway 70. Such evacuations and closure of Highway 70 are normal and frequent precautions routinely performed during WSMR flight tests.

Noise - Missile launches and debris recovery activities present potential noise impacts. For flight testing of the ERINT-1 missile, the evaluation of noise hazards associated with rocket launches requires the quantitative determination of the effect of such parameters as engine thrust, specific impulse, source, observer distance and orientation, atmospheric temperature and wind gradients, and humidity in the acoustic field at locations of interest. Operations personnel in the vicinity of the launch sites would be in control blockhouses, protected from the noise.

Noise generated by the projected ERINT-1 flight test launches from WSMR would be of short duration and within a remote area. Noise hazard during launch, although substantial, would be mitigated by designating zones off limits to personnel.

Because no measured noise data are available for the ERINT-1 motor, approximate noise levels were calculated as shown in Figure 3-3. A NASA-derived technique was used incorporating an equation that considers the sound source motion; the engine parameters, including thrust, flow rate, gas exit velocity, and number of engines; the sound energy loss due to molecular absorption; and a distribution factor (Wilhold, Guest, and Jones, 1963). The model provides, as simply as possible, the far-field sound pressure levels in decibels (referenced to 0.0002 dynes/cm^2) as a function of frequency and time.

There are no standards for single-event noise exposures of short duration that are characteristic of rocket launches. However, OSHA standards limit exposure of 115 dBA cumulative over a 24-hour period to 15 minutes or less. The 115 dBA limit is generally considered the noise level at which humans will experience pain (see Table 3-7). Because the ERINT-1 rocket motor burns for less than 5 minutes and its noise levels are less than the 115 dBA limit, as shown by the noise contour plot (Figure 3-3), the noise impact to the surrounding area should not be significant.

Debris recovery activities may require helicopter support and each recovery operation should last less than one day. Helicopter noise levels should not reach the 115 dBA limit; noise measurements on helicopters indicate an equivalent continuous sound level of 92.6 dBA (Cheeny, 1991). No debris recovery would be conducted within the San Andres National Wildlife Refuge or other sensitive areas. The helicopter noise levels and short recovery durations would limit any potential noise impacts to other wildlife within WSMR.

Water Resources - During ERINT test activities there is the potential for beryllium components to come in contact with surface water and decompose. After missile intercept, large pieces of missile components would be recovered, if possible. However, smaller pieces, most of which would be environmentally inert materials, would remain. Possible exceptions may include small amounts of beryllium (approximately 1.23 kilograms) from the radar seeker and minute amounts of battery electrolyte. However, beryllium would have such a low leach rate in water that no appreciable concentrations would be produced or be available for introduction into the food chain, and battery electrolyte would be quickly diluted in water and poses no problems for living organisms.

The amount of surface water present at WSMR is small, and is not used for drinking water, nor does it have a significant potential to enter underground sources of drinking water due to the presence of an impermeable silt and clay barrier. The quantity of environmentally significant materials which would have the potential for release to surface waters due to ERINT activities would be minimal. The release rates and aqueous behaviors of materials which do impact into surface water would be such that no significant changes in surface water quality should be detectable. There would be no significant impact to water quality at WSMR associated with ERINT-1 test activities.

ERINT activities would not represent a significant increase in current operations, and no cumulative impacts were identified.

Based on the above conclusions, all of the assessment criteria for a determination of no significant impacts are met for ERINT-1 flight test activities.

3.2.5.2 ERINT Target System (ETS)

ERINT Ballistic Tactical Missile Target System. Flight test activities for the ETS are described in Section 1.3.5.2. These activities would include approximately 8 existing and 12 temporary personnel. Because approximately 7,550 personnel currently work at WSMR, the number of people required for these activities would not pose any significant infrastructure or socioeconomic impacts. No physical or water resource impacts are expected from ETS flight tests. These activities do present potential air quality, biological and cultural resources, hazardous materials and waste, health and safety, land use, and noise impacts. These are environmental components and appropriate mitigations discussed below.

Air Quality - Emission products from the ETS first-stage motor (SERGEANT motor) are shown in Table 3-11. The potential impacts to air quality from the motor during flight was analyzed using the emission product data. The results are shown in Table 3-12 and indicate that no significant impact should occur to air quality because of the short burn time (36 seconds) of rocket motor emissions and amount of propellant. Values are well below the standards for the 8-hour threshold limit values for carbon dioxide, carbon monoxide, hydrogen chloride, and hydrogen sulfide.

TABLE 3-11. SERGEANT AIR EMISSION PRODUCTS

Emission	Weight	
Carbon Dioxide (CO_2)	681.0 kg	(1,501.3 lbs)
Carbon Monoxide (CO)	235.0 kg	(518.1 lbs)
Hydrogen Chloride (HCl)	602.0 kg	(1,327.2 lbs)
Sulphur (S)	48.6 kg	(107.1 lbs)
Hydrogen Sulfide (H_2S)	196.0 kg	(432.1 lbs)
Sulphur Dioxide (SO_2)	129.0 kg	(28.4 lbs)
Water (H_2O)	639.0 kg	(1,408.8 lbs)
Nitrogen (N_2)	235.0 kg	(518.1 lbs)
Hydrogen (H_2)	180.0 kg	(39.7 lbs)
Nitrogen Oxide (NO)	3.03 kg	(6.7 lbs)
Chlorine (Cl)	10.8 kg	(23.8 lbs)

kg = kilogram
lbs = pounds
Source: Haden, 1991b

TABLE 3-12. SERGEANT EMISSION RATES AND CONCENTRATIONS

Emission	Emission Rate kg/sec	(lbs/sec)	8-Hour Average Concentrations at 2000 Meters* (mg/m^3)	Standard 8 Hour TLV mg/m^3
HCl	25.1	(55.3)	7.3×10^{-18}	7.5
H_2S	8.2	(17.9)	2.4×10^{-18}	14.0
CO_2	28.4	(62.6)	8.3×10^{-18}	9,000.0
CO	9.8	(21.6)	2.9×10^{-18}	5.7

* Wind at 16 km/hr (10 mi/hr)
hr = hour m = meter
kg = kilogram mg = milligram
km = kilometers mi = mile
lbs = pounds sec = second
Source: Trinity Consultants, Inc., 1990.

If it is necessary to terminate a flight of the SERGEANT motor, the command destruct system would be activated by range safety. As a result of this action, debris would be generated from rocket motor and payload material fragmentation. The solid propellant would burn intensely, allowing the exhaust gas products, further reducing their concentrations. The debris impact zone would be within the flight hazard corridor established by range safety and cleared of personnel prior to launch activities.

Air dispersion concentrations were calculated for both the ETS first-stage SERGEANT motor and second-stage M57A-1 motor in the event of a launch failure on the pad. These values appear in Table 3-13. Values are well below the standards for the 8-hour threshold for hydrogen chloride, hydrogen sulfide, and carbon dioxide. The 5.7 mg/m^3 computation for carbon monoxide is equal to the current standard threshold. However, the assumption for this calculation was that all propellant would be burned, contributing to the maximum possible amount of emission. This results in a highly conservative estimate since this event would most likely not occur.

TABLE 3-13. ETS EMISSION RATES AND CONCENTRATIONS FOR A LAUNCH FAILURE

Emission	Emission Rate kg/sec	(lbs/sec)	8-Hour Average Concentrations at 2,000 Meters* (mg/m^3)	Standard 8 Hour TLV mg/m^3
AL_2O_3	N/A	N/A	3.9	10.0
HCL	25.1	(55.3)	4.4	7.5
H_2S	8.2	(17.9)	1.3	14.0
CO_2	28.4	(62.6)	4.9	9000.0
CO	9.8	(21.6)	5.7	5.7

* Wind at 16 km/hr (10 mi/hr)
hr = hour m = meter
kg = kilogram mg = milligram
km = kilometers sec = second
lbs = pounds mi = mile
Source: Trinity Consultants, Inc., 1990.

Target system booster launches would not create cumulative impacts because of the limited quantity, and the prompt dispersion of exhaust products.

Biological Resources - Potential impacts on biological resources from launch noise debris impact and TMDCFE activities are discussed below.

The effects of debris impact from the ballistic target vehicle are the same as those described in Section 3.2.5.1 and the areas are identified in Figures 1-30a and 1-30b. No significant impacts to sensitive plant or wildlife species are expected to occur from the proposed action.

The ETS ballistic tactical missile would be launched from the Sulf Site. Sound levels during the launches would reach approximately 90 dBA at the launch site and would last for less than 20 seconds (Figure 3-4). The expected sound level would decrease with distance from the launch site and would be approximately 58 dBA at eight miles from the Sulf Site. The sound pressure levels that would be associated with the launch of the ETS ballistic target missile are not expected to cause startle reactions in sensitive wildlife species. Sound levels on the Bosque del Apache National Wildlife Refuge resulting from the target launch activities are estimated to be less than 68 dBA. The 58 dBA contour would include portions of the refuge between the eastern boundary and a point approximately 1.6 kilometers (1 mile) east of the Rio Grande River.

Noise impacts resulting from debris recovery activities potentially associated with the launch of the target vehicles are the same as those described in Section 3.2.5.1.

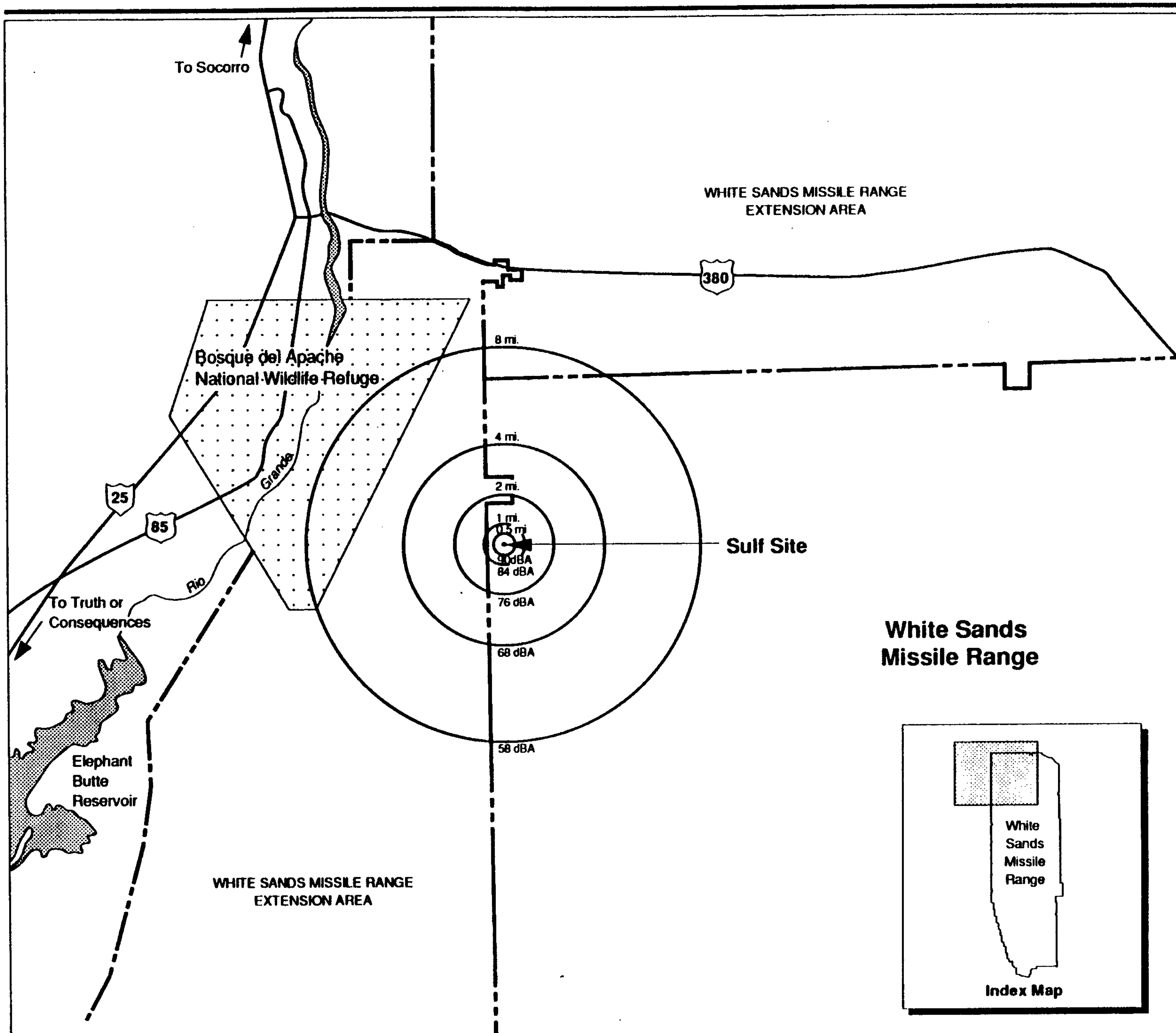
Cultural Resources - No known cultural or historic sites exist near the launch site. However, the debris recovery team would keep off-road travel to a minimum. An archaeologist will accompany the recovery team on all debris recovery operations. An archaeologist will be contacted 4 weeks prior to firing to arrange accompaniment with the recovery team. If archaeological or historical sites are potentially affected, the WSMR Environmental Services Division would be contacted (Dynaspan Services Company, 1986).

Hazardous Materials/Waste - Debris from flight tests would be recovered by the debris recovery team as soon as possible. Critical or hazardous material, if any, would be recovered immediately after impact. EOD personnel would dispose of or destroy contaminated or hazardous material. Management and control of hazardous materials would be subject to specific Safety Standard Operating Procedure and Recovery Guidelines for the ERINT program.

Debris craters would be filled in, as necessary (White Sands Missile Range, 1990a).

Because hazardous materials/waste activities would follow applicable regulations and procedures, no cumulative impacts would be expected.

Health and Safety - All flight plans and trajectories must be approved by the WSMR Flight Safety Office. All debris would impact in areas approved by the WSMR Range Safety Office and recovered in accordance with WSMR Regulation 70-8 *Security, Recovery, and Disposition of Classified and Unclassified Test Material Impacting On-Range and Off-Range* (U.S. Department of the Army, 1991a). Hazardous debris, if any, would be recovered immediately after impact.



SERGEANT Rocket Motor Noise Level Contours (Approximate)

Sulf Site,
White Sands
Missile Range,
New Mexico

Figure 3-4

ERINT/031-5

Potential cumulative impacts to health and safety would be minimized by using established safety procedures, developed for similar operations at this facility.

Land Use - The ETS flight trajectory would pass over the western portion of White Sands National Monument. WSMR has an agreement with the National Park Service to allow such overflights. Flight testing would require the temporary closure of Highway 70 and evacuation of White Sands National Monument. These are routine precautions used during flight tests.

Because WSMR has an agreement with the :ational Park Service to allow for overflights, closure and evacuation times are short-term, and debris would not impact the White Sands National Monument or the San Andres National Wildlife Refuge, no cumulative impacts would occur.

Noise - Missile launches and debris recovery activities present potential noise impacts. For flight testing of the ETS ballistic target missile, the evaluation of noise hazards associated with rocket launches requires the quantitative determination of the effect of such parameters as engine thrust, specific impulse, source, observer distance and orientation, atmospheric temperature and wind gradients, and humidity in the acoustic field at locations of interest.

Because no noise measurements were ever conducted on the SERGEANT motor, approximate noise levels were calculated, as discussed in Section 3.2.5.1, and are shown in Figure 3-4.

The SERGEANT rocket motor burns for less than 36 seconds, and its approximate noise emissions are less than the 115 dBA limit (see Section 3.2.5.1), as shown by the noise contour plot figures. In addition, operations personnel in the vicinity of the launch sites would be in control blockhouses, protected from the noise. Therefore, the noise impacts to the surrounding area should not be significant.

Debris recovery activities may require helicopter support and should last less than one day for each flight test. Helicopter noise levels should not reach the 115 dBA limit; noise measurements on helicopters indicate an equivalent continuous sound level of 93 dBA (Cheeny, 1991). Helicopters are frequently used throughout the missile range without any known impacts. Therefore, the helicopter noise levels and short recovery durations would limit any potential noise impacts to wildlife.

Noise from target launches would have the potential to cause cumulative noise impacts. However, because the noise is a one-time event, and tests would not be simultaneous, no cumulative noise impacts were identified.

ERINT activities would not represent a significant increase in current operations, and no cumulative impacts were identified.

Based on the above conclusions, all of the assessment criteria for a determination of no significant impact are met for ETS ballistic target missile flight tests at WSMR.

Air-Breathing Target. Flight test activities for the MQM-107 are discussed in Section 1.3.5.2. These activities would involve approximately 10 existing MICOM personnel. These tests would not include the TMDCFE. Because approximately 7,550 personnel currently work at WSMR, the number of people required for these activities would not pose any significant infrastructure or socioeconomic impacts. The launch facility has been used for over 10 years for similar activities and is previously disturbed; therefore, no significant biological or cultural resource impacts are expected. No physical or water resource impacts are expected from MQM-107 flight tests. These activities do present potential air quality, hazardous materials and waste, health and safety, land use, and noise impacts. These environmental components and appropriate mitigations are discussed below.

Air Quality - Emission products from the MQM-107 (SR121 Rocket Engine) are shown in Table 3-14. The potential impacts to air quality from the rocket motor during its flight were analyzed using the emission product data. The results are shown in Table 3-15 and indicate that no significant impact should occur to air quality because of the extremely short burn time (2 to 2.5 seconds) of rocket motor emissions and amount of propellant. Values are well below the standards for the 8-hour threshold limit values for aluminum oxide, carbon dioxide, carbon monoxide, and hydrogen chloride. Because of the short duration of rocket motor emissions, there should not be a significant impact to air quality.

TABLE 3-14. MQM-107 AIR EMISSION PRODUCTS

Emission	Weight	
Aluminum Oxide (Al_2O_3)	7.93 kg	(17.5 lbs)
Carbon Dioxide (CO_2)	0.89 kg	(2.0 lbs)
Carbon Monoxide (CO)	5.75 kg	(12.7 lbs)
Hydrogen Chloride (HCl)	5.70 kg	(12.6 lbs)
Water (H_2O)	13.56 kg	(6.2 lbs)
Nitrogen (N_2)	11.38 kg	(5.2 lbs)

kg = kilogram
lbs = pounds
Source: Newton, 1991

TABLE 3-15. MQM-107 EMISSION RATES AND CONCENTRATIONS

Emission	Emission Rate kg/sec	(lbs/sec)	8-Hour Average Concentrations at 2,000 Meters* (mg/m^3)	Standard 8 Hour TLV mg/m^3
AL_2O_3	3.2	(7.0)	0.029	10.0
CO_2	0.4	(0.8)	0.003	9000.0
CO	2.3	(5.1)	0.021	5.7
HCl	2.3	(5.0)	0.021	7.5

* Winds at 16 km/hr (10 mi/hr)
hr = hour; m = meter
kg = kilogram; mg = milligram
km = kilometers; sec = second
lbs = pounds; mi = mile
Source: Trinity Consultants, Inc., 1990.

Hazardous Materials/Waste - Debris from flight tests would be recovered by the debris recovery team as soon as possible. Critical or hazardous material, if any, would be recovered immediately after impact. EOD personnel would dispose of or destroy contaminated or hazardous material. Management and control of hazardous materials would be subject to specific Safety Standard Operating Procedure and Recovery Guidelines for the ERINT program.

Debris craters would be filled in, as necessary (White Sands Missile Range, 1990a)

Because hazardous materials/waste activities would follow applicable regulations and procedures, no cumulative impacts would be expected.

Health and Safety - All flight plans and trajectories must be approved by the WSMR Flight Safety Office. All debris would impact in areas approved by the WSMR Range Safety Office and recovered in accordance with WSMR Regulation 70-8 *Security, Recovery, and Disposition of Classified and Unclassified Test Material Impacting On-Range and Off-Range* (U.S. Department of the Army, 1991a). Hazardous debris, if any, would be recovered immediately after impact.

Potential cumulative impacts to health and safety would be minimized by using established safety procedures, developed for similar operations at this facility.

Land Use - Flight testing would require the temporary closure of Highway 70 and evacuation of White Sands National Monument. These are routine precautions used during flight tests.

Because WSMR has an agreement with the National Park Service to allow for overflights, closure and evacuation times are short-term, and debris would not impact the White Sands National Monument or the San Andres National Wildlife Refuge, no cumulative impacts would occur.

Noise - The SR121 rocket engine would be used in the performance of the MQM-107 flight tests. These motors have been used numerous times in recent years at the Army Materiel Test and Evaluation Drone Launch Facility. Standard operating procedures would be used during the two MQM-107 flight tests. Noise impacts would be brief (2 to 2.5 seconds) during motor firings and should be similar to past conditions. The solid propellant booster only fires for 2 to 2.5 seconds, producing approximately 2,722 kilograms (6,000 pounds of thrust). Because no measured noise data are available for the MQM-107, approximate noise levels were calculated. A NASA-derived technique was used in incorporating an equation that considers the sound motion; the engine parameters, included thrust, flow rate, gas exit velocity, and number of engines; the sound energy loss due to molecular absorption; and a distribution factor (Wilhold, Guest, and Jones, 1963). The model indicates that noise levels would not exceed 70 dB at the 0.8 kilometer (0.5 mile) distance from the launch facility.

In addition, the noise hazard during MQM-107 flight tests would not be significant because off-limit zones are designated to nonessential personnel. Entry into these zones would be prohibited except for personnel who must enter this zone in support of the mission and they would be required to wear hearing protection. No significant noise impacts are expected.

Because complete details are not yet available on these activities, supplemental documentation will be provided at a later date, prior to this portion of the action proceeding, verifying no significant impacts.

ERINT Maneuvering Tactical Missile Target System. Flight test activities for the maneuvering are essentially the same as those discussed for the ballistic tactical missile system described above. The TMDSCE would be incorporated in tests involving the maneuvering tactical missile target system. In flight tests ten and eleven, the ERINT-1 test missile would attempt to intercept the maneuvering tactical missile target, which would contain the TMDSCE simulant. TMDSCE flight tests would involve incorporating 20 to 30 individual canisters of unthickened chemical simulant into the target for each flight. Radio transmitters would be attached to each canister to relay information on the number of canisters opened during flight termination or intercept. An optical sensor attached to the target would provide data on the location of intercept for flights ten and eleven (Strietzel, 1991b). Because complete details are not yet available on these activities, supplemental documentation will be provided at a later date, prior to this portion of the action proceeding, verifying no significant impacts.

Simulant Dissemination. The proposed simulant dissemination activities would be conducted at WSMR. These activities are described in Section 1.3.5.

Simulant dissemination activities at WSMR present the potential for air quality, biological resource, hazardous materials/waste, health and safety, and water resources impacts. These environmental components are discussed in more detail below.

Air Quality - As discussed in Section 1.3.5.2, the ATM NUSSE3 model can predict the simulant footprint location and ground-level concentrations. Modeling runs can be conducted for various meteorological conditions (e.g., wind speed and direction, and air temperature). TMDBCE testing will take place only under meteorological conditions for which modeling predicts no transport of chemical simulant through the air that would result in measurable deposition (greater than 1 mg/m^2) in sensitive areas, or outside of WSMR's boundaries. No significant impacts to air quality are expected outside of WSMR's boundaries.

Biological Resources - Potential impacts on biological resources from simulant dissemination are discussed below.

TMDCFE simulant dissemination would occur when target missiles are intercepted by the ERINT-1 test missile, detonated by remote during the demonstration flights, and could occur if a target missile flight is terminated for safety reasons. Because of the high altitude of the tests and the characteristics of the chemical simulant (see Section 1.3.3.1), little, if any measurable deposition of the simulant is expected to occur. At no time would TMDBCE activities be conducted under meteorological conditions for which the modeling predicts ground deposition of measurable concentrations (greater than 1 mg/m^2) of the chemical simulant off range or on sensitive land use areas, such as White Sands National Monument and the San Andres National Wildlife Refuge. The data currently available, as discussed in Section 1.3.3.1, suggests that significant direct impacts are not likely to occur to wildlife from simulant dissemination during the normal operation of the project. The effects of simulant dissemination activities at DPG were discussed in the Theater Missile Defense Bulk Chemical Experiment Environmental Assessment (U.S. Army Strategic Defense Command, 1991b). The conclusion was reached that no significant impacts would occur to biological resources from these activities at DPG.

TEP characteristics and available literature are discussed in Section 1.3.3.1 (see page 1-45). Based on the information provided, a conclusion has been reached that TEP would not pose significant effects to the environment. In addition, studies have been conducted by the Tennessee Valley Authority to determine if TEP has characteristics that would result in potentially significant effects on soil and vegetation (Harper, 1991). The studies are designed to determine the following:

- Sensitivity of plants when roots or foliage are contacted by TEP
- Effect of TEP on soil pH, cation exchange capacity, and microbial activity
- Rate of degradation of TEP in soil
- Retention of TEP in soil and its potential for transport through soil.

These laboratory and greenhouse studies have verified that no effect would occur on WSMR soils and vegetation at concentrations up to 400 mg/m^2 and releases of TEP are not expected to exceed that level at the ground surface. While it is not anticipated that concentrations above this level would have an effect, studies will be completed to address this range of 400 - 40,000 mg/m^2 prior to activities occurring which could result in ground level concentrations above 400 mg/m^2.

If, after these studies are completed, it is determined that the use of TEP for ERINT activities poses significant effects to the environment, the TMDCFE activities will not be conducted.

Hazardous Materials/Waste - The maximum amount of non-hazardous simulant disseminated during flight tests at WSMR would be 820 liters for TMDBCE activities and 56 liters for TMDSCE activities. Not all of the disseminated simulant would be deposited due to destruction upon intercept or flight termination, and evaporation. Because the simulant cloud would begin to break down and continue to evaporate after deposition, no clean-up of the deposited simulant would be required.

None of the simulant components is considered hazardous by the CERCLA (Jacobs, 1990). Because the TMDBCE simulant mixture consists mostly of TEP and maintains TEP characteristics (Alexander, 1990h), and the TMDSCE simulant consists entirely of TEP, the chemical simulant would be transported, stored, and handled according to the safety measures described on the TEP MSDS (Eastman Kodak Company, 1986) (see Appendix A).

Although TEP can react with water vapor to form ethanol and phosphoric acid, the generally low humidity in the area is not likely to initiate this reaction. Because testing would be conducted only under conditions for which modeling predicts no transport of chemical simulant through the air that would result in measurable deposition in sensitive areas or beyond WSRM's boundaries, the low concentrations of phosphoric acid would be insufficient to produce any measurable change in acidity of precipitation and moisture in the vicinity of the test area. Because ethanol would be produced in low concentrations and has no ozone depletion or other atmospheric interaction, there should be no observable effects from its release. Further, both chemicals are widely used in private industry (ethanol as a chemical intermediate in rubber production, and phosphoric acid in the manufacture of fertilizer), with emissions resulting during handling and use. Ethanol is also widely used as a carrier solvent for cosmetics, evaporating after its use, and is found in all alcoholic beverages. No significant hazardous materials/waste impacts are expected.

Because hazardous materials/waste activities would follow applicable regulations and procedures, no cumulative impacts would be expected.

Health and Safety - The TMDCFE simulants would be stored in the VANDAL Missile Assembly Building at the Sulf Site. The TMDCFE would be incorporated into the target on the launch pad.

Because the TMDBCE simulant mixture consists mostly of TEP and maintains TEP characteristics (Alexander, 1990h), and the TMDSCE simulant consists entirely of TEP, the chemical simulant would be transported, stored, and handled according to the safety measures described on the TEP MSDS (Eastman Kodak Company, 1986) (see Appendix A). Safety measures for the other components in the TMDBCE simulant would no longer apply (Alexander, 1990i).

All personnel handling the chemical simulant would be required to wear protective eyewear, gloves, and clothing in accordance with the recommendations on the TEP MSDS (Eastman Kodak Company, 1986). All nonessential personnel would be cleared from the predicted simulant ground footprint area prior to dissemination tests. No significant impacts to health and safety are expected.

Potential cumulative impacts to health and safety would be minimized by using established safety procedures, developed for similar operations at WSMR.

Water Resources - TMDCFE simulant deposition presents a potential water resource impact. Intermittent and permanent surface waters off-range or in sensitive land use areas (e.g., Lake Lucero in White Sands National Monument and the springs in the San Andres National Wildlife Refuge) are not expected to be significantly affected by TMDCFE activities because flight tests that would involve TMDCFE activities would not be conducted under meteorological conditions for which computer modeling predicts a measurable deposition of the simulant (greater than 1 mg/m^2) beyond WSMR boundaries or on sensitive land use areas. In addition, because of the high altitude of the TMDCFE tests and the physical characteristics of the simulant, it is likely that little, if any, of the simulant would reach any intermittent or permanent surface waters. The deeper water aquifer is separated from surface waters by impermeable clay and silt. For this reason, it is unlikely that any surface deposition of the simulant or its breakdown products (e.g. phosphoric acid and ethanol) would move down to the groundwater level. It is expected that the proposed action would not have a significant impact on water resources.

ERINT activities would not represent a significant increase in current operations, and no cumulative impacts were identified.

Based on the above conclusions, all of the assessment criteria for a determination of no significant impact are met for flight testing activities at WSMR.

3.3 ENVIRONMENTAL CONSEQUENCES OF THE NO-ACTION ALTERNATIVE

If the no-action alternative is selected, no additional environmental consequences associated with the ERINT program are anticipated. Present activities would continue at the installations with no change in operations. Under the no-action alternative, a preprototype missile and launch control system technology for theater missile defense applications would not be developed. The no-action alternative would not provide the technical information necessary to reduce the risk if a later decision is made to develop an operational TMD system.

3.4 CONFLICTS WITH FEDERAL, REGIONAL, STATE, LOCAL, OR INDIAN TRIBE LAND-USE PLANS, POLICIES, AND CONTROLS

All of the proposed program activities at all test locations would take place in existing facilities with the exception of the Sulf Site upgrades at WSMR. These upgrades would not alter the use of the site, which is to support missile and rocket launches. Temporary evacuation of White Sands National Monument and WSMR Range Extension Areas, and temporary closure of Highway 70 are procedures routinely conducted during WSMR test activities. Overall, proposed ERINT test program activities would present no conflicts with land-use plans, policies, and controls.

3.5 ENERGY REQUIREMENTS AND CONSERVATION POTENTIAL

Anticipated energy requirements of each program activity at each location would be well within the energy supply capacity of each installation. Energy requirements would be subject to any established energy conservation practices at each installation. No new power generation capacity would be required of any of the proposed ERINT activities at any of the locations identified because the activities would be compatible with the installations' ongoing missions.

3.6 NATURAL OR DEPLETABLE RESOURCE REQUIREMENTS

Other than the various metallic and nonmetallic structural materials and fuel resources used in the proposed program activities, there are no significant natural or depletable resource requirements associated with the program.

3.7 ADVERSE ENVIRONMENTAL EFFECTS THAT CANNOT BE AVOIDED

There are no known adverse environmental effects that cannot be avoided for any of the proposed ERINT activities at any of the test program locations.

3.8 RELATIONSHIP BETWEEN SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Activities at all locations involved in the proposed action would take advantage of existing facilities and infrastructure, with the exception of the Sulf Site upgrades at WSMR. However, these upgrades would not alter the use of the site, which is to support missile and rocket launches. Therefore, the proposed action does not eliminate any options for future use of the environment for any of the locations under consideration.

3.9 IRREVERSIBLE OR IRRETRIEVABLE COMMITMENT OF RESOURCES

The proposed action would result in no loss of habitat for plants or animals, no loss or impact on threatened or endangered species, and no loss of cultural resources, such as archaeological or historic sites. Moreover, there would be no changes in land use nor preclusion of development of underground mineral resources that were not already precluded.

The amount of materials required for any program-related activities and energy use during the project would be small. Although the ERINT program would result in some irreversible and irretrievable commitment of resources such as various metallic and nonmetallic structural materials, fuel, and labor, this commitment of resources is not significantly different from that necessary for many other aerospace research and development programs. It is similar to the activities that have been carried out in previous aerospace programs over the past several years.

3.10 CONDITIONS NORMALLY REQUIRING AN ENVIRONMENTAL IMPACT STATEMENT

The potential impacts arising from the proposed ERINT activities were evaluated specifically in the context of the criteria for actions normally requiring an EIS, described in Paragraph 6-2 of AR 200-2, *Environmental Effects of Army Actions*. The evaluation indicated that the proposed ERINT activities, as described in this EA, did not meet any of those criteria.

Specifically, the proposed ERINT activities were evaluated for their potential to:

- Significantly affect environmental quality or public health or safety
- Significantly affect historic or archaeological resources, public parks and recreation areas, wildlife refuge or wilderness areas, wild and scenic rivers, or aquifers
- Adversely affect properties listed or meeting the criteria for listing on the NRHP or the National Registry of Natural Landmarks
- Significantly affect prime and unique farm lands, wetlands, or ecologically or culturally important areas or other areas of unique or critical environmental concern
- Result in significant and uncertain environmental effects or unique or unknown environmental risks
- Significantly affect a species or habitat listed or proposed for listing on the federal list of endangered or threatened species
- Establish a precedent for future actions
- Adversely interact with other actions so that cumulatively environmental effects result
- Involve the use, transportation, storage, and disposal of hazardous or toxic materials that may have significant environmental impact.

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4.0 Summary of Conclusions

4.0 SUMMARY OF CONCLUSIONS

The significance of the environmental consequences of the proposed action was evaluated according to the approach described in Section 3.1 and discussed in Section 3.2. This section summarizes the conclusions of the evaluations for each of the eleven areas of environmental consideration. Within each area of consideration discussed below, only those facilities for which a potential environmental concern was determined are described.

Air Quality – Beryllium missile component fabrication activities at Rockwell International and L.A. Gauge present potential air quality impacts. Both facilities would utilize control equipment to maintain any emissions of beryllium dust and vapors below EPA standards; therefore, no significant air quality impacts are expected. Sled test activities at Holloman AFB present potential impacts to air quality. These activities have taken place at Holloman AFB under similar conditions with no known impacts.

The proposed static motor tests at the ARC Orange County, Virginia and Camden, Arkansas facilities present potential air quality impacts. However, because the frequency of ERINT testing would not represent a significant increase in the number of tests normally conducted at these facilities, and impacts to air quality would be short term and localized, no significant air quality impacts are expected from these activities.

Proposed construction activities at the Sulf Site may result in pollutants from construction equipment exhaust and dust from vehicular traffic on unpaved roads. Because there would not be continuous emissions and the area has good atmospheric dispersion characteristics, no significant air quality impacts are expected.

ERINT flight testing activities at WSMR would produce air emissions from launch exhaust. Evaluation of emission data on ERINT Target System and ERINT-1 missiles indicate no significant impacts would result. Emission volumes are well below the standards for the 8-hour threshold limit values for carbon monoxide, aluminum oxide, carbon dioxide, hydrogen chloride, and hydrogen sulfide. Therefore, no significant impacts are expected to air quality for flight testing and related rocket engine testing activities.

Because TMDCFE testing activities at WSMR would take place only under conditions for which modeling predicts no transport of chemical simulant through the air that would result in ground deposition of measurable concentrations (i.e., greater than 1 milligram[mg]/meter $[m]^2$) of simulant beyond WSMR's boundaries or on sensitive land use areas (e.g., White Sands National Monument and San Andres National Wildlife Refuge), no significant air quality impacts are expected.

Biological Resources – No significant impacts from past sled test operations at Holloman AFB have been identified. ERINT sled tests would not involve or generate any hazardous materials that could potentially affect the state group 2 endangered White Sands pupfish found on base. No significant biological impacts from ERINT sled tests are expected.

Flight preparation activities at WSMR present potential biological resource impacts. The Sulf Site modification activities would occur entirely within a pre-disturbed, graded area which contains little or no vegetation. Surveys conducted by the WSMR Environmental Services Division indicate that no federal- or state-listed threatened or endangered species are present at the Sulf Site. For these reasons, no significant impacts to biological resources are expected from these activities.

Flight test activities at WSMR present potential biological resource impacts from debris impacts and noise. An analysis has shown that the probability of at least one bighorn sheep to be hit by at least one LE fragment from the ERINT-1 missile is estimated to be 10^{-8} or lower. Launch-related sound levels within the San Andres and Bosque del Apache National Wildlife Refuges are likely to be low, and no significant impacts to desert bighorn sheep or other wildlife species are expected. Because LE fragments are not considered critical or hazardous debris, no recovery activities are planned within the San Andres National Wildlife Refuge or other sensitive areas. No sensitive species potentially affected by debris recovery helicopters are known to occur within areas where recovery of debris is planned; therefore, no significant impacts are expected from these activities.

Because of the high altitude of TMDCFE tests and the physical characteristics of the chemical simulant, little, if any measurable deposition of the simulant would be expected to occur. At no time would TMDCFE activities be conducted under conditions for which modeling predicts ground deposition of measurable concentrations (greater than 1 mg/m^2) of the simulant outside of WSMR's boundaries or on sensitive land use areas. Available data suggest that no significant impacts to biological resources should be expected. Results of laboratory and greenhouse studies conducted by the Tennessee Valley Authority have verified that no effect would occur to WSMR soils and vegetation at concentrations up to 400 mg/m^2.

Cultural Resources – The Sulf Site modification activities would take place entirely within a previously disturbed area. An archaeological survey conducted by the WSMR Environmental Services Division did not discover any cultural resources at the Sulf Site. The REC for the Sulf Site and the WSMR Environmental Services Division survey have shown that the proposed ERINT activities would present no adverse effects to cultural resources either eligible for inclusion or listed on the National Register of Historic Places. Although cultural sites have been identified near LC50, the debris recovery team would keep off-road travel to a minimum and an archaeologist will accompany the recovery team on all debris recovery activities. An archaeologist will be contacted 4 weeks prior to firing to arrange accompaniment with the recovery team. If any cultural resources were to be potentially affected, the WSMR Environmental Services Division would be contacted. No significant impacts to cultural resources are expected.

Hazardous Materials/Waste – The use of small quantities of hazardous materials (e.g., solvents, chemical filming materials, paints, beryllium) and/or solid propellants in support of the ERINT program presents potential hazardous materials/waste impacts at each ERINT test location discussed in this EA. Each facility would store and handle all hazardous materials according to the manufacturer's recommendations on the material safety data sheet for each substance.

In addition, each contractor facility (i.e., LTV, Rockwell International, L.A. Gauge, ARC, Aerotherm, Orbital Sciences Corporation, and Battelle) would follow internal procedures for the storage, handling, and disposal of hazardous materials.

Beryllium materials at Rockwell International and L.A. Gauge would be handled in accordance with EPA regulations regarding hazardous materials as administered by the California Department of Health Services.

Chemical simulant preparation at Battelle would generate little or no chemical waste because most of the simulant would be prepared, transported, and stored in its original shipping container. None of the individual simulant components is listed as a hazardous substance by the CERCLA.

At LTV and ARC, solid propellants would be handled in accordance with Department of Defense and Department of Transportation regulations for handling and transport of explosives. Waste propellant at ARC would be disposed of by thermal treatment under an EPA permit.

Holloman AFB, Hill AFB, Pueblo Depot Activity, and WSMR would also follow Department of Defense and Department of Transportation regulations regarding the handling and transport of explosives when conducting ERINT activities involving solid propellant rocket motors.

Hill AFB would handle cleaning solvents, hydraulic fluids, and paints in accordance with the requirements of its Resource Conservation and Recovery Act permit. WSMR would follow Army Materiel Command regulations for the handling and use of any hazardous materials.

Renovation of a building containing asbestos as part of upgrades to the Sulf Site would follow WSMR safety operating procedures for handling asbestos that incorporate EPA and OSHA regulations.

Hazardous debris, if any, resulting from flight tests at WSMR would be recovered immediately after impact.

None of the components of the TMDCFE simulant that would be disseminated at WSMR is considered a hazardous material under the CERCLA. At no time would TMDCFE activities be conducted under conditions for which modeling predicts ground deposition of measurable concentrations (greater than 1 mg/m^2) of simulant outside of WSMR's boundaries or on sensitive land use areas. In addition, it is expected that little, if any, measurable deposition of the simulant would occur even within WSMR. Any simulant that did reach ground level would continue to evaporate and break down.

For these reasons, no significant hazardous materials/waste impacts are expected from ERINT activities.

Health and Safety – The use of small quantities of hazardous materials and/or solid propellants and ordnance in support of the ERINT program presents a potential health and safety impact at each ERINT test location discussed in this EA. The procedures and regulations for the safe handling of hazardous materials and solid propellants, as discussed under Hazardous Materials and Waste, also apply to Health and Safety. In addition, ESQDs are established around facilities where propellants or ordnance would be stored or handled at LTV, Holloman AFB, ARC, Hill AFB, Pueblo Depot Activity, and WSMR.

Hill AFB would follow safety procedures for all M57A-1 refurbishment activities, including x-raying the motor, as described in an Air Force technical order. A standard operating procedure based on Army Materiel Command regulations would be used during radiographic inspection of the SERGEANT booster at Pueblo Depot Activity. At Battelle, personnel working with the simulant would wear protective clothing and eyewear, and these activities would take place under ventilated hoods.

At WSMR, safety measures outlined in Army Regulations would be followed for the use and handling of explosives. All flight plans and trajectories must be approved by the WSMR Flight Safety Office. All debris would impact in areas approved by the WSMR Range Safety Office and recovered in accordance with WSMR Regulations. Hazardous debris, if any, would be recovered immediately after impact. For these reasons, no significant health and safety impacts are expected.

Infrastructure - At all ERINT locations except the Sulf Site, ERINT facilities would take place in existing facilities that are routinely used for these types of activities. These facilities would operate at levels and intensities similar to current conditions. No new construction or modification of existing facilities would be required. At WSMR, upgrades to the Sulf Site would be required. However, these upgrades would not alter the typical use of the site, which is to support missile and rocket launches. Except for small numbers of temporary personnel required at Holloman AFB, Pueblo Depot Activity, and WSMR, no additional personnel would be required at any facility. For these reasons, no significant impacts to infrastructure are expected.

Land Use - ERINT flight testing at WSMR would involve ETS overflights of the western portion of White Sands National Monument. WSMR has a memorandum of understanding with the National Park Service to allow this. Flight testing would also require the temporary closure of U.S. Highway 70 and evacuation of White Sands National Monument. These are both routine precautions used during flight tests, and are allowed by agreements with the New Mexico Department of Transportation and the National Park Service. All nominal debris impact areas would occur on WSMR or on the co-use area of White Sands National Monument. Although some lethality enhancer fragments could potentially impact in the San Andres National Wildlife Refuge, the debris would be non-hazardous and would not be recovered and therefore should not present a significant land use impact to the refuge. No significant land use impacts are expected from any ERINT activities.

Noise - Sled test activities at Holloman AFB present potential noise impacts. However, similar tests have been conducted at Holloman AFB with no known noise impacts; therefore, no significant noise impacts are expected.

Static testing activities at the ARC Orange County, Virginia, and Camden, Arkansas facilities present potential noise impacts. Because personnel would be evacuated near the testing areas and noise levels are regulated at the facilities, no significant noise impacts are expected.

Because construction equipment used during modifications to the Sulf Site would generate noise, personnel working on site would wear appropriate ear protection as required. No significant noise impacts from these activities are expected.

Flight test activities (i.e., missile launches and debris recovery activities) at WSMR present potential noise impacts. Because the ERINT-1 rocket motor burns for less than 5 minutes and the ERINT Target System's SERGEANT motor burns for less than 36 seconds, and because the approximate noise emissions for both are less than the 115 dBA OSHA noise exposure limit, noise impacts should not be significant. Debris recovery activities may require helicopter support, and should last less than one day per operation. Helicopters are used throughout WSMR without any known impacts. The short recovery durations would limit any potential noise impacts to wildlife. No debris recovery activities would take place in the San Andres National Wildlife Refuge where helicopter noise could startle the desert bighorn sheep. Therefore, noise impacts from these activities should not be significant.

Physical Resources – At all ERINT facilities except for the WSMR Sulf Site, ERINT activities would take place at existing facilities and would not require any construction or major modifications to existing facilities. No significant impacts to physical resources are expected at these facilities.

Modifications at the Sulf Site would not alter the typical use of the site, which is to support missile and rocket launches. The area is previously disturbed; therefore, no significant impacts to physical resources are expected.

Socioeconomics – ERINT activities would not require a permanent or significant increase in personnel at any location. The temporary personnel required at Hill AFB, Holloman AFB, and WSMR would not create significant socioeconomic impacts.

Water Resources – Debris from ERINT-1 flight test activities and TMDCFE activities would present the potential for water resource impacts at WSMR. Because the deeper aquifer is separated from surface waters by an impermeable silt and clay barrier, it is unlikely that any debris or deposited simulant would affect the local groundwater. Any beryllium components remaining in surface water would have such a low leach rate that no appreciable concentrations would be produced or be available for accumulation in the food chain. Any electrolyte from a missile's batteries would be quickly diluted. Because TMDCFE simulant dissemination would only occur under meteorological conditions for which computer modeling predicts no measurable deposition beyond WSMR boundaries or in sensitive land use areas, any surface waters in these areas should not be significantly affected by TMDCFE activities. It is likely that little, if any, simulant deposition would occur in surface waters on or off WSMR. For these reasons, no significant water resource impacts are expected.

Overall, for the eleven areas of environmental consideration evaluated, no significant impacts from the ERINT program are expected. In addition, no cumulative environmental impacts were identified. In summary, analysis of the proposed ERINT test activities results in a determination of no significant environmental impacts.

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5.0 Glossary of Terms and Acronyms

5.0 GLOSSARY OF TERMS AND ACRONYMS

Ablation	The dissipation of heat generated by atmospheric friction.
ACM	Attitude Control Motor
AFB	Air Force Base
AFR	Air Force Regulation
Aileron	A movable control surface on the edge of an aircraft wing or fin.
ALC	Air Logistics Center
AMC-R	Army Materiel Command - Regulation
AR	Army Regulation
ARC	Atlantic Research Corporation
ATM NUSSE3	Anti-Tactical Missile Non-Uniform Simple Surface Evaporation Model 3
Attainment Area	An air quality control region that has been designated by the EPA and the appropriate state air quality agency as having ambient air quality levels better than the standards set by the National Ambient Air Quality Standards (NAAQS).
BOE	Bureau of Explosives
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
Cholinergenic	Activated by or capable of liberating acetylcholine.
Cholinesterase Inhibitor	A substance that inhibits cholinesterase activity. Cholinesterase is an enzyme that breaks down acetylcholine, which is the primary chemical transmitter in the neuromuscular system. Cholinesterase breaks down acetylcholine once it has performed its neuromuscular function. If cholinesterase activity is inhibited, acetylcholine continues its neuromuscular transmission, which can result in spasming, tonic activity, and breakdown of neuromuscular functioning. Many insecticides are cholinesterase inhibitors.
CONUS	Continental United States
CTF	Control Flight Test
Cultural Resources	Prehistoric and/or historic districts, sites, structures, or other physical evidence of human use considered of some importance to a culture, subculture, or community for scientific, traditional, religious, or other reasons.
CY	Calendar Year
dB	Decibel
dBA	A-weighted decibel
DOD	Department of Defense
DOT	Department of Transportation

DPG	Dugway Proving Ground
EA	Environmental Assessment
ED	Environmental Division
EIS	Environmental Impact Statement
Endangered Species	A species that is threatened with extinction throughout all or a significant portion of its range.
EOD	Explosive Ordnance Disposal
EPA	Environmental Protection Agency
ERINT	Extended Range Intercept Technology
ESQD	Explosive Safety Quantity-Distance
Ethylate	To introduce ethyl groups (C_2H_5) into a compound.
ETS	ERINT Target System
Explosive Safety Quantity-Distance	The quantity of explosives material and distance separation relationships providing defined types of protection. These relationships are based on levels of risk considered acceptable for the stipulated exposures. Explosive safety quantity-distance standards are prescribed in AR 385-64 and AMC-R 385-100.
FLAGE	Flexible Lightweight Agile Guided Experiment
Flash point	The lowest temperature at which the vapor of a combustible liquid can be made to ignite momentarily in air.
FLD	Fraunhofer Line Discriminator. An optics system that measures relative fluorescence by using the effectively dark background of the selected Fraunhofer line in the solar spectrum.
Fraunhofer Lines	A set of several hundred dark lines appearing against the bright background of the continuous solar spectrum, and produced by absorption of light by the cooler gases in the sun's outer atmospheres at frequencies corresponding to the atomic transition frequencies of these gases.
FTS	Flight termination system
GTF	Guided Flight Test
Habitat	The area or type of environment in which an organism or biological population normally lives or occurs.
Hazardous Material	A substance that, because of its physical or chemical properties, can cause an unreasonable risk to the health and safety of individuals, property, or the environment.
Hazardous Waste	A waste, or combination of wastes, which, because of its quantity, concentration, or physical, chemical, or infectious characteristics, may either cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible illness; or pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.
Hepatotoxin	A chemical that causes adverse effects on the liver.
HVAR	High Velocity Rocket Motor

Impact	An assessment of the meaning of changes in all attributes being studied for a given resource; an aggregation of all the adverse effects, usually measured by a qualitative and nominally subjective technique.
Infrastructure	The utility and transportation networks needed for the functioning of an installation.
IRP	Installation Restoration Program
JER	Jornada Experimental Range
Kg	Kilogram
LD_{50}	That quantity of a substance, administered either orally or by skin contact, necessary to kill 50 percent of exposed animals in laboratory tests within a specified time. A substance having an LD_{50} of less than 50 mg/kg (0.0008 ounce/pound) of body weight is rated highly toxic by toxicologists.
LE	Lethality enhancer
Leg Stat	A static control product used to ensure a static-safe work environment. It can be either a wrist or shoe (leg) grounding strap that provides a reliable path for a static charge to drain to the ground.
Lidar	A remote tracking device that uses a pulsed laser source and receiving optics to detect atmospheric aerosol droplets or particles, often used for meteorological and air pollution monitoring.
LUCS	Launch and Update Control System
Mg	Milligram
MICOM	U.S. Army Missile Command
Mitigation	A method or action to reduce or eliminate adverse environmental impacts.
MLRS	Multiple Launch Rocket System
MSDS	Material Safety Data Sheet. Presents information, required under Occupational Safety and Health Act standards, on a chemical's physical properties, health effects, and use precautions.
NAAQS	National Ambient Air Quality Standards
NASA	National Aeronautics and Space Administration
National Ambient Air Quality Standards	Standards established on a Federal level that define the limits for airborne concentrations of designated "criteria" pollutants to protect public health with an adequate margin of safety (primary standards) and to protect public welfare, including plant and animal life, visibility, and materials (secondary standards). Standards cover ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, particulates, and hydrocarbons.
National Register of Historic Places	The nation's master inventory of known historic properties worthy of preservation. The National Register of Historic Places is administered by the National Park Service on behalf of the Secretary of the Interior. National Register listings include buildings, structures, sites, objects, and districts that possess historic, architectural, engineering, archaeological, or cultural significance. Properties listed are not limited to those of national significance; most are significant primarily at the state or local level.

NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
Nonattainment Area	An air quality control region that has been designated by the EPA and the appropriate state air quality agency as having ambient air quality levels below the primary standards set by the National Ambient Air Quality Standard.
NPL	National Priorities Listing
NRHP	National Register of Historic Places
OSHA	Occupational Safety and Health Act
PMMA	Polymethyl methacrylate; chemical formula $(C_3H_8D_2)n$
Polymer	Any of numerous natural and synthetic compounds of usually high molecular weight consisting of up to millions of repeated linked units, each a relatively light and simple molecule.
PSD	Prevention of Significant Deterioration
PSI	Pounds per square inch
Radome	A domelike protective housing for a radar antenna used especially in certain aircraft.
RCRA	Resource Conservation and Recovery Act. Established in 1976 to protect human health and the environment from improper waste management practices.
REC	Record of Environmental Consideration
Riparian	Of, on, or pertaining to the bank of a river, or of a pond or small lake.
Roentgen	An obsolete unit of radiation dosage, equal to the quantity of ionizing radiation that will produce one electrostatic unit of electricity in one cubic centimeter of dry air at 0° C and standard atmospheric pressure.
SCAQMD	South Coast Air Quality Management District
SHPO	State Historic Preservation Officer
SRM	Solid Rocket Motor
SSOP	Safety Standard Operating Procedure
Stilbene 420	2,2' - ([1,1' - biphenyl]-4,4' - diyldi-2, 1-ethenediyl) bis-benzene-sulfonic acid disodium salt; chemical formula $C_{28}H_{20}O_6S_2Na_2$
Tactical	(As in tactical missiles). A land-based missile that has a range of less than 4,830 kilometers (3,000 miles) designated to operate within a continental theater of operations.
TCA	1-1-1-Trichloroethane; chemical formula CH_3CCl_3
TEP	Triethyl phosphate; chemical formula $C_6H_{15}O_4P$
Theater	A large geographical area in which military operations are coordinated.
Threatened Species	Species likely to become endangered in the foreseeable future.
TLV	Threshold Limit Value
TMD	Theater Missile Defense

TMDBCE	Theater Missile Defense Bulk Chemical Experiment
TMDCFE	Theater Missile Defense Chemical Flight Experiments
TMDSCE	Theater Missile Defense Submunitions Chemical Experiment
USACERL	U.S. Army Construction Engineering Research Lab
Vapor Pressure	The pressure exerted by a vapor in equilibrium with its solid or liquid phase.
Viscosity	The degree to which a fluid resists flow under an applied force.
Wetlands	A lowland area, such as a marsh or swamp, that is saturated with moisture.
WSMR	White Sands Missile Range

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6.0 Agencies Contacted

6.0 AGENCIES CONTACTED

U.S. DEPARTMENT OF DEFENSE AGENCIES

U.S. Army Strategic Defense Command
P.O. Box 1500
Huntsville, AL 35807

U.S. Army Pueblo Depot Activity
SDSTE-PU-EE
Pueblo, CO 81001-5000

U.S. Army White Sands Missile Range
STEWS-EL-N
White Sands, NM 88002-5076

Hill Air Force Base
Environmental Office
2849 ABG/DEV
Hill Air Force Base, UT 84056

Holloman Air Force Base
6585 Test Group/TKPM
Holloman Air Force Base, NM 88330-5000

OTHER FEDERAL AGENCIES

Environmental Protection Agency
RCRA/Superfund Hotline
401 M Street SW
Washington, DC 20460

Environmental Protection Agency, Region 3
841 Chestnut Street
Philadelphia, PA 19107

Environmental Protection Agency, Region 5
230 South Dearborn Street
Chicago, IL 60604

Environmental Protection Agency, Region 6
1445 Ross Avenue
Dallas, TX 75202

Environmental Protection Agency, Region 8
999 18th Street, Suite 500
Denver, CO 80202

U.S. Fish and Wildlife Service
3530 Pan American Highway NE
Suite D
Albuquerque, NM 87107

U.S. Fish and Wildlife Service
730 Simms Street, Room 290
Golden, CO 80401

U.S. Army Corps of Engineers
517 Gold SW
Albuquerque, NM 87102

STATE AGENCIES

California Department of Health
Toxic Substances Control Program
700 Heinz Avenue, Building F
Berkeley, CA 94710

Virginia Department of Air Pollution Control
6225 Brandon Avenue, Suite 310
Springfield, VA 22150

Virginia Water Control Board
1519 Davis Ford Road, Suite 14
Woodbridge, VA 22192

Virginia Health Department
Environmental Health Division
9301 Lee Avenue
Manassas, VA 22110

Virginia Department of Waste Management
101 North 14th Street
Richmond, VA 23219

New Mexico Department of
Health and Environment
1190 Saint Francis Drive
Santa Fe, NM 87503
(Hazardous Waste Bureau, Air Quality Division,
Surface Water Section)

New Mexico Department of Game and Fish
Biological Services Division
State Capitol Complex
Villagra Building
Santa Fe, NM 87503

State of New Mexico
Bureau of Business and Economic Research
1920 Lomas NE
Albuquerque, NM 87131

Texas Water Commission
1019 North Duncanville Road
Duncanville, TX 75116

Texas Air Control Board
6421 Camp Bowie Boulevard
Suite 312
Fort Worth, TX 76116

Arizona Environmental Quality Department
2655 East Magnolia Street
Phoenix, AZ 85034
(RCRA Permits Group, Office of Water Quality)

Colorado Division of Wildlife
2126 North Weber
Colorado Springs, CO 80907

Colorado Health Department
Water Quality Division
4210 East 11th Avenue
Denver, CO 80220

Ohio Environmental Protection Agency Divisions of Air Pollution Control, Water Pollution Control, and Solid and Hazardous Waste Management
Central District
2305 Westbrooke Drive
P.O. Box 2198
Columbus, OH 43266

Bureau of Workers Compension
Division of Safety and Hygiene
246 North High Street, Fourth Floor
Columbus, OH 43215

Utah Department of Health
288 North 1460 West
Salt Lake City, UT 84116
(Bureaus of Air Quality and Solid and Hazardous Waste)

Virginia Department of Air Pollution Control
300 Central Road, Suite B
Fredericksburg, VA 22401

Department of Pollution Control and Ecology
8001 National Drive
Little Rock, AR 72204

LOCAL AGENCIES

San Francisco Bay Region
Water Quality Control Board
1800 Harrison Street, Suite 700
Oakland, CA 94612

Bay Area Air Quality Management District
939 Ellis Street
San Francisco, CA 94109

South Coast Air Quality Management District
9150 Flair Drive
El Monte, CA 91731

County Sanitation Districts of Orange County
Industrial Waste Division
10844 Ellis Avenue
Fountain Valley, CA 92708

Upper Occoquan Sewage Authority
P.O. Box 918
Centerville, VA 22020

Prince William County Chamber of Commerce
P.O. Box 495
Manassas, VA 22110

Grand Prairie Environmental Health Department
218 South Center Street
Grand Prairie, TX 75051

Grand Prairie Chamber of Commerce
P.O. Box 531227
Grand Prairie, TX 75053

Maricopa County Division of Public Health
Air Pollution Control
1825 E. Roosevelt Street
Phoenix, AZ 85006

City of Chandler
Development and Community Services
200 East Commonwealth
Chandler, AZ 85225

Chandler Chamber of Commerce
218 North Arizona Avenue
Chandler, AZ 85224

Pueblo Chamber of Commerce
P.O. Box 697
Pueblo, CO 81002

Pueblo County Health Department
151 Central Main
Pueblo, CO 81003
(Air Quality and Solid and Hazardous Waste Sections)

Mountain View Chamber of Commerce
580 Castro Street
Mountain View, CA 94041

Culpeper Chamber of Commerce
133 West Davis Street
Culpeper, VA 22701

Camden Area Chamber of Commerce
P.O. Box 99
Camden, AR 71701

Sun Valley Chamber of Commerce
8113 Sunland Blvd.
Sun Valley, CA 91352

Calhoun County Judge's Office
P.O. Box 566
Hampton, AR 71744

County Sanitation Districts of Orange County
Industrial Waste Division
10844 Ellis Avenue
Fountain Valley, CA 92708

Orange County Administration Office
P.O. Box 111
Orange, VA 22960

CONTRACTORS

Orbital Sciences Corporation
Space Data Division
3380 South Price Road
Chandler, AZ 85248

Aerotherm
555 Clyde Avenue
P.O. Box 7040
Mountain View, CA 94039

LTV Aerospace and Defense Company
Missiles and Electronics Group-Missiles Division
P.O. Box 650003
Mail Stop MM-74
Dallas, TX 75265-0003

Atlantic Research Corporation
Virginia Propulsion Division
5945 Wellington Road
Gainesville, VA 22065

Atlantic Research Corporation
Route 4, Box 121
Culpeper, VA 22701

Atlantic Research Corporation
P.O. Box 1036
Highland Industrial Park
Arkansas Propulsion Division
Camden, AR 71701

Rockwell International
3370 Miraloma Avenue
Anaheim, CA 92803

L.A. Gauge
7440 San Fernando Road
Sun Valley, CA 91352

Battelle
505 King Avenue
Columbus, OH 43201

Teledyne Brown Engineering
Cummings Research Park
300 Sparkman Drive NW
P.O. Box 07007
Huntsville, AL 35807

TRW
Building 01, Room 2281, 1 Space Park
Redondo Beach, CA 90278

Kaman Sciences Corporation
1500 Garden of the Gods Road
P.O. Box 763
Colorado Springs, CO 80933

CHEMICAL SUPPLIERS

Eastman Kodak Company
343 State Street
Rochester, NY 14650

Exciton Chemical Company
P.O. Box 31126, Overlook Station
Dayton, OH 45431

Tennessee Eastman Company
Kingsport, TN 37662

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7.0 References

7.0 REFERENCES

Note: Citations in the text of this document are presented in two ways. Citations presented at the end of a paragraph, outside of the period, refer to information throughout the paragraph. Citations presented in the body of the paragraph, and/or inside a period, refer specifically to the information in that sentence, or to the document title immediately preceeding it.

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PhD, 1984, Biology, New Mexico State University, Las Cruces
M.S., 1977, Biology, University of Texas at El Paso
M.Ed, 1974, Curriculum & Instruction, Texas A & M University
B.S., 1970, Biology, Lamar University, Texas
Area of Responsibility: Biological Resources
Years of Experience: 10

Jackie Eldridge, Technical Editor, The Earth Technology Corporation
M.B.A., 1983, Business Administration, National University, California
M.S., 1979, Marine and Environmental Science, Long Island University, New York
B.S., 1971, Biology, Fairleigh Dickinson University, New Jersey
Area of Responsibility: Technical Editing
Years of Experience: 16

Ronald W. Freeman, Group Director, Natural Resources, Advanced Sciences, Inc.
B.S., 1971, Wildlife Management, Humbolt State University, California
A.A., 1967, Life Sciences, San Diego Mesa College, California
Area of Responsibility: Biological Resources
Years of Experience: 18

Albert Goodman, Senior Physicist, Advanced Sciences, Inc.
Ph.D., 1960, Physics, University of New Mexico, Albuquerque
M.S., 1955, Physics, University of New Mexico, Albuquerque
B.S., 1945, Physics, City College of New York , New York City
Area of Responsibility: Technical Analysis, Development Test
Years of Experience: 46

Troy Gray, Senior Analyst, Advanced Sciences, Inc.
M.B.A., 1986, Management, New Mexico Highlands University, Las Vegas, New Mexico
B.A., 1960, Industrial Psychology, University of Tulsa, Oklahoma
Areas of Responsibility: Systems Analysis, Ground and Flight Safety
Years of Experience: 27

Edd Joy, Managing Senior Geographer, The Earth Technology Corporation
B.A., 1973, Geography, California State University, Northridge
Area of Responsibility: Assistant Program Director
Years of Experience: 17

Joseph B. Kriz, Senior Project Environmental Specialist, The Earth Technology Corporation
B.A., 1979, Geoenvironmental Studies, Shippensburg State College, Pennsylvania
B.S., 1979, Biology, Shippensburg State College, Pennsylvania
Area of Responsibility: Project Manager
Years of Experience: 8

Maria Langmaack, Senior Staff Environmental Specialist, The Earth Technology Corporation
B.A., 1987, Geography, California State University, San Bernardino
Area of Responsibility: Regulatory Compliance, Permitting
Years of Experience: 4

Walter Odening, Assistant Vice President, Advanced Sciences, Inc.
Ph.D., 1971, Botany, Duke University, Durham, North Carolina
M.S., 1968, Biology, San Diego State University, California
B.S., 1963, Biology, San Diego State University, California
Area of Responsibility: Program Director
Years of Experience: 23

Robert Poll, Health and Safety Manager, The Earth Technology Corporation
B.S., 1985, Nuclear Engineering, Rensselaer Polytechnic Institute, Troy, New York
Area of Responsibility: Hazardous Materials and Waste, Health and Safety
Years of Experience: 5

George F. Provancha, Principal Technologist, Teledyne Brown Engineering
B.S., 1986, Technical Business, Athens State, Alabama
A.S., 1982, Missile and Munitions, Calhoun Community College, Decatur, Alabama
Area of Responsibility: Technical Management of ERINT Target Program
Years of Experience: 30

Leo Rahal, Senior Physicist, Advanced Sciences, Inc.
Ph.D., 1977, Physics, University of New Mexico, Albuquerque
M.S., 1964, Physics, University of Detroit, Michigan
B.S., 1962, Physics, University of Detroit, Michigan
Area of Responsibility: Air Dispersion
Years of Experience: 26

Lesliee Reilly, Technical Editor, The Earth Technology Corporation
B.A., 1990, English Literature, University of California, Riverside
Area of Responsibility: Technical Editing
Years of Experience: 1

Nelson Rodrigues, Director, Advanced Technologies Group, Advanced Sciences, Inc.
M.B.A., 1985, Project Management, New Mexico Highlands University, Las Vegas, New Mexico
M.S., 1968, Astronautical Engineering, Air Force Institute of Technology, Dayton, Ohio
B.S., 1966, Nuclear Engineering, Lowell Technical Institute, Massachusetts
Area of Responsibility: Technical Director, Systems Analysis, Noise Assessment
Years of Experience: 24

Carl Rykaczewski, Senior Staff Environmental Specialist, The Earth Technology Corporation
B.S., 1981, Environmental Resource Management, Pennsylvania State University, State College
Area of Responsibility: Land Use, Water Quality
Years of Experience: 2

Cathy Strietzel, Technologist, Teledyne Brown Engineering
B.S., 1983, Chemistry, Birmingham Southern College, Alabama
Area of Responsibility: Deposition Modeling
Years of Experience: 4

George Wandler, Senior Project Manager, Advanced Sciences, Inc.
M.B.A., 1978, Business Administration, University of Tennessee, Knoxville
B.B.A., 1969, Business Administration, Memphis State University, Tennessee
Area of Responsibility: Deputy Project Manager
Years of Experience: 20

Amy H. Werkheiser, Scientist, Advanced Sciences, Inc.
B.S., 1986, Biology, University of Alabama, Huntsville
Area of Responsibility: Task Management Support
Years of Experience: 5

Jan M. Williams, Biologist, Advanced Sciences, Inc.
B.A., 1990, Biology, San Diego State University, California
Area of Responsibility: Biological Resources
Years of Experience: 2

Barbara Zeman, Senior Technical Editor, The Earth Technology Corporation
M.S., 1979, Biomedical Engineering, University of Southern California, Los Angeles
B.S., 1976, Electrical Engineering, Rutgers University, New Brunswick, New Jersey
Area of Responsibility: Technical Editing
Years of Experience: 11

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Appendix A

APPENDIX A
MATERIAL SAFETY DATA SHEETS

- Triethyl Phosphate
- Polymethyl Methacrylate
- Stilbene 420

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MATERIAL SAFETY DATA SHEET

EASTMAN KODAK COMPANY
343 State Street
Rochester, New York 14650

For Emergency Health, Safety, and Environmental Information, call 716-722-5151
For all other purposes, call 800-225-5352, in New York State call 716-458-4014

Date of Preparation: 07/16/86 Kodak Accession Number: 904662

SECTION I. IDENTIFICATION

- Product Name: Triethyl Phosphate
- Synonym(s): Phosphoric Acid Triethyl Ester
- Formula: C6 H15 O4 P
- CAT No(s): 114 3114; 117 3400; 117 3418; 117 3426; 117 3434
- Chem. No(s): 04662
- Kodak's Internal Hazard Rating Codes: R: 1 S: 2 F: 1 C: 0

SECTION II. PRODUCT AND COMPONENT HAZARD DATA

COMPONENT(S):	Percent	ACGIH TLV(R)	CAS Reg. No.
Triethyl Phosphate	ca. 100	---	78-40-0

SECTION III. PHYSICAL DATA

- Appearance: Colorless liquid
- Boiling Point: 209 C (408 F)
- Vapor Pressure: 0.27 mmHg at 20 C (68 F)
- Evaporation Rate (n-butyl acetate = 1): Not Available
- Volatile Fraction by Weight: ca. 100 %
- Specific Gravity (Water = 1): 1.07
- Solubility in Water (by Weight): Appreciable

SECTION IV. FIRE AND EXPLOSION HAZARD DATA

- Flash Point: 99 C (210 F) Pensky-Martens closed cup
- Extinguishing Media: Water spray; Dry chemical; Carbon dioxide; "Alcohol" foam
- Special Fire Fighting Procedures: Wear self-contained breathing apparatus and protective clothing.
- Unusual Fire and Explosion Hazards: Fire or excessive heat may produce hazardous decomposition products.

SECTION V. REACTIVITY DATA

- Stability: Stable
- Incompatibility: Strong oxidizers
- Hazardous Decomposition Products: Combustion will produce carbon dioxide and probably carbon monoxide. Oxides of phosphorus may also be present.
- Hazardous Polymerization: Will not occur.

==
SECTION VI. TOXICITY AND HEALTH HAZARD DATA

A. EXPOSURE LIMITS: Not established.

B. EXPOSURE EFFECTS:
Inhalation: Low hazard for usual industrial handling.
Skin: Low hazard for usual industrial handling.
Eye: Causes irritation.

C. FIRST AID:
Inhalation: None should be needed.
Skin: None should be needed.
Eye: Immediately flush eyes with plenty of water for at least 15 minutes and get medical attention.

==
SECTION VII. VENTILATION AND PERSONAL PROTECTION

A. VENTILATION:
Good general room ventilation should be sufficient.

B. RESPIRATORY PROTECTION:
None should be needed.

C. SKIN AND EYE PROTECTION:
Protective gloves and clothing should be worn. Safety glasses or goggles should be worn.

==
SECTION VIII. SPECIAL STORAGE AND HANDLING PRECAUTIONS

Keep from contact with oxidizing materials.

==
SECTION IX. SPILL, LEAK, AND DISPOSAL PROCEDURES

Absorb material in vermiculite or other suitable absorbent and place in impervious container. Dispose by incineration or contract with licensed chemical waste disposal agency. Discharge, treatment, or disposal may be subject to federal, state or local laws.

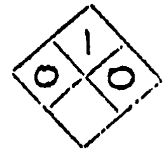
==
For transportation information regarding this product, please phone the Eastman Kodak Distribution Center nearest you: Rochester, NY (716) 254-1300; Oak Brook, IL (312) 654-5300; Chamblee, GA (404) 455-0123; Dallas, TX (214) 241-1611; Whittier, CA (213) 945-1255; Honolulu, HI (808) 833-1661.

==

CHEMCENTRAL
CHEMCENTRAL/Cincinnati
4619 Reading Rd.
Cincinnati, OH 45229
(513) 242-7700

MATERIAL SAFETY DATA SHEET

SECTION I

NFPA 704 DESIGNATION	CIN # NONE
	CAS # 9011-14-7

MANUFACTURER:
E. I. Du Pont de Nemours & Co., Inc.
Finishes & Fabricated Products Dept.
Wilmington, DE 19898

TELEPHONE:
For Product Information: 800-441-7515
For Medical Emergencies: 800-441-3637
For Transportation Emergency: 800-424-9300

PRODUCT: Polymethyl Methacrylate, Trade name - Elvacite® 2008 and 2041 Acrylic Resins, Chemical family - Acrylic Resin

SECTION II: INGREDIENTS

NON-HAZARDOUS POLYMER

SECTION III: PHYSICAL DATA

EVAPORATION RATE: Not applicable

VAPOR DENSITY: Not applicable

SOLUBILITY IN WATER: Nil

PERCENT VOLATILE: < 1.0%

APPROXIMATE BOILING RANGE: Not applicable

DENSITY: Not applicable

SECTION IV: FIRE & EXPLOSION DATA

FLASH POINT (METHOD): Flash ignition approx. 304C(580F)* (ASTM D-1929)
* Based on similar resins.

APPROX. FLAMMABLE LIMITS: Not applicable

EXTINGUISHING MEDIA: Chemical foam, CO_2, water fog, dry chemical

Special fire fighting procedures: None

Unusual fire & explosion hazards: None

SECTION V: HEALTH HAZARD DATA

ROUTE OF ENTRY: Symptoms/effects of overexposure and first aid

INGESTION: Ingestion of small quantities of this material under normal circumstances would not cause harmful effect.

INHALATION: Gross overexposure to nuisance particles, regardless of how generated, may cause irritation of the respiratory tract. If affected by inhalation, remove to fresh air. If breathing difficulty persists consult a physician.

SKIN OR EYE CONTACT: Nuisance particulates may cause irritation. In case of eye contact, flush immediately with large amounts of water for 15 minutes. Call a physician. For skin, wash with soap and water. If irritation persists consult a physician.

SECTION VI: REACTIVITY DATA

STABILITY: Stable

CONDITIONS TO AVOID: Temperatures above 299C (570°F)

INCOMPATIBILITY: Strong acids and oxidizing agents

HAZARDOUS DECOMPOSITION: Hazardous decomposition products: Methyl methacrylate and carbon monoxide depending on conditions of heating or burning.

HAZARDOUS POLYMERIZATION: Will not occur

CONDITIONS TO AVOID FOR HAZARDOUS POLYMERIZATION: Not applicable

SECTION VII: SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Sweep up carefully to prevent slipping hazard.

WASTE DISPOSAL METHOD: Incineration or landfill in accordance with Federal, State and local regulations.

SECTION VIII: SPECIAL PROTECTION INFORMATION

RESPIRATORY: None required under normal processing conditions.

VENTILATION: Normally not required.

PROTECTIVE GLOVES: Not required.

EYE PROTECTION: Safety glasses during processing.

OTHER PROTECTIVE EQUIPMENT: None.

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: Dry storage. Keep containers closed to prevent moisture absorption and contamination.

OTHER PRECAUTIONS: None.

TRANSPORTATION: Not regulated.

NOTICE: The data in this material safety data sheet relate only to the specific material designated herein and do not relate to use in combination with any other material or in any process.

Technical Services Manager
Date: 11/1/85

MATERIAL SAFETY DATA SHEET

CURRENT AS (

EXCITON, INC.
P.O. Box 31126 Overlook Station
Dayton, Ohio 45431

NOV 20 1990

Date of Preparation: 06-21-90
Person to contact: Larry Knaak
Telephone number for information: 513-252-2989

SECTION I. IDENTIFICATION

* Product Name: Stilbene 420
* Synonym(s): 2,2'-([1,1'-biphenyl]-4,4'-diyldi-2,1-ethenediyl)bis-benzenesulfonic acid disodium salt.
* Cat No.: 04200

SECTION II. PRODUCT AND COMPONENT HAZARD DATA

COMPONENT(s):	Percent	TLV	CAS Reg. No.
Stilbene 420	~100	N/D	27344-41-8

SECTION III. PHYSICAL DATA

* Appearance and odor: Yellow powder: Odorless
* Melting Point: Greater than 360°C
* Vapor Pressure: Negligible
* Evaporation Rate (n-butyl acetate=1): Not applicable.
* Volatile fraction by Weight: Not applicable.
* Specific Gravity (water=1): Not applicable.
* Solubility in Water: 300g/l at 100 C:pH 1g/l water=about 7

SECTION IV. FIRE AND EXPLOSION HAZARD DATA

* Flash Point: Not applicable.
* Extinguishing Media: Water spray; Dry chemical; Carbon dioxide.
* Special Fire Fighting Procedures: Wear self-contained breathing apparatus and protective clothing.
* Unusual Fire and Explosion Hazards: Fire or excessive heat may produce hazardous decomposition products.

SECTION V. REACTIVITY DATA

* Stability: Stable.
* Incompatibility: Strong oxidizers.
* Hazardous Decomposition Products: Combustion will produce carbon dioxide and probably carbon monoxide. Oxides of sulfur will also be present.
* Hazardous Polymerization: Will not occur.

SECTION VI. TOXICITY AND HEALTH HAZARD DATA

A. EXPOSURE LIMITS: Acute-oral LD_{50} (rat) greater than 5000mg/kg. Not a skin irritant or sensitizer.

B. EXPOSURE EFFECTS:
Inhalation: Low hazard for usual industrial handling.
Skin: Low hazard for usual industrial handling.
Eye: No specific hazard known. Contact may cause transient irritation.
Ingestion: Expected to be a low ingestion hazard.

C. FIRST AID:
Inhalation: Remove to fresh air.
Skin: Wash after each contact.
Eye: Immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if symptoms are present.
Ingestion: Drink 1-2 glasses of water. Seek medical attention.

SECTION VII. VENTILATION AND PERSONAL PROTECTION

* Ventilation: Good general room ventilation is recommended. Local exhaust may be needed.
* Respiratory Protection: A NIOSH approved dust respirator should be worn, if needed.
* Skin and Eye Protection: Protective gloves should be worn. Safety glasses should be worn.

SECTION VIII. SPECIAL STORAGE AND HANDLING PRECAUTIONS

* Keep from contact with oxidizing materials.

* Handling Precautions: In accordance with good industrial practice, handle with care and avoid unnecessary personal contact. Avoid contact with eyes and prolonged or repeated skin contact. Avoid continuous or repetitive breathing of dust. Use only with adequate ventilation. For **laboratory** use by technically qualified individual only.

* Shipping and Storing Precautions: Keep container tightly closed when not in use and during transport.

* Personal Hygiene: Wash thoroughly after handling.

SECTION IX. SPILL, LEAK, AND DISPOSAL PROCEDURES

Sweep up material and package for safe feed to an incinerator. Dispose by incineration or contract with licensed chemical waste disposal agency. Follow all federal, state and local laws.

SECTION X. REGULATORY INFORMATION

* Dot Proper Shipping Name: Not regulated as a hazardous material by the U.S. Dept. of Transportation (DOT) 49 CFR 172.101 Hazardous Materials Table.
* Dot Class: None.
* Dot Number: None.
* RCRA Status: Not a hazardous waste under RCRA (40 CFR 261).
* CERCLA Status: Not listed.
* SARA/Title III - Toxic Chemicals List: This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under SEC. 313 (40 CFR 372).
* TSCA Inventory Status: Chemical components listed on TSCA inventory.

Appendix B

APPENDIX B

RECORD OF ENVIRONMENTAL CONSIDERATION
SULF SITE MODIFICATION
WHITE SANDS MISSILE RANGE, NEW MEXICO

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U.S. ARMY TEST AND EVALUATION COMMAND
WHITE SANDS MISSILE RANGE, NEW MEXICO 88002-5510

RECORD OF ENVIRONMENTAL CONSIDERATION
CONTROL NO. REC-007-91

MASTER PLANNING BOARD ACTION NO. 17-91 DATE: ______

TITLE: Gulf Site Modification

DESCRIPTION OF PROPOSED ACTION: (Provide short description of action in the space provided). The addition of three concrete pads and connection of th two existing tracks is necessary to ensure performance of work in a saf manner and to reduce the cost involved in transferring the ALPS buildin between the launch pad and its storage position.

ACTION COMMENCE DATE: 03 DEC 1990 COMPLETION DATE: 01 JAN 1991

IT HAS BEEN DETERMINED THAT THIS ACTION:

a. IS ADEQUATELY COVERED IN THE EXISTING ENVIRONMENTAL ASSESSMENT X ENVIRONMENTAL IMPACT STATEMENT ____; ENTITLED: WHITE SANDS MISSILE RANGE ENVIRONMENTAL ASSESSMENT AND DATED MARCH 1985.

b. QUALIFIED FOR CATEGORICAL EXCLUSION NO.______, APPENDIX A, ARMY REGULATION 200-2 (AND NO EXTRAORDINARY CIRCUMSTANCES EXIST AS DEFINED IN PARAGRAPH 4-3. ARMY REGULATION 200-2).

THIS DOCUMENT DOES NOT RELIEVE THE PROPONENT OF COMPLIANCE WITH APPLICABLE FEDERAL AND STATE LAWS AND REGULATIONS.

PROPONENT:

1. Dan Lilley Date 10/11/90
DAN LILLEY
NOMTS, Facility Engineer
(505) 678-2336

CONCURRENCE:

3. [signature] Date 10/11/90
DAVID MARTINEZ
NOMTS, Security Officer
(505) 678-5942

CONCURRENCE:

2. for Robert J. Burton Date 11/20/90
ROBERT J. ANDREOLI,
WSMR Environmental Quality Coordinator
(505) 678-2224

APPROVED BY:

4. W B Christy Date 21 Nov 9
WILLIAM B. CHRISTY
COL, QM
Director, Engineering, Housing and Logistics

ENVIRONMENTAL QUALITY CONSIDERATIONS

1. Concise description of proposed action: (Describe the overall project. Give details for the what, how, where, and when of this site specific action. Use an extra sheet if needed.) This project consists of pouring three reinforced concrete pads and extending existing track to a point of intersection. The work is located at Sulf Site and is scheduled for completion by the beginning of the second quarter of FY 91.

2. Does proposal conform with Installation Master Plan: Yes X No ___

3. Would the proposed project alter land use on the installation? Yes ___ No X

4. Describe project activities that could possible affect the archaeological and/or cultural resources and the qualities of air, land and water on White Sands Missile Range (WSMR), e.g., clearing, digging or leveling. These actions must be coordinated with the Environmental Division of WSMR.
Minor excavation and/or backfill may be required for placement of concrete, however the location of the work is on previously disturbed soil and within the Sulf Site launch complex. There are no foreseeable effects on the environmental or cultural resources.

5. Prior use and condition of the property and/or equipment involved:
This project will not alter the prior use of this facility, which is to support rocket and missile launches.

6. Proposed use of the property, equipment, and/or completed project:
The addition of the concrete pads and extension of the track will not alter the use of the property, but will eliminate safety concerns.

7. Areas of potential environmental impact during implementation (e.g., construction phase, equipment placement/replacement phase, etc.) of proposed action.
1=improvement, 2=no change, 3=minor adverse impact, 4=moderate adverse impact, 5=major adverse impact:

a. Potential to cause air pollution. 1 (2) 3 4 5

b. Potential to cause water pollution. 1 (2) 3 4 5

c. Potential to impact on the quality or quantity of groundwater. 1 (2) 3 4 5

d. Potential to affect wetlands, floodplain, wild and scenic rivers. 1 (2) 3 4 5

e. Potential for discharge or release of hazardous substance. 1 (2) 3 4 5

f. Potential to cause soil contamination. 1 (2) 3 4 5

g. Potential to violate a safety, public health, or noise standard. 1 (2) 3 4 5

h. Potential to impact on protected species or their habitat. 1 (2) 3 4 5

i. Potential to affect cultural resource that are either on or eligible for the National Register, or unstudied. 1 (2) 3 4 5

j. Potential effects upon labor force. 1 (2) 3 4 5

k. Potential to impact upon recreational areas and/or prime farmland. 1 (2) 3 4 5

l. Potential to affect energy demand. 1 (2) 3 4 5

m. Potential environmental controversy involved with project:

(1) Local Yes___ No X

(2) National Yes___ No X

n. Potential to violate Federal, State, or local law/regulation designed to control air pollution. Yes___ No X

o. Potential to violate Federal, State or local law/regulation designed to control water pollution. Yes___ No X

p. Potential involvement with contaminated areas and/or material. Yes___ No X

8. Areas of potential environmental impact during operation phase of proposed action. 1=improvement, 2=no change, 3=minor adverse impact, 4=moderate adverse impact, 5=major adverse impact:

a. Potential to cause air pollution. 1 (2) 3 4 5

b. Potential to cause water pollution. 1 (2) 3 4 5

c. Potential to impact on the quality or quantity of groundwater. 1 (2) 3 4 5

d. Potential to affect wetlands, floodplain, wild and scenic rivers. 1 (2) 3 4 5

e. Potential for discharge or release of hazardous substance. 1 (2) 3 4 5

f. Potential to cause soil contamination. 1 (2) 3 4 5

g. Potential to violate a safety, public health, or noise standard. 1 (2) 3 4 5

h. Potential to impact on protected species or their habitat. 1 (2) 3 4 5

i. Potential to affect cultural resource that are either on or eligible for the National Register, or unstudied. 1 (2) 3 4 5

j. Potential effects upon labor force. 1 (2) 3 4 5

k. Potential to impact upon recreational areas and/or prime farmland. 1 (2) 3 4 5

l. Potential to impact upon recreational areas and/or prime farmland. 1 (2) 3 4 5

m. Potential environmental controversy involved with project:

(1) Local Yes__ No X

(2) National Yes__ No X

n. Potential to violate Federal, State, or local law/regulation designed to control air pollution. Yes__ No X

o. Potential to violate Federal, State or local law/regulation designed to control water pollution. Yes__ No X

p. Potential involvement with contaminated areas and/or material. Yes__ No X

9. Planned mitigation of adverse impact.

There are no foreseen adverse impacts.

SULF SITE MODIFICATIONS
Purpose, Description and Impact

1. Purpose and Description:

Connection of Tracks

The existing stow position for the Aries Launch Preparation Shelter (ALPS) is located such that it will not interfere with a Vandal launch. This location consists of a short section of rails and tie-downs for the ALPS. The Aries launch pad also has rails for moving the ALPS. These two sections of rail were not connected due to time constraints and the process of transferring the ALPS to and from the launch pad relied heavily on the weather conditions and availability of a crane. The remote location and high winds make this process a costly one.

The tracks will be extended and the building can then be transferred on rail with the assistance of towing equipment readily available.

Concrete Pads

During the loading process at the Aries pad, the rocket is lifted off of a trailer, using a crane, both of which are positioned as close to the launch stool as possible. The existing terrain is not level and is subject to erosion, causing a safety concern.

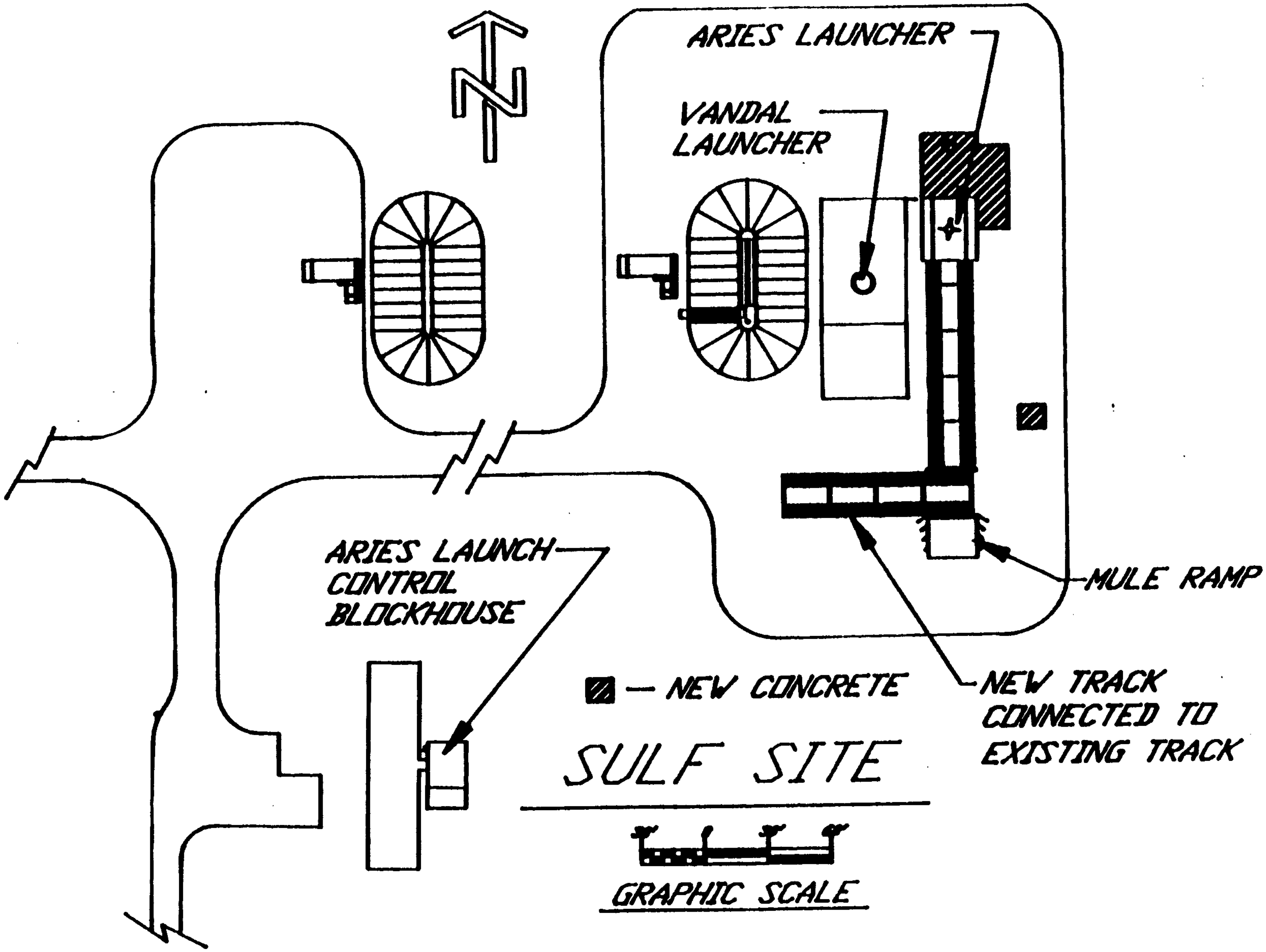
An additional concrete pad is required for placement of mission related equipment which is currently being positioned on the ground.

Three reinforced concrete pads will be placed at the Aries launch pad per the attached site plan.

2. Impact:

There will be no impact upon Range/Post activities or the environment, as all work will be confined to already disturbed areas within the Sulf Site launch complex. However, potential safety hazards will be eliminated.

Encl: (1)


N
ARIES LAUNCHER
VANDAL LAUNCHER
MULE RAMP
NEW TRACK CONNECTED TO EXISTING TRACK
ARIES LAUNCH CONTROL BLOCKHOUSE
— NEW CONCRETE
SULF SITE
GRAPHIC SCALE

Appendix C

APPENDIX C
ENVIRONMENTAL ATTRIBUTES, APPLICABLE LAWS AND REGULATIONS, AND COMPLIANCE REQUIREMENTS

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APPENDIX C
ENVIRONMENTAL ATTRIBUTES, APPLICABLE LAWS AND REGULATIONS, AND COMPLIANCE REQUIREMENTS

The following federal environmental laws and regulations were reviewed to assist in determining the significance of environmental impacts under the National Environmental Policy Act.

Air Quality - The *Clean Air Act* seeks to achieve and maintain air quality to protect public health and welfare. To accomplish this, Congress directed the Environmental Protection Agency (EPA) to establish *National Ambient Air Quality Standards (NAAQS)*. Primary standards protect public health; secondary standards protect public welfare (vegetation, property damage, scenic value, etc.). Standards cover sulfur dioxide, particulates, carbon monoxide, ozone, hydrocarbons, and nitrogen dioxide. The NAAQS for these criteria pollutants are described in Table C-1.

Primary responsibility to implement the Clean Air Act rests with each state. However, each state must submit a state implementation plan outlining the state's strategy for attaining and maintaining the NAAQS within the deadlines established by the Act.

The Clean Air Act mandates establishment of performance standards, called *New Source Performance Standards*, for new and modified stationary sources to keep new pollution to a minimum. Under the Act, the EPA can establish emission standards for "hazardous" air pollutants for both new and existing sources. So far, the EPA has set air emission standards for beryllium, mercury, asbestos, vinyl chloride, and other hazardous materials including radioactive materials.

The Clean Air Act also seeks to "prevent significant deterioration" of air quality in areas where the air is cleaner than that required by the NAAQS. Areas subject to PSD regulation have a Class I, II, or III designation. Class I allows the least degradation.

Nonattainment policies also exist. A nonattainment area is one where monitoring data or air quality modeling demonstrates a violation of the NAAQS. Nonattainment polices prevent construction or modification of any source that will "interfere with" attainment and maintenance of ambient standards. A new source must demonstrate a net air quality benefit. The source must secure "offsets" from existing sources to achieve the air quality benefit.

Biological Resources - The *Endangered Species Act* declares that it is "the policy of Congress that all federal departments and agencies shall seek to conserve endangered species and threatened species." Further, the Act directs federal agencies to "use their authorities in furtherance of the purposes of the Act."

The Secretary of the Interior creates lists of "endangered" and "threatened" species. The term "endangered species" means "any species which is in danger of extinction throughout all or a significant portion of its range." The Act defines a "threatened species" as any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

TABLE C-1. NATIONAL AMBIENT AIR QUALITY STANDARDS

Pollutant	Averaging Time	Primary Standard[1]	Secondary Standard[2]	General Objectives
Ozone	1 hr	235 $\mu g/m^3$ (0.12 ppm)	235 $\mu g/m^3$ (0.12 ppm)	To prevent eye irritation and possible impairment of lung functions in persons with chronic pulmonary disease, and to prevent damage to vegetation.
Carbon monoxide	8 hr	10 mg/m^3 (9 ppm)	10 mg/m^3 (9 ppm)	To prevent interference with the capacity to transport oxygen in the blood.
	1 hr	40 mg/m^3 (35 ppm)	40 mg/m^3 (35 ppm)	
Nitrogen dioxide	Annual average	100 $\mu g/m^3$ (0.05 ppm)	100 $\mu g/m^3$ (0.05 ppm)	To prevent possible risk to public health and atmospheric discoloration.
Sulfur dioxide	Annual average	80 $\mu g/m^3$ (0.03 ppm)	...	To prevent pulmonary irritation.
	24 hr	365 $\mu g/m^3$ (0.14 ppm)	...	
	3 hr	...	1300 $\mu g/m^3$ (0.5 ppm)	To prevent odor.
Suspended particulate matter	Annual geometric mean	50 $\mu g/m^3$	...	To prevent health effects attributable to long continued exposures.
	24 hr	150 $\mu g/m^3$	...	
Hydrocarbons (corrected for methane)	3 hr	160 $\mu g/m^3$ (0.24 ppm)	160 $\mu g/m^3$ (0.24 ppm)	To reduce oxidant formation.

1 National Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect public health.

2 National Secondary Standards: The levels of air quality necessary to protect public welfare from any known or anticipated adverse effects of a pollutant.

hr = hour
$\mu g/m^3$ = micrograms per cubic meter
mg/m^3 = milligrams per cubic meter
ppm = parts per million

Sources: Rau, J. G., and D. C. Wooten (editors), 1980. Environmental Impact Analysis Handbook, McGraw Hill.
U.S. Department of the Air Force, 1989. Draft Environmental Impact Statement, Construction and Operation of Space Launch Complex 7, Vandenberg Air Force Base, California, July 20.

The key provision of the Act for federal activities is Section 7 Consultation. Under Section 7 of the Act, every federal agency must consult with the Secretary of the Interior, U.S. Fish and Wildlife Service (USFWS), to ensure that any agency action (authorization, funding, or carrying out) is "not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species."

The *Bald and Golden Eagle Protection Act* establishes penalties for the unauthorized taking, possession, selling, purchase, or transportation of bald or golden eagles, their nests, or their eggs. Any federal activity that might disturb eagles requires consultation with the USFWS for appropriate mitigation.

In the *Fish and Wildlife Conservation Act*, Congress encourages "all Federal departments and agencies to utilize their statutory and administrative authority, to the maximum extent practicable and consistent with each agency's statutory responsibilities, to conserve and to promote conservation of nongame fish and wildlife and their habitats." Further, the Act encourages each state to develop a conservation plan.

Whenever a federal department or agency proposes or authorizes the modification, control, or impoundment of the waters of any stream or body of water (greater than 10 acres), including wetlands, that agency must first consult with the USFWS under the *Fish and Wildlife Coordination Act*. Any such project must make adequate provision "for the conservation, maintenance and management of wildlife resources." The Act requires a Federal agency to give full consideration to the recommendations of the USFWS and to any recommendations of a state agency on the wildlife aspects of a project.

The *Migratory Bird Treaty Act* protects many species of migratory birds. Specifically, the Act prohibits the pursuit, hunting, taking, capture, possession, or killing of such species or their nests and eggs. The Act further requires that any affected federal agency or department must consult with the USFWS to evaluate ways to avoid or minimize adverse effects on migratory birds.

Hazardous Materials and Wastes - Under the *Resource Conservation and Recovery Act (RCRA)*, Congress declares the national policy of the United States to be that, wherever feasible, the generation of hazardous waste is to be reduced or eliminated as expeditiously as possible. Waste that is nevertheless generated should be treated, stored, or disposed of so as to minimize the present and future threat to human health and the environment.

RCRA defines wastes as "hazardous" through four characteristics: ignitability, corrosivity, reactivity, or toxicity. Once defined as a "hazardous" waste, RCRA establishes a comprehensive "cradle to grave" program to regulate hazardous wastes from generation through proper disposal or destruction.

RCRA also establishes a specific permit program for the treatment, storage, and disposal of hazardous wastes. Both interim status and final status permit programs exist.

Any underground tank containing hazardous waste is also subject to RCRA regulation. Under the Act, an underground tank is one with 10 percent or more of its volume underground. Underground tank regulations include design, construction, installation, and release detection standards.

RCRA defines solid waste as "any garbage, refuse, sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, including solid, liquid, semi-solid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations and from community activities." To regulate solid waste, RCRA provides for the development of state plans for waste disposal and resource recovery. RCRA encourages and affords assistance for solid waste disposal methods that are environmentally sound, maximize the utilization of valuable resources, and encourage resource conservation. RCRA also regulates mixed wastes. A mixed waste contains both a hazardous waste and radioactive component.

The *Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)* – commonly known as Superfund – provides for funding, cleanup, enforcement authority, and emergency response procedures for releases of hazardous substances into the environment.

The CERCLA covers the cleanup of toxic releases at uncontrolled or abandoned hazardous waste sites. By comparison, the principal objective of the RCRA is to regulate active hazardous waste storage, treatment, and disposal sites to avoid new Superfund sites. The RCRA seeks to prevent hazardous releases; a release triggers the CERCLA.

The goal of the Superfund program is to clean up sites where releases have occurred or may occur. A trust fund supported, in part, by a tax on petroleum and chemicals supports the Superfund. The Superfund allows the government to take action now and seek reimbursement later.

The CERCLA also mandates spill reporting requirements. The Act requires immediate reporting of a release of a hazardous substance (other than a federally permitted release) if the release is greater than or equal to the reportable quantity for that substance.

Title III of the *Superfund Amendments and Reauthorization Act* is a freestanding legislative program known as the *Emergency Planning and Community Right-to-Know Act of 1986*. The Act requires (1) immediate notice for accidental releases of hazardous substances and extremely hazardous substances; (2) information to local emergency planning committees for the development of emergency plans; and (3) Material Safety Data Sheets, emergency and hazardous chemical inventory forms. and toxic release forms.

The law requires each state to designate a state emergency response commission. In turn, the state must designate emergency planning districts and local emergency planning commissions. The primary responsibility for emergency planning is at the local level.

The *Toxic Substances Control Act* authorizes the Administrator of the EPA broad authority to regulate "chemical substances and mixtures" which may present an unreasonable risk of injury to human health or the environment.

The EPA may regulate when the Administrator finds that "there is a reasonable basis to conclude that the manufacture, processing, distribution in commerce, use, or disposal of a chemical substance or mixture" poses or will pose "an unreasonable risk of injury to health or the environment".

Upon a finding of "unreasonable risk", the EPA Administrator has a number of regulatory options or controls. The EPA's authority includes total or partial bans on production, content restrictions, operational constraints, product warning statements, instructions, disposal limits, public notice requirements, and monitoring and testing obligations.

The Toxic Substances Control Act Chemical Substance Inventory is a database providing support for assessing human health and environmental risks posed by chemical substances. As such, the inventory is not a list of toxic chemicals. Toxicity is not a criterion used in determining the eligibility of a chemical substance for inclusion on the inventory.

Health and Safety - The *Occupational Safety and Health Act's (OSHA)* purpose is to "assure so far as possible every working man and woman in the Nation safe and healthful working conditions and to preserve our human resources."

The Act further provides that each federal agency has the responsibility to "establish and maintain" an effective and comprehensive occupational safety and health program that is consistent with national standards. Each agency must:

- Provide safe and healthful conditions and places of employment
- Acquire, maintain, and require use of safety equipment
- Keep records of occupational accidents and illnesses
- Report annually to the Secretary of Labor.

Finally, the Superfund Amendments and Reauthorization Act requires the Occupational Safety and Health Administration to issue regulations specifically designed to protect workers engaged in hazardous waste operations. The OSHA hazardous waste rules include requirements for hazard communication, medical surveillance, health and safety programs, air monitoring, decontamination, and training.

Land Use - *The Federal Farmland Protection Act* states two primary purposes: (1) to minimize the extent to which federal programs contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses, and (2) to assure federal programs, to the extent practicable, will be compatible with state, local, and private programs to protect farmland.

The Act requires that all federal departments and agencies adopt a protective approach to farmland. Each agency must undertake: (1) to identify and take into account the adverse effects of their programs on farmland, and (2) to consider alternative actions, as appropriate, that could lessen such adverse effects.

Noise - The *Federal Noise Control Act* directs all federal agencies "to the fullest extent within their authority" to carry out programs within their control in a manner that furthers the promotion of "an environment for all Americans free from noise that jeopardizes their health or welfare".

The Act requires a federal department or agency engaged in any activity resulting in the emission of noise to comply with "Federal, state, interstate, and local requirements respecting control and abatement of environmental noise".

Water Quality - The objective of the *Clean Water Act* is to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters."

The Clean Water Act prohibits any discharge of pollutants into any public waterway unless authorized by a permit. The *National Pollutant Discharge Elimination System (NPDES)* permit establishes precisely defined requirements for water pollution control.

The EPA is the principal permitting and enforcement agency for NPDES permits. This authority may be delegated to the states.

The Clean Water Act requires all branches of the federal government involved in an activity that may result in a point source discharge or runoff of pollution to waters of the United States to comply with applicable federal, interstate, state, and local requirements.

NPDES permit requirements typically include (1) effluent limitations (numerical limits on the quantity of specific pollutants allowed in the discharge);
(2) compliance schedules (abatement program completion dates);
(3) self-monitoring and reporting requirements; and (4) miscellaneous provisions governing modifications, emergencies, etc.

The *Safe Drinking Water Act* sets primary drinking water standards for owners/operators of public water systems and seeks to prevent underground injection that can contaminate drinking water sources.

The EPA has adopted *National Primary Drinking Water Regulations*, 40 CFR 141, that define maximum contaminant levels in public water systems. Further, the EPA may adopt a regulation that requires the use of a treatment technique in lieu of a maximum contaminant level. The EPA may delegate primary enforcement responsibility for public water systems to a state.

Appendix D

APPENDIX D

THREATENED, ENDANGERED, AND SENSITIVE SPECIES AT WHITE SANDS MISSILE RANGE, NEW MEXICO

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TABLE D-1. STATE AND FEDERALLY LISTED THREATENED, ENDANGERED, AND SENSITIVE PLANTS KNOWN OR EXPECTED TO OCCUR ON WHITE SANDS MISSILE RANGE

Page 1 of 2

COMMON NAME	SCIENTIFIC NAME (Genus Species)	STATE[1] STATUS	FEDERAL[2] STATUS
Alamo penstemon	*Penstemon alamoensis*	Endangered	Candidate
button cactus	*Epithelantha micromeria*	Endangered	
dune Unicorn plant	*Proboscidea sabulosa*	Endangered	Candidate
grama grass cactus	*Toumeya papyracantha*	Endangered	Candidate
Kuenzler's hedgehog cactus	*Echinocereus fendleri kuenzleri*	Endangered	Endangered
Lloyd's hedgehog cactus	*Echinocereus lloydii*	Endangered	Endangered
longstemmed talinum	*Talinum longipes*	Endangered	
Mescalero milkwort	*Polygala rimulicola mescalerum*	Endangered	
night blooming cereus	*Cereus greggii*	Endangered	Candidate
nodding cliff daisy	*Perityle cemua*	Endangered	Candidate
Organ Mountain pincushion cactus	*Coryphantha sneedii organensis*	Endangered	
pineapple cactus	*Neolloydia intertexia*	Endangered	
Sacramento prickly poppy	*Argemone pleicantha pinnatisecta*	Endangered	Endangered
Sacramento Mountains thistle	*Cirsium vinaceum*	Endangered	Threatened
sand prickly pear	*Opuntia arenaria*	Endangered	Candidate
Sandberg's pincushion cactus	*Coryphantha sneedii sandbergii*	Endangered	
Scheer's pincushion cactus	*Coryphantha scheeri*	Endangered	
Sneed's pincushion cactus	*Coryphantha sneedii sneedii*	Endangered	Endangered
Todsen's pennyroyal	*Hedeoma todsenii*	Endangered	Endangered
Wright's fishhook cactus	*Mammilaria wrightii wrightii*	Endangered	
blue limonium	*Limonium liabatus*	Sensitive	
candelilla	*Euphorbia antisyphilitica*	Sensitive	
Castetter's milkvetch	*Astragalus castetteri*	Sensitive	
cockroach plant	*Halophyton crooksii*	Sensitive	
cross-leaf rock daisy	*Perityle staurophylla homoflora*	Sensitive	
curlleaf needlegrass	*Stipa curvifolia*	Sensitive	
desert rose	*Rosa stellata*	Sensitive	
fiddleleaf	*Nama camosum*	Sensitive	
Graham's prickly pear	*Opuntia grahami*	Sensitive	
grayish white hyssop	*Agastache cana*	Sensitive	
gypsum blazing star	*Mentzelia perenis*	Sensitive	
gypsum wort	*Pseudoclappia arenaria*	Sensitive	
La Jolla prairie clover	*Dalea scariosa*	Sensitive	
mustardwort	*Thelypodiopsis purpusii*	Sensitive	
New Mexico blackberry	*Rubus exrubicundus*	Sensitive	
Organ Mountain aster	*Machaerantha amplifolia*	Sensitive	
Organ Mountain evening primrose	*Oenothera organensis*	Sensitive	Candidate
Organ Mountain figwort	*Scrophularia laevis*	Sensitive	

TABLE D-1. STATE AND FEDERALLY LISTED THREATENED, ENDANGERED, AND SENSITIVE PLANTS KNOWN OR EXPECTED TO OCCUR ON WHITE SANDS MISSILE RANGE

COMMON NAME	SCIENTIFIC NAME (Genus Species)	STATE[1] STATUS	FEDERAL[2] STATUS
Organ Mountain paintbrush	*Castilleia organorum*	Sensitive	
Payson's hiddenflower	*Cryptantha paysonii*	Sensitive	
Plank's catchfly	*Silene plankii*	Sensitive	
rock mustard	*Dryopetalon runcinatum*	Sensitive	
rock spleenwort	*Asplenium resiliens*	Sensitive	
scorpionweed	*Phacelia intermedia*	Sensitive	
smooth cucumber	*Sicyos glaber*	Sensitive	
smooth figwort	*Scrophularia laevis*	Sensitive	
southwest barrel cactus	*Ferocactus wislizenii*	Sensitive	
spoonleaf rabbitbrush	*Chrysothamnus spathulatus*	Sensitive	
Standley's whitlowgrass	*Draba standleyi*	Sensitive	
supreme sage	*Salvia summa*	Sensitive	
tall prairie gentian	*Eustoma exaltatus*	Sensitive	
tall rabbitbrush	*Chrysothamnus pulchellus elatior*	Sensitive	
threadleaf false carrot	*Aletes filifolius*	Sensitive	
threadleaf horsebrush	*Tetradymia filifolia*	Sensitive	
whorledleaf giant hyssop	*Agastache verticillata*	Sensitive	
Wooten's prickly pear cactus	*Opuntia wootonii*	Sensitive	
zephyr lily	*Zephranthes longifolia*	Sensitive	
(no common name)	*Phanerophlebia auriculata*	Sensitive	

[1] Endangered - Species which is listed as threatened or endangered under the provisions of the Federal Endangered Species Act (16 U.S.C. Section 1531 et seq.) or is considered proposed under the tenets of the act; or is rare across its entire range and of such limited distribution and population size that unregulated collection could jeopardize its survival in New Mexico; or which may be widespread in its distribution, but its numbers are being significantly reduced to a degree that within the foreseeable future the survival of the species in New Mexico is jeopardized (NRD Rule No. 85-3).

Sensitive - Species for which more scientific information is needed to determine its current biological status.

[2]Candidate - Federal "Notice of Review" species for which information supports the biological appropriateness of proposing to list as endangered or threatened (50 CFR 17).

Endangered - Species which is in danger of extinction throughout all or a significant portion of its range (50 CFR 17.12).

Threatened - Species which is likely to become endangered within the foreseeable future throughout all or significant portion of its range (50 CFR 17.12).

Sources:

New Mexico Department of Natural Resources, 1985. Endangered Plant Species in New Mexico, NRD Rule No. 85-3.

New Mexico Department of Game and Fish, 1990. Amended Listing of Endangered Wildlife of New Mexico, Regulation No. 682.

U.S. Fish and Wildlife Service, 1989a. Endangered and Threatened Wildlife and Plants. 50 CFR 17.11 & 17.12, January 1.

U.S. Fish and Wildlife Service, 1989b. Endangered and Threatened Wildlife and Plants; Annual Notice of Review. 50 CFR 17, January 6.

U.S. Fish and Wildlife Service, 1990. Endangered and Threatened Wildlife and Plants; Review of Plant Taxa for Listing as Endangered or Threatened Species. 50 CFR 17, February 21.

TABLE D-2. STATE AND FEDERALLY LISTED THREATENED AND ENDANGERED ANIMALS KNOWN OR SUSPECTED TO OCCUR ON WHITE SANDS MISSILE RANGE

COMMON NAME	SCIENTIFIC NAME (*Genus Species*)	STATE STATUS (GROUP)[1]	FEDERAL STATUS (GROUP)[2]
MAMMALS			
"occult" little brown bat	*Myotis lucifugus occultus*		Candidate
"southwestern" cave bat	*Myotis vellier brevis*		Candidate
spotted bat	*Euderma maculata*	2	Candidate
"Arizona" black-tailed prairie dog	*Cynomys ludovicianus arizonensis*		Candidate
"Organ Mountains" Colorado chipmunk	*Eutamias quadrivittatus australis*	2	Candidate
"White Sands" woodrat	*Neotoma micropus leucophaeus*		Candidate
"New Mexico" meadow jumping mouse	*Zapus hudsonius luteus*	2	Candidate
"Mexican" gray wolf	*Canis lupus balleyi*	1	Endangered
black-footed ferret	*Mustela nigripes*		Endangered
"desert" bighorn sheep	*Ovis canadensis mexicana*	1	
BIRDS			
white-faced ibis	*Plegadis chihi*		Candidate
olivaceous cormorant	*Phalacrocorax olicaceus*	2	
bald eagle	*Haliaeetus leucocephalus*	2	Endangered
"Mexican" spotted owl	*Strix occidentalis mexicanus*		Proposed Threatened
common black hawk	*Buteogallus anthracinus*	2	
ferruginous hawk	*Buteo regalis*		Candidate
peregrine falcon	*Falco peregrinus*	1	Endangered
"northern" aplomado falcon	*Falco femoralis septentrionalis*	1	Endangered
whooping crane	*Grus americana*	1	Endangered
"western" snowy plover	*Charadrius alexandrinus nivosus*		Candidate
mountain plover	*Charadrius monatanus*		Candidate
long-billed curlew	*Numenius americanus*		Candidate
common ground-dove	*Columbina passerina*	1	
"interior" least tern	*Sterna antillarum athalassos*	1	Endangered
"southwestern" willow flycatcher	*Empidonax traillii extimus*	2	Candidate
Bell's vireo	*Vireo bellii*	2	
gray vireo	*Vireo vicinior*	2	
Baird's sparrow	*Ammodramus bairdii*	2	

TABLE D-2. STATE AND FEDERALLY LISTED THREATENED AND ENDANGERED ANIMALS KNOWN OR SUSPECTED TO OCCUR ON WHITE SANDS MISSILE RANGE

Page 2 of 2

COMMON NAME	SCIENTIFIC NAME *(Genus Species)*	STATE STATUS (GROUP)[(1)]	FEDERAL STATUS (GROUP)[(2)]
REPTILE			
Texas horned lizard	*Phymosoma cornutum*		Candidate
rock rattlesnake	*Crotalus lepidus lepidus*	2	
AMPHIBIAN			
"Arizona" southwestern toad	*Bufo microscaphus microscaphus*		Candidate
FISH			
White Sands pupfish	*Cyprinodon tularosa*	2	Candidate

(1) Group 1 - Species whose prospects for survival or recruitment in the state are in jeopardy
Group 2 - Species whose prospects for survival or recruitment in the state may become in jeopardy in the foreseeable future

(2) Endangered - Species which is in danger of extinction throughout all or a significant portion of its range
Threatened - Species which is likely to become endangered within the foreseeable future throughout all or a significant portion of its range
Candidate - Federal "Notice of Review" species for which information support the biological appropriateness of proposing to list as endangered or threatened

Sources:

New Mexico Department of Natural Resources, 1985. Endangered Plant Species in New Mexico, NRD Rule No. 85-3.
New Mexico Department of Game and Fish, 1990. Amended Listing of Endangered Wildlife of New Mexico, Regulation No. 682.
U.S. Fish and Wildlife Service, 1989a. Endangered and Threatened Wildlife and Plants. 50 CFR 17.11 & 17.12, January 1.
U.S. Fish and Wildlife Service, 1989b. Endangered and Threatened Wildlife and Plants; Annual Notice of Review. 50 CFR 17, January 6.
U.S. Fish and Wildlife Service, 1990. Endangered and Threatened Wildlife and Plants; Review of Plant Taxa for Listing as Endangered or Threatened Species. 50 CFR 17, February 21.

Appendix E

APPENDIX E

CORRESPONDENCE

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

REPLY TO
ATTENTION OF

July 23, 1991

Environmental and
Engineering Office

U.S. Fish and Wildlife Service
Attention: Mr. Gary Halvorson
P.O. Box 1306
Albuquerque, New Mexico 87103-1306

Dear Mr. Halvorson:

In compliance with the National Environmental Policy Act (NEPA) and the Council on Environmental Quality (CEQ) regulations implementing NEPA, an Environmental Assessment (EA) is being prepared for the U.S. Army Strategic Defense Command (USASDC) Extended Range Interceptor Technology (ERINT) program. In order to complete the process, we are requesting an informal Endangered Species Act Section 7 compliance list from your office. The White Sands Missile Range (WSMR) environmental office has provided us with their standard compliance list from which the potential sensitive species affected by a project are taken. After review of this list, we suggest the following species as appropriate to be addressed in a Biological Assessment under the Section 7 consultation process (Table 1). We would appreciate your concurrence with this list. If you desire additional species to be addressed please let us know as soon as possible. A summary of the project description and of activities proposed for WSMR are provided below.

The proposed action is to develop, test and deploy a non-nuclear ERINT missile system. The proposed ERINT missile system will employ ground based missiles to intercept and destroy designated target missiles. Provisions for Theater Missile Defense Bulk Chemical Experiments (TMDBCE) have been included in the proposed program. The ERINT program activities would include the development and flight testing of two different missiles: the ERINT-1 interceptor missile and the ERINT Target System (ETS) missile. The ERINT-1 missile includes 24 tungsten pellets as part of the lethality enhancer. The ETS missile may incorporate a non-hazardous TMDBCE chemical simulant payload in the target bulkhead.

Activities for the ERINT program at WSMR will occur at the existing Sulf Site launch area in the Northern area of WSMR (Figure 1) and at the existing Launch Complex 50 in the southern area of WSMR. These activities will require limited construction/modification at the Sulf Site, including the renovation of a storage building and the addition of three concrete pads, 100 feet of rail, and two retaining walls. All construction activity will occur in a previously disturbed, graded area.

Some of the lethality enhancer pellets released during the target intercept will fall in an elliptical pattern and may enter into areas of the San Andres Wildlife Refuge (Figure 1). The simulant will be released at a high enough altitude it is unlikely that the nonhazardous chemical simulant will reach the ground in measurable concentrations (> 1 mg/m^3). However, studies of the simulant effect on WSMR soils and vegetation are being conducted.

If you have any questions, please contact Ms. Sharon Mitchell, (205) 955-5938.

Sincerely,

Robert F. Shearer
Chief, Environmental and
Engineering Office

Enclosures

CF: New Mexico Department of Game and Fish

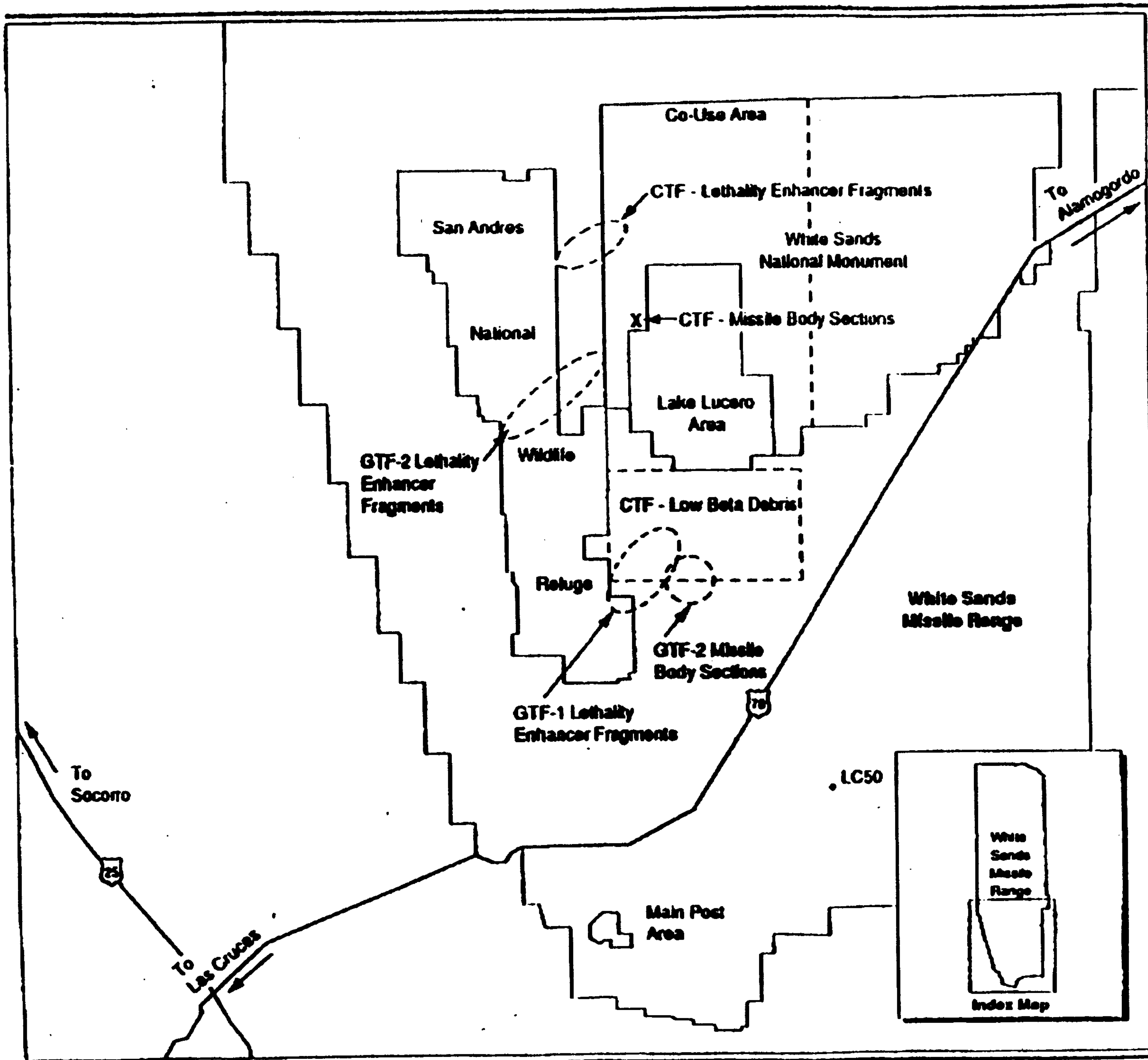
Table 1. Endangered, Threatened, and Candidate Plant and Animal Species That May Occur in the ERINT Project Area

Common Name	Scientific Name	Status	
		Federal	State
Night blooming cereus	*Cereus greggi*	C2	E
Scheer's pincushion cactus	*Coryphantha scheeri*	C2	E
Sandberg's pincushion cactus	*Coryphantha sneedii sandbergii*	-	E
Button cactus	*Epithelantha micromeria*	C2	E
Todsen's pennyroyal	*Hedeoma todsenii*	E	E
Wright's fishhook cactus	*Mammillaria wrightii*	C2	E
Pineapple cactus	*Neolloydia intertextus*	C2	E
Alamo penstemon	*Penstemon alamoensis*	C2	E
Nodding cliff daisy	*Perityle cernua*	C2	E
Mescalero milkwort	*Polygala rimulicola mescalerum*	-	E
Grama grass cactus	*Toumeya papyracantha*	C2	E
Texas horned lizard	*Phrynosoma cornutum*	C2	-
Baird's sparrow	*Ammodramus bairdii*	-	T
Peregrine falcon	*Falco peregrinus*	E	E
Bell's vireo	*Vireo bellii*	-	T
Gray vireo	*Vireo vicinior*	-	T
Desert bighorn sheep	*Ovis canadensis mexicanus*	-	E

E - Endangered

T - Threatened

C2 - Category 2: Taxa which existing information indicates may warrant listing, but for which substantial biological information to support a proposed rule is lacking.



Debris Impact Areas (Unclassified)

White Sands Missile Range, New Mexico

CTF = Control Test Flight

GTF = Guided Test Flight

Figure 1

ADVANCED
SCIENCES, INC.

July 26, 1991

Mr. Gary Halverson
U.S. Fish and Wildlife Service
P.O. Box 1306
Albuquerque, NM 87103-1306

Dear Mr. Halverson:

In response to a request by Ms. Sharon Mitchell of the environmental office of the Strategic Defense Command, we are sending you a copy of the Draft Biological Assessment for the Extended Range Intercept Technology (ERINT) project.

We have used the standard list of sensitive species supplied by the White Sands Missile Range (WSMR) as the basis for the Assessment. However, using habitat requirements, we modified the list to include only those species with a high likelihood of occurring in areas potentially affected by the ERINT activities. We look forward to your concurrence with the findings of this Biological Assessment. However, if there are additional species you would like addressed, we will do so in the final document.

We would appreciate your expeditious review of the Biological Assessment. Your comments should be sent to:

Ms. Sharon Mitchell
U.S. Army Strategic Defense Command
P.O. Box 1500
CSSD-EN-V
Huntsville, AL 35807-3801

Sincerely,

Ron Freeman for

Walter Odening, Ph.D.
Assistant Vice President
Environmental Sciences Division

4909 Murphy Canyon Road, Suite 400 San Diego, CA 92123-4301 (619) 560-8552 FAX (619) 560-8538

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
Ecological Services
Suite D, 3530 Pan American Highway, NE
Albuquerque, New Mexico 87107

CONFIRMATION

August 13, 1991

Cons. No. 2-22-91-I-268

Ms. Sharon Mitchell
U.S. Army Strategic Defense Command
P.O. Box 1500
CSSD-EN-V
Huntsville, AL 35807-3801

Re: Review of Preliminary Final Draft Environmental Assessment for the Extended Range Intercept Technology (ERINT) Project

Dear Ms. Mitchell:

This responds to a July 24, 1991, letter from Robert F. Shearer requesting comments on the subject Environmental Assessment for the ERINT Project at White Sands Missile Range (WSMR), New Mexico. This also responds to a July 26, 1991, letter from Walter Odening of Advanced Sciences, Inc. (ASI), to Mr. Gary Halvorson, requesting our comments on or concurrence with the draft Biological Assessment for the ERINT Project.

The ERINT program includes development and flight testing of two different missiles, the ERINT-1 interceptor missile and the ERINT Target System (ETS) missile. The ERINT-1 will use Lethality Enhancers (LE) to increase the lethal radius of the interceptor. These LE consist of 24 separate tungsten fragments, each weighing about 7.5 ounces, deployed symmetrically around the mid-section of the missile. Two types of ETS missiles would be developed and tested: a tactical ballistic missile and a maneuvering tactical missile, both of which would carry a chemical simulant payload. Flight tests would also be conducted using air-breathing pilotless targets without chemical simulants on board. The purpose of the program is to demonstrate the feasibility of intercepting and destroying ballistic and maneuvering tactical missiles (7 tests) and dispersing both theater bulk chemical warheads (4 tests) and chemical submunitions (3 tests). Two tests would use air-breathing targets to simulate aircraft and cruise missiles and the remaining two tests would be ERINT-1 control tests with no target. The ERINT-1 missile would be used in all but three target demonstration tests. The ERINT test program would begin in the fourth quarter of 1991 and extend into the third quarter of 1993.

The chemical simulant consists of triethyl phosphate (TEP) to which polymethyl methacrylate (PMMA) will be added as a thickening agent for ballistic target tests. In addition, one of two different fluorescent dyes, Stilbene 420 or Coumarin 500, will be added to facilitate visual tracking the dispersed simulant. Each ballistic target would use about 32.8 gallons of simulant. Maneuvering targets would use a total of about 18 gallons of pure TEP placed in 20-30 individual canisters (submunitions) within each missile body.

TEP is a precursor to several organophosphate insecticides and exhibits mild cholinesterase inhibition. Acute oral toxicity tests suggest that TEP is moderately toxic (LD_{50} = 1,500 mg/kg in mice). However, the Strategic Defense Command (SDC) predicts TEP concentrations at ground level of only 1 mg/m^3. Additional studies are underway at the Tennessee Valley Authority in Alabama to determine the effects of TEP on soils and vegetation. The results of these studies will be published in supplemental documentation.

PMMA is commonly used as an acrylic resin in plastics for such applications as windows and aircraft canopies. It is marketed under the trademarks of Plexiglas and Lucite, among others. Although PMMA generally is considered non-toxic, it has been implicated as a carcinogen in laboratory animals. In addition, small particulates of PMMA may cause skin and eye irritation. PMMA would be a minor constituent (4.5 percent) of the ballistic target chemical simulant tests.

Stilbene 420 is a non-volatile, water-soluble compound. Its acute oral toxicity is relatively low (4,920 mg/kg in mice). Coumarin 500 is one of about 1000 derivatives of coumarin, which is toxic by ingestion and is a known carcinogen. However, derivatives may have chemical properties which differ from the parent compound. The fluorescent dye would represent one percent of the chemical simulant mixture in ballistic tests.

Debris, consisting of LE fragments, missile body sections and low-density debris, would impact on areas of WSMR approved by the Range Safety Office and would be recovered in accordance with WSMR regulations. The SDC has identified nominal impact areas in which most of the debris is expected to fall. Areas within three standard deviations of the nominal area have also been identified. For the LE, these areas include portions of San Andres National Wildlife Refuge (NWR).

At a meeting at the ASI Albuquerque office on May 14, 1991, the Fish and Wildlife Service (Service) expressed concern for the potential impacts of falling debris, including the LE, on threatened, endangered and sensitive species. No debris is expected to fall within the occupied or potential habitat of Todsen's pennyroyal (*Hedeoma todsenii*), Federally listed as endangered. LE fragments may fall within the boundaries of San Andres National Wildlife NWR and known habitat of the desert bighorn sheep (*Ovis canadensis mexicana*), State listed as endangered (Group 1). However, the probability of fragments hitting bighorn sheep has been estimated as only 3.81 x 10^{-6}. Furthermore, no missile debris recovery activities associated with the ERINT program will occur in habitat occupied by either Todsen's pennyroyal or desert bighorn sheep. Therefore, the Service does not anticipate any adverse impact to these species.

Although WSMR is within the historic range of the aplomado falcon (*Falco femoralis septentrionalis*) and provides suitable habitat for this species, its occurrence on WSMR is uncertain. The American peregrine falcon (*Falco peregrinus anatum*) is not likely to occur in areas affected by the ERINT program. Therefore, the Service does not anticipate any adverse impact to these species.

The Service would like the opportunity to review and comment on the supplemental document for the chemical simulant. We are concerned about not only the effects of TEP deposition on soils and vegetation, but also the potential effects on migratory birds exposed to higher levels of TEP by flying through the simulant cloud. If we can be of further assistance, please call Mr. Gerry Roehm or Ms. Anne Cully at (505) 883-7877 or FTS 474-7877.

Sincerely,

Jennifer Fowler-Propst
Field Supervisor

cc:
Director, New Mexico Department of Game and Fish, Santa Fe, New Mexico
Director, New Mexico Energy, Minerals and Natural Resources Department, Forestry Division, Santa Fe, New Mexico
Commanding General, U.S. Army White Sands Missile Range, White Sands Missile Range, New Mexico
Regional Director, U.S. Fish and Wildlife Service, Fish and Wildlife Enhancement & Refuges and Wildlife, Albuquerque, New Mexico
Refuge Manager, San Andres National Wildlife Refuge, Las Cruces, New Mexico

GOVERNOR
BRUCE KING

DIRECTOR AND SECRETARY
TO THE COMMISSION
BILL MONTOYA

State of New Mexico

DEPARTMENT OF GAME AND FISH

VILLAGRA BUILDING
SANTA FE
87503

August 14, 1991

RE: ERINT Program

U.S. Army Strategic Defense Command
P.O. Box 1500
ATTN: CSSD-EN (Sharon Mitchell)
Huntsville, Alabama 35807-3801

Dear Ms. Mitchell:

Thank you for affording the Department of Game and Fish (Department) the opportunity to comment on the Preliminary Final Environmental Assessment (EA) for the Extended Range Intercept Technology (ERINT) Program. Based on the information and mitigation measures contained in the EA we anticipate no significant adverse impacts to wildlife or its habitat as a result of this individual project. The Department appreciates the efforts made by the Army to assess and mitigate concerns we expressed during previous meetings.

However, the Department is still concerned about potential cumulative impacts occurring on White Sands Missile Range. We look forward to seeing the programmatic Environmental Impact Statement currently under development. Hopefully, that document will provide a full assessment of cumulative effects. If you have any questions, please contact Jon Klingel (827-9912) of this Department.

Sincerely,

Bill Montoya
Director

BM/jtk

cc: Jennifer Fowler-Propst (Ecological Services, USFWS)

BRUCE KING
GOVERNOR

STATE OF NEW MEXICO
OFFICE OF CULTURAL AFFAIRS
HISTORIC PRESERVATION DIVISION
VILLA RIVERA, ROOM 101
228 EAST PALACE AVENUE
SANTA FE NEW MEXICO 87503
(505) 827-6320

THOMAS W. MERLAN
DIRECTOR

HELMUTH J. NAUMER
CULTURAL AFFAIRS OFFICER

August 14, 1991

Mr. Robert F. Shearer
Chief
Environmental and Engineering Office
U.S. Army Strategic Defense Command - Huntsville
ATTN: CSSD-EN (Sharon Mitchell)
Post Office Box 1500
Huntsville, Alabama 35807-3801

Re: ERINT Preliminary Final Draft Environmental Assessment

Dear Mr. Shearer:

At your request, I have reviewed the *Extended Range Intercept Technology Preliminary Final Draft Environmental Assessment* to determine the adequacy of the consideration of potential effects on significant cultural resources that may result from proposed project activities in New Mexico.

Rocket sled tests to be conducted at the existing Holloman Air Force Base High Speed Test Track will not require any new construction or significant alteration of existing facilities. The described test activities will have no effect on any historic properties.

Ground activities associated with missile flight testing at White Sands Missile range will be confined to existing facilities at Launch Complex (LC) 50 and Sulf Site. No properties entered in or determined eligible for inclusion in the National Register of Historic Places are located at or in the vicinity of either facility. Proposed modifications to launch facilities at Sulf Site will be confined to a previously disturbed launch pad. The described flight test activities will have no effect on any historic properties.

Off-road vehicle travel necessary for the recovery of missile debris following flight tests at White Sands Missile Range has the potential to affect significant archaeological sites adversely. However, provided that such activities are monitored by a qualified archaeologist as proposed in the EA, and that recommendations of the archaeologist to avoid sites in the vicinity of recovery activities are followed by recovery crews, recovery activities will have no effect on any historic properties.

In the unlikely event that missile debris impacts within the boundaries of a significant archaeological site, further consultation with the White Sands Missile Range Archaeologist and this office may be necessary to assess site damage and to consider measures that may be necessary to prevent further loss of archaeological data. The archaeologist monitoring recovery activities may recommend special measures to be employed to recover debris from within the boundaries of an archaeological site. Since the nature of the archaeological site and the extent of damage that may occur from such impacts cannot be accurately predicted, any such events should be treated as discovery situations and treated in accordance with the provisions of 36 CFR 800.11 and the WSMR Historic Preservation Plan.

In general, I believe the EA has given adequate consideration to the potential effects on significant cultural resources that may result from the ERINT testing program. Based on this assessment and the measures to be employed to prevent inadvertent damage to archaeological sites, I can concur in a determination of no effect for the described undertaking.

Thank you for the opportunity to consult with you on the ERINT program. Provided that you have no further questions regarding my comments, this determination of no effect should conclude our consultation on this matter.

Sincerely,

Thomas W. Merlan
State Historic Preservation Officer

TWM:DER:bc/Log 31996

cc: Robert J. Burton

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Appendix F

APPENDIX F

DISTRIBUTION LIST

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APPENDIX F - DISTRIBUTION LIST

Federal Agencies

SDIO/TNE/EA
The Pentagon
Room 1E180
Washington, DC 20301-7100

SDIO/GC
The Pentagon
Room 1E083
Washington, DC 20301-7100

DESO
400 Army Navy Drive
Arlington, VA 22202

OASA (I, L & E) - ESOH
The Pentagon
Washington, DC 20310

Department of the Army
HQDA, SARD-T-S
The Pentagon
Washington, DC 20310-1000

Army Environmental Office
The Pentagon
Washington, DC 20310-1000

Department of the Army
The Judge Advocate General
The Pentagon
Washington, DC 20310-1000

Department of the Army
Office of the Chief Legislative Liaison
The Pentagon
Washington, DC 20310-1000

Department of the Army
Office of the Chief of Public Affairs
The Pentagon
Washington, DC 20310-1000

Department of the Army
Office of the Surgeon General
5 Skyline Pike
5111 Leesburg Pike
Falls Church, VA 22041

HQ USASDC
CSSD-RM
Crystal Mall 4, Room 900
1941 Jefferson Davis Highway
Arlington, VA 22202

U.S. Army Strategic Defense Command
CSSD-EN/LC/PA/SL-L/KE-F/TA/IN-C
106 Wynn Drive
Huntsville, AL 35805

U.S. Army Strategic Defense Command
CSSD-EA
Crystal Mall 4, Room 900
1941 Jefferson Davis Highway
Arlington, VA 22202

U.S. Army Missile Command
PATRIOT Project Office
SFAE-AD-PA-SE
Redstone Arsenal, AL 35898-5620

U.S. Army White Sands Missile Range
STEWS-ES-E, Building T150
White Sands, NM 85048

U.S. Army White Sands Missile Range
STEWS-TE-MH
Building 23642-LC38
White Sands, NM 88002-5167

U.S. Army Pueblo Depot Activity
SDSTE-PU-EE
Pueblo, CO 81001-5000

Hill Air Force Base
Environmental Office
2849 ABG/DEV
Hill Air Force Base, UT 84056

Holloman Air Force Base
AFDTC/SE (OLAH), 6585 Test Group
Holloman Air Force Base, NM 88330-5000

Office of Federal Activities
Environmental Protection Agency
401 M Street SW
Mail Code A104
Washington, DC 20460

Environmental Protection Agency, Region 3
841 Chestnut Street
Philadelphia, PA 19107

Environmental Protection Agency, Region 6
1445 Ross Avenue
Dallas, TX 75202

Environmental Protection Agency, Region 8
Federal Facilities Branch
Hazardous Waste Division
999 18th Street, Suite 500
Denver, CO 80202

Jornada Experimental Range
USDA/ARS, Dept. 3 JER
New Mexico State University
Las Cruces, NM 88003

Tennessee Valley Authority
Agricultural Research Department
NFE2K
Muscle Shoals, AL 35660

U.S. Department of the Interior
White Sands National Monument
U.S. Highway 70 West-Mile 200
Alamogordo, NM 88310

U.S. Fish and Wildlife Service
San Andres National Wildlife Refuge
P.O. Box 756
Las Cruces, NM 88004

U.S. Fish and Wildlife Service
3530 Pan American Highway NE, Suite D
Albuquerque, NM 87107

U.S. Fish and Wildlife Service
730 Simms Street, Room 290
Golden, CO 80401

State Agencies

Utah Department of Health
Division of Environmental Health
288 North 1460 West
Salt Lake City, UT 84116
(Bureaus of Air Quality, Water Pollution Control, and Solid and Hazardous Wastes)

New Mexico Department of Health and Environment
Environmental Division
1190 Saint Francis Drive
Santa Fe, NM 87503
(Bureaus of Air Quality, Surface Water Quality, Groundwater, Hazardous Waste, Solid Waste, Occupational Health and Safety, and Toxic Sites)

New Mexico Department of Game and Fish
Biological Services Division
State Capitol, Villagra Building
Santa Fe, NM 87503

New Mexico State Forestry Department
Forestry and Resources Conservation Division
State Capitol, Villagra Building
Santa Fe, NM 87504-1948

State Historic Preservation Officer
Villa Rivera Building
228 East Palace Avenue
Santa Fe, NM 87503

Arizona Environmental Quality Department
2655 East Magnolia Street
Phoenix, AZ 85034
(Offices of Water Quality and Waste Programs)

Colorado Division of Wildlife
2126 North Weber
Colorado Springs, CO 80907

Virginia Department of Air Pollution Control
300 Central Road, Suite B
Fredericksburg, VA 22401

Department of Pollution Control and Ecology
8001 National Drive
Little Rock, AR 72209

Local Agencies

Grand Prairie Environmental Health Department
Water Quality Division
218 S. Center Street
Grand Prairie, TX 75050

Contractors

Aerotherm
555 Clyde Avenue
P.O. Box 7040
Mountain View, CA 94039

Atlantic Research Corporation
Virginia Propulsion Division
5945 Wellington Road
Gainesville, VA 22065

Atlantic Research Corporation
Route 4, Box 121
Culpeper, VA 22701

Atlantic Research Corporation
P.O. Box 1036
Highland Industrial Park
Arkansas Propulsion Division
Camden, AR 71701

Battelle
505 King Avenue
Columbus, OH 43201

LTV Aerospace and Defense Company
Missiles and Electronic Group-Missiles Division
2400 West Marshall Drive
Grand Prairie, TX 75051

Orbital Sciences Corporation
Space Data Division
3380 South Price Road
Chandler, AZ 85248

Rockwell International
3370 Miraloma Avenue
DD-45
Anaheim, CA 92803

L.A. Gauge
7440 San Fernando Road
Sun Valley, CA 91352

Teledyne Brown Engineering
Attn: Military Apps., MS 180
Cummings Research Park
300 Sparkman Drive
Huntsville, AL 35807-5301

Libraries

U.S. Army Strategic Defense Command
CSSD-IM-PA
Huntsville, AL 35807-3801

Defense Technical Information Center
FDAC Division
Cameron Station
Alexandria, VA 22304-6145

Alamogordo Public Library
920 Oregon Avenue
Alamogordo, NM 88310

Central Library
8601 Mathis Avenue
Manassas, VA 22110

Chandler Public Library
75 East Commonwealth
Chandler, AZ 85225

Gainesville Mini Library
4603 James Madison Highway
Haymarket, VA 22065

Grand Prairie Memorial Library
901 Conover
Grand Prairie, TX 75051

Las Cruces Public Library
200 E. Picacho
Las Cruces, NM 88001

Layton Public Library
155 North Wasatch Drive
Layton, UT 84041

Mountain View Public Library
585 Franklin Street
Mountain View, CA 94041

Ogden Public Library
2464 Jefferson Avenue
Ogden, UT 84401

Pueblo Library System
McClellan Branch
100 E. Abriendo
Pueblo, CO 81004

Huntsville Public Library
P.O. Box 443
Huntsville, AL 35804

University of Alabama
Huntsville Library
Huntsville, AL 35899

West Jefferson Public Library
270 Lilly Chapel Road
West Jefferson, OH 43162

London Public Library
20 E. First Street
London, OH 43140

The Public Library of Camden
and Ouachita County
120 Harrison Street
Camden, AR 71701

Anaheim Public Library
500 W. Broadway
Anaheim, CA 92805

Los Angeles Public Library
Sun Valley Branch
7935 Vineland Avenue
Sun Valley, CA 91352

El Paso Public Library
501 N. Oregon Street
El Paso, TX 79901

Fort Bliss Library
Building 21, Pershing Road
Fort Bliss, TX 79916

Socorro Public Library
401 Park Street SW
Socorro, NM 87801