FINAL ENVIRONMENTAL ASSESSMENT of the JOINT AIR-TO-SURFACE STAND-OFF MISSILE (JASSM) DEVELOPMENT AND EVALUATION TESTING

WHITE SANDS MISSILE RANGE, NEW MEXICO

Prepared for:
JASSM Program Office
Air Armament Center (AAC/YV)
U. S. Air Force

Prepared by:
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Under the Technical Engineering and Acquisition Support Contract
Eglin AFB, FL

Sverdrup
TEAS Group

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U.S. ARMY WHITE SANDS MISSILE RANGE
WHITE SANDS MISSILE RANGE, NEW MEXICO 88002-5048

ENVIRONMENTAL ASSESSMENT

TITLE: Final Environmental Assessment of the Joint Air-to-Surface Stand-off Missile (JASSM) Development and Evaluation Testing White Sands Missile Range, New Mexico

PROPONENT: Kenneth E. Bandy — 6 Dec 2001
KENNETH E. BANDY — DATE
Lieutenant Colonel, USAF
JASSM CTF, Director

CONCURRENCE:

Peggy Hoffer — 10 Dec 01
PEGGY HOFFER — DATE
Chief, Customer Support Office

[signature] — 11 Dec 2001
OPSEC POC — DATE

Jim Eblen — 12 Dec 2001
PUBLIC AFFAIRS POC — DATE

RECOMMEND APPROVAL:
The attached Environmental Assessment (EA) and the Finding of No Significant Impact have been reviewed are recommended for Publication.

[signature] — 12 DEC 2001
Staff Judge Advocate — DATE

Thomas A. Ladd — 19 Dec 01
THOMAS A. LADD — DATE
Director, Environment and Safety Directorate

APPROVED:

[signature] — 14 Jan 02
WILLIAM F. ENGEL — DATE
Brigadier General, U.S. Army
Commanding General

JOINT AIR-TO-SURFACE STAND-OFF MISSILE FINDING OF NO SIGNIFICANT IMPACT

NAME OF THE PROPOSED ACTION:

ENVIRONMENTAL ASSESSMENT OF THE JOINT AIR-TO-SURFACE STANDOFF MISSILE (JASSM) DEVELOPMENTAL AND EVALUATION TESTING WHITE SANDS MISSILE RANGE, NEW MEXICO

DESCRIPTION OF PROPOSED ACTION:

The JASSM Program Office (AAC/YV) proposes flight test missions between November 2001 and December 2003. All JASSM flight tests will terminate in established, designated impact areas in the northern portion of the range well within the WSMR boundaries

PURPOSE AND NEED OF PROPOSED ACTION:

JASSM is a joint U.S. Air Force, U.S. Navy conventional weapon development program that provides our nation's warfighters with a precision guided, standoff range capability that can defeat a variety of enemy targets. The highly survivable airframe uses state-of-art technologies to achieve its mission requirements.

The flight test program is needed to demonstrate and verify key/critical performance parameters, including missile integration and employment, mission planning, weapon lethality, and other system performance requirements.

ALTERNATIVES TO THE PROPOSED ACTION:

WSMR was chosen as the JASSM test location because available infrastructure and existing target assets. Duplication of these capabilities at other locations or test installations, or the construction of new targets is cost prohibitive and undesirable. The no action alternative would inhibit the progress of the JASSM program and could compromise national defense.

ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION:

Climate, geology, soil, air, water, vegetation, wildlife, socioeconomic, and other resources have been evaluated and determined to not be significantly affected or changed by the Proposed Action. The targets are all located in established impact areas. The Proposed Action and subsequent clean-up activities would cause a negligible impact to soils and would not significantly affect the biological environment. Proposed impact points are in previously disturbed ground, which has been set aside as designated targets areas. The majority of the proposed impact areas are free from vegetation or have very sparse vegetational and

animal communities. The JASSM program will minimize potential impacts by consulting White Sands Environmental Services (WS-ES) on a case- by case basis before initiating each test event, and adopting appropriated mitigation as required.

Protected flora and fauna species will not be adversely impacted by proposed JASSM test activities. Impact areas are free from listed species and critical habitat. Flights will be limited to 3000 ft above ground level of the majority of the flight profile. All flight operations will be subsonic. JASSM test will be planned so that debris and impacts locations do not affect White Sands Pupfish (*Cyprinodon tularosa*) habitat. Because the aplomado falcon (*Falco femoralis septentrionalis)* is transitory on WSMR, project activities may affect but will not adversely impact aplomado falcons and their habitat. JASSM activities will be suspended if an aplomado falcon is sighted in JASSM impacts areas while WS-ES consults with U.S. Fish and Wildlife Service.

JASSM testing occurring within established impact sites will not have a significant impact on cultural resources. Archaeological surveys to detect and classify cultural resources will be conducted in undisturbed areas to protect artifacts, if necessary.

Mitigation to minimize the impacts of the test event includes JASSM personnel recovering and removing the JASSM system and targets from the impact locations immediately following test activities. Recovery operations will be coordinated with WSMR and in accordance with WSMR environmental and safety regulations. Personnel will follow standard procedures and mitigation to avoid potential impacts from potential health and safety issues, noise, hazardous materials, etc.

CONCLUSIONS:

Proposed JASSM testing considered in this EA will not significantly affect existing environmental conditions at WSMR. Any potential threats have been mitigated.

Based on the considerations herein and the foregoing conclusions an Environmental Impact Statement (EIS) is not required and a finding of no significant impact (FONSI) is warranted for the Proposed Action.

DEADLINE FOR RECEIPT OF PUBLIC COMMENTS: Within thirty (30) days.

POINT OF CONTACT FOR FURTHER INFORMATION AND RECEIPT OF PUBLIC COMMENT:

The JASSM Combined Test Force invites all comments for consideration within 30 days of this notice. Address all correspondence in reference to the notice to:

46 OG/OGMJ
Joint Air-to-Surface Stand-off Missile Combined Test Force
Attn: Lt Col Kenneth Bandy
301 N. Barrancas Ave Ste 12
Eglin AFB, NM, 32542-5407
850-882-7069

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ACRONYMS AND ABBREVIATIONS

A

AAC	Air Armament Center
AAC/YV	JASSM Program Office Symbol
ACC	Air Combat Command
ACHP	Advisory Council on Historic Preservation
ACM	Advanced Composite Materials
ADP	Air Data Probe
AFB	Air Force Base
AFI	Air Force Instruction
AFOTEC	Air Force Operational Test and Evaluation Center
AGL	Above Ground Level
AOA	Analysis of Alternatives
AQMP	Air Quality Management Plan
ARPA	Archaeological Resources Protection Act
APE	Affected Potential Environment
AUR	All-Up-Round

B

BDA	Bomb Damage Assessment
BIA	Bomb Impact Assessment
BIT	Built-In Test
BLM	Bureau of Land Management

C

CAA	Clean Air Act
CDT	Contractor Developmental Testing
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
cm	Centimeter
cm^2	Square Centimeter
CNO	Chief of Naval Operations
CNS	Central Nervous System
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CWA	Clean Water Act

D

dB	Decibel
DoD	Department of Defense
DOF	Degrees of Freedom
DOT	Department of Transportation
DRA	Destruct Ring Assembly
DRS	Destruct Ring Subassembly
DT	Developmental Test
DT&E	Development Test and Evaluation

DT/OT	Combined DT&E and OT&E
DTV	Developmental Test Vehicle

E

EA	Environmental Assessment
EIAP	Environmental Impact Analysis Process
EIS	Environmental Impact Statement
EMD	Engineering and Manufacturing Development
EOD	Explosive Ordnance Disposal
EPA	Environmental Protection Agency
ESA	Endangered Species Act

F

FCS	Flight Control System
FOT&E	Follow-On Test and Evaluation
FR	Federal Register
FTS	Flight Termination System
FTV	Flight Test Vehicle

G

g/m^3	Gram Per Cubic Meter
GPS	Global Positioning System

H

H_2	Hydrogen
H_2O	Water
HAFB	Holloman Air Force Base
H_2S	Hydrogen Sulfide
HAZMAT	Hazardous Material
HCl	Hydrochloric Acid
HCN	Hydrogen Cyanide
HF	Hydrofluoric Acid
HMMP	Hazardous Materials Management Program
Hz	Hertz (cycles per second)

I

IIR	Imaging Infrared
IMU	Inertial Measuring Unit
INS	Inertial Navigation System
IOT&E	Initial Operational Test and Evaluation
IPT	Integrated Product Team
IR	Infrared

J

JASSM	Joint Air-to-Surface Stand-off Missile

K

kg	Kilogram
km	Kilometer
kW	Kilowatt

L

lb	Pound
lb/ft^2	Pounds Per Square Foot
LFT&E	Live Fire Test and Evaluation
LCTA	Land Condition Trend Analysis
LMEM	Lockheed Martin Electronics and Missiles
LMIS	Lockheed Martin Integrated Systems
LMSW	Lockheed Martin Skunk Works
LRIP	Low Rate Initial Production
LSTB	Large Scale Test Bed

M

m^3	Cubic Meter
µg/g	Microgram Per Gram
$µg/m^3$	Microgram Per Cubic Meter
µm	Micrometer
MCU	Missile Control Unit
mg	Milligram
mg/L	milligram Per Liter
mm	Millimeter
mm^3	Cubic Millimeter
MNS	Mission Need Statement
MOA	Military Operations Area
MSDS	Material Safety Data Sheet
MOU	Memorandum of Understanding
MST	Mountain Standard Time
MSL	Mean Sea Level

N

N_2	Nitrogen
NAAQS	National Ambient Air Quality Standards
NASA	National Aeronautics and Space Administration
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NIOSH	National Institute for Occupational Safety and Health
nm	Nautical Mile
NiCd	Nickel Cadmium
nm/h	Nautical Miles per Hour
NMNHP	New Mexico Natural Heritage Program
NAGPRA	Native American Graves Protection and Repatriation Act
NMED	New Mexico Environment Department
NMWQCCR	New Mexico Water Quality Control Commission Regulations

NOI	Notice of Intent
NO_X	Nitrogen Oxide

O

O_3	Ozone
ODS	Ozone-Depleting Substance
ORD	Operational Requirements Document
OSHA	Occupational Safety and Health Act
OT	Operational Test
OT&E	Operational Test and Evaluation
OTV	Operational Test Vehicle

P

Pa	Pascal
PAH	Polyaromatic Hydrocarbons; Petroleum Aromatic Hydrocarbons
Pb	Lead
PCB	Polychlorinated Biphenyl
PHETS	Permanent High-Explosive Test Site
PDRR	Program Definition and Risk Reduction
PEL	Permissible Exposure Limit
PEO	Program Executive Office
PEP	Propellants, Explosives, and Pyrotechnics
PM_{10}	Particulate Matter less than 10 Microns in Size
PMOA	Programmatic Memorandum of Agreement
PPE	Personal Protective Equipment
ppm	Parts Per Million
psi	Pounds Per Square Inch

R

RCC	Range Commanders Counsel
RCRA	Resource Conservation and Recovery Act
RF	Radio Frequency
ROC	Reactive Organic Compounds
ROI	Region of Interest
RONA	Record of Nonapplicability
RSO	Range Safety Officer
RTO	Responsible Test Organization

S

S/A	Safe/Arm
SIP	State Implementation Plan
SL	Screening Level
SHPO	State Historic Preservation Office
SPO	System(s) Program/Project Office

T

TBD	To Be Determined
TIK	Test Instrumentation Kit
TLV	Threshold Limit Value
TSSAM	Tri-Service Stand-off Attack Missile
TDS	(concentration of) Total Dissolved Solids
TTR	Tonopah Test Range
TWA	Time-Weighted Average

U

US EPA	U.S. Environmental Protection Agency
USAF	United States Air Force
USC	United States Code
USGS	United States Geological Service
USFWS	United States Fish and Wildlife Service
USN	United States Navy

V

VDC	Volts Direct Current
VOC	Volatile Organic Compound

W

WSMR	White Sands Missile Range
WIT	Weapon Impact Target

1.0 INTRODUCTION AND PURPOSE

1.1 Introduction

As part of the engineering manufacturing and development (EMD) and operational test (OT) phase of the JASSM acquisition program, the U.S, Air Force (USAF) Air Armament Center (AAC) Joint Air-to-Surface Stand-off Missile (JASSM) Program Office (AAC/YV) proposes to use White Sands Missile Range (WSMR) for development test and evaluation (DT&E) initial operation test and evaluation (IOT&E) for flight testing the JASSM on the F-16, B-1B, B-2 and B-52H aircraft. The JASSM flight test program at WSMR is the focus of this environmental assessment (EA).

JASSM is a tactical, stand-off air-to-surface cruise missile with conventional munitions. The JASSM weapon system is defined as the JASSM (AGM-158A) and its components (air vehicle, avionics [guidance and control], and warhead and fuze) along with its associated facilities and facility equipment, spares and repair parts, support equipment, training equipment, test and evaluation instrumentation and simulation equipment, data, and containers.

WSMR, a Department of Defense (DoD) major range and test facility located near Las Cruces, New Mexico, possesses unique characteristics required by the U.S. Army, U.S. Navy, U.S. Air Force, National Aeronautics and Space Administration (NASA), and other federal and commercial testing concerns to conduct safe, large-scale experiments on advanced weapons and space flight systems. WSMR covers approximately 8,288 km^2 (3,200 mi^2) in south central New Mexico (figure 1-1). WSMR is the largest, all-overland test range in the United States. The range itself, together with adjacent extension and off-range use areas, is diverse with respect to environmental attributes such as geology and soils, weather patterns, and biological and cultural resources. The EA identifies how testing will be performed, the potential impacts JASSM testing will have if tested at WSMR, and how potential impacts are controlled during testing at this important defense facility.

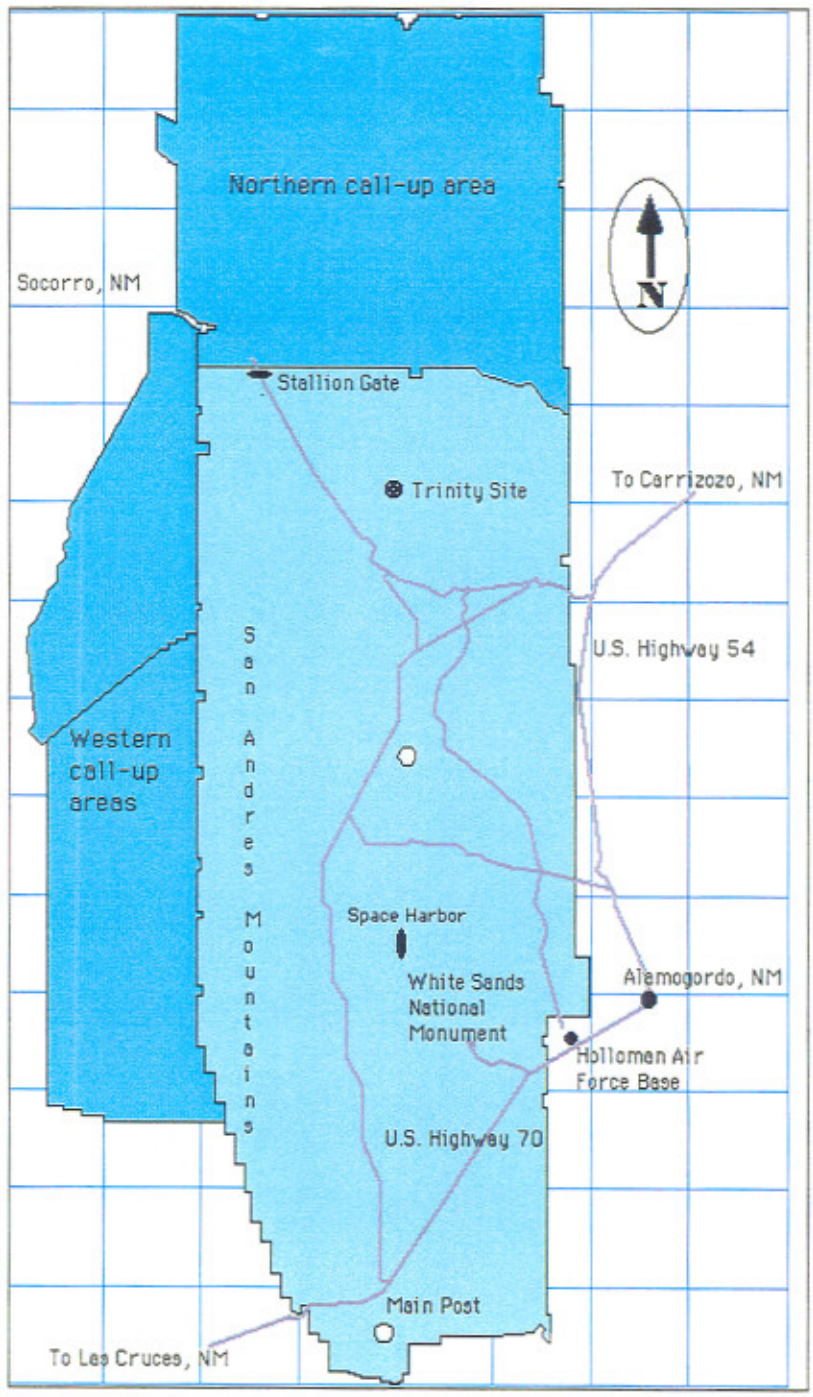

Figure 1-1. Map of White Sands Missile Range, New Mexico.

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1.2 Purpose and Need for the Proposed Action

JASSM is a joint U.S. Air Force, U.S. Navy conventional weapon development program that provides our nation's warfighters with a precision guided, standoff range capability that can defeat a variety of enemy targets. The highly survivable airframe uses state-of-art technologies to achieve its mission requirements.

The operational need is to provide both fighters and bombers the capability to strike critical, high-value targets early in any campaign. The Joint Requirements Oversight Council (JROC) validated the JASSM Mission Need Statement (MNS) in August 1995. The Air Combat Command (ACC) and Chief of Naval Operations (CNO-N880) signed a Joint Operational Requirements Document (JORD) in March 1996.

1.3 JASSM System Components

In layman's terms, the JASSM is a jet cruise missile with two wings, a tail, and a small jet engine (figure 1-2). Table 1-1 provides the physical parameters. It is guided by a computerized autopilot system flying a preprogrammed route from its launch point to its target.

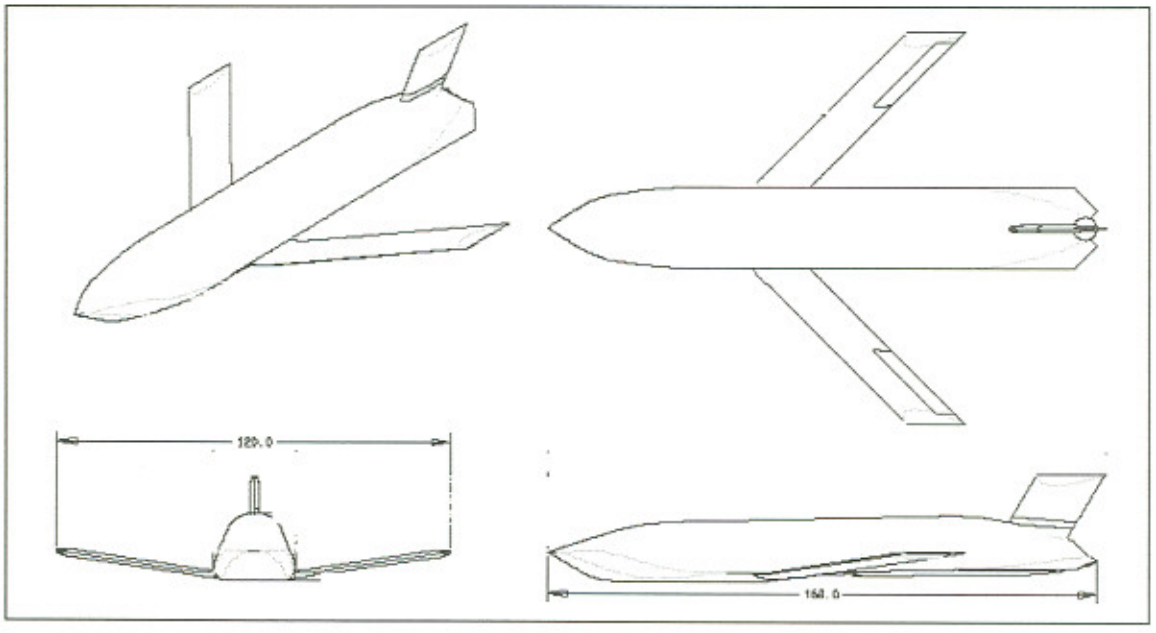


Figure 1-2. JASSM Geometry (post-release).

The fuselage has a pointed nose and a trapezoidal cross section. The fabricated skins are constructed of sandwich (epoxy graphite) composite panels stiffened with foam cores. The bulkheads consist of a superframe assembly and two conventional frames. The superframe assembly (named for having more than three functions) retracts the launch lugs, absorbs

sway brace loads, and holds the warhead. The engine/tail frame secures the engine to the upper fuselage, the vertical fin actuator, and the vertical fin root.

The missile fuselage is suspended from launch lugs. The missile has two deployable wings. The wing skin is fabricated from graphite epoxy materials over the internal wing core. The vertical tail is constructed similarly to the wings. After launch, and when the missile is clear of the aircraft, a pyrotechnic actuator (similar to car airbag technology) fires to erect and latch the wings and tail in place. The propulsion system uses a Teledyne M370-9-2 turbojet that operates on JP-10 fuel. The engine powers the missile at subsonic speeds. The fuel tanks hold less than 40 gallons of JP-10.

A thermal battery provides power after missile release, allowing time for the engine/alternator to spin up. The battery is activated prior to launch. An engine-driven alternator provides power for the remainder of the flight. In the event of complete missile power loss to the telemetry and flight termination system (FTS) located in the test instrumentation kit (TIK), Nickel-Cadmium (Ni-Cd) batteries serve as an alternator back-up power source. The TIK power can be provided independently from the missile's other power sources.

The missile carries a 1,000-pound class hardened, penetrating warhead. The warhead contains approximately 250 pounds of AFX-757 explosive. The fuze is installed in the fuze well located at the aft end of the J-1000 warhead. The inert warheads are filled with a polymer to simulate the weight of the explosive.

Table 1-1. AGM-158A Physical Parameters

Parameter	Value (Nominal)
Length Nose to aft end of fuselage	168.0 inches
Width Wings extended	120.0 inches
Height	20.0 inches
Weight (including Fuel and Warhead)	2100 pounds

The TIK facilitates tracking the missile during flight with a tracking beacon, allows retrieval of mission critical signals data via a telemetry system (which allows for monitoring the health of the missile in real time), and allows the missile flight to be terminated upon command using FTS.

The FTS is comprised of a destruct ring subsystem (DRS), FTS antenna, and Safe/Arm (S/A) devices. A destruction ring, composed of two halves, is installed on the inside of the fuselage in front of the engine bulkhead. Upon detonation, the engine and tail fin separate from the rest of the vehicle. All power necessary to support the FTS operation is completely independent of missile power sources in the event engine alternator power is lost. The FTS

is designed to meet the requirements of the Range Commanders Counsel (RCC) Standard 319-92.

The established JASSM system and subsystems are tested by the contractor to develop reliability data and predict performance confidence. Moreover, each flight vehicle is ground tested to uncover manufacturing defects that would cause test failures during planned flights. Finally, each test vehicle is flown in the captive mode and critical systems are functioned to further remove risk of failure due to the flight environment. This cautious approach enables the assembled test and range personnel to have the highest level of confidence possible that each mission will be successful and safe.

1.4 Objective of the Proposed Action

The objective of the JASSM EMD/OT program is to enable the prime contractor, Lockheed Martin Integrated Systems (LMIS), to verify key/critical performance parameters, including missile integration and employment, mission planning, weapon lethality, and other system performance specifications. Furthermore, testing by Air Force Operational Test and Evaluation Center (AFOTEC) will determine the operational suitability and effectiveness of the JASSM weapon system.

1.5 Scope of Project

The purpose of this document is to assess the JASSM EMD/OT flight test program's impact on the human environment at WSMR. Focus is on potential impacts from the launch, free flight, and termination of the JASSMs. For that reason, the area of potential effect (APE) is limited to operations within the WSMR and the adjacent DoD facilities.

Flight tests will be staged out of Holloman AFB, NM (HAFB), Edwards AFB, CA (EAFB), or Barksdale AFB, LA (BAFB); however, the JASSM would not be launched until the aircraft is inside the WSMR boundary. Test support activities associated with the staging bases are consistent with standard base operations and within normal flight operation volumes. Additionally, all ferrying activities from the staging bases to WSMR would be along high altitude jet routes and comply with the Federal Aviation regulations subject to those routes.

1.5.1 Issues Studied in Detail

The following is a list of issues, which have been identified as having the potential to effect or to be affected by the Proposed Action.

a. **Air Quality Issues** involve airborne pollutants that degrade visibility such as particulate matter, or pollutants that may cause harm to human health.

b. **Hazardous Material Issues** with the JASSM include potential impacts from chemical exposure, procedures for handling, and proper care of resources that may come in contact with hazardous materials.

c. **Biological Issues** involve the impacts within region of influence (ROI) to vegetation, fish, amphibians, reptiles, and mammals that occupy WSMR, including the threatened and endangered species.

d. **Cumulative Impacts** involve impacts defined as those impacts that would result from the incremental impacts of the Proposed Action when added to other activities.

1.5.2 Issues Eliminated from Detailed Study

The following is a list of issues that were eliminated from detailed study for this document.

a. **Noise Issues** are usually the largest and most pervasive environmental problem associated with aircraft operations. However, in this case, the Proposed Action would not have an adverse impact on the environment. All aircraft flight operations would be flown at or above 3,000 feet (914 meters) above ground level (AGL) or would be flown within restricted military airspace areas with sparse or no civilian population. Additionally, the entire JASSM flight test program would involve flight operations in the subsonic range.

b. **Cultural and Infrastructure Resources** would not be impacted. Termination of the JASSM flight tests would be located in well established, previously assessed target areas the Drew Site and the large-scale test bed (LSTB) on the Permanent High-Explosive Test Site (PHETS). These impact areas have been selected due to the fact that similar activities have occurred in these areas for many years, and potential archaeological impacts have been addressed in previous *National Environmental Policy Act* (NEPA) documents (see para 1.5.2.c, below). The absence of cultural resources in at the Drew Site was one of the main factors for considering this area. (Personal communication, Mr. Robert Burton). However, if unplanned ground disturbances outside the designated target areas occur, then a WSMR archaeological monitor will support the project team to ensure appropriate measures are taken. Mitigation measures will be taken in conjunction with WSMR Environment and Safety Directorate, and in accordance with Section 106 of the National Historic Preservation Act.

c. **System/Target Impacts at the PHETS** targets are covered by the following:

- *Environmental Assessment of Long–Term, High-Explosive Testing at WSMR PHETS*, dated 15 September 1987 (HE Testing 1987-2007)
- "Addendum to the EA of Long-Term Testing at WSMR PHETS," dated July 1995 (Addressed air delivery, static detonations, Davis Gun testing 1995-2005)
- "Supplement to the Long-Term Testing EA for Collateral Effects Test Series," dated October 1995 (Addressed using taggants, tracers, and special test materials, biological simulants Bg and Bt, plume tracking)

1.6 Decision To Be Made

The decision to be made is whether or not to proceed with the JASSM EMD/OT flight test program at WSMR.

1.7 Regulatory Requirements

This EA has been prepared in accordance with NEPA and the President's Council on Environmental Quality guidelines implementing NEPA. This document fulfills the requirements for compliance with Title 40 of the *Code of Federal Regulations* (CFR), Parts 1500-1508; and Air Force Instruction (AFI) 32-7061, *The Environmental Impact Analysis Process.*

In addition, compliance with all other federal acts and regulations, Air Force and Army guidance and policy directives are required to carry out the Proposed Action. Federal laws, regulations, Air Force/Army guidance, and policy directives related to the Proposed Action include but are not limited to the following:

a. AR 200-1, *Environmental Protection and Enhancement*, Feb 97

b. AR 200-2, *Environmental Effects of Army Actions*, Dec 88

c. AR 200-3, *Natural Resources – Land, Forest, and Wildlife Management*, Feb 95

d. AR 200-4, *Cultural Resources Management*, Oct 98

e. AR-385-64, *U.S. Army Explosives Safety Program*, Feb 00

f. WSMR-385-18, *WSMR Safety Regulation*

g. *Clean Air Act*, and the Amendments of 1990

h. *Clean Water Act of 1977*, Re-authorized in 1987

i. *Resource Conservation and Recovery Act*, 1986

j. *Endangered Species Act*, 1973

k. *Migratory Bird Treaty Act of 1918*, Dec 89

l. *National Historic Preservation Act of 1966*, Oct 92

m. *Archaeological Resource Protection Act of 1979*

n. *American Indian Religious Freedom Act of 1978*, Amended in 1994

o. *Native American Graves Protection and Repatriation Act*, 1990

p. AFI 32-7061, *Environmental Impact Analysis Process*, Jan 95

q. AFI 11-202V3, *General Flight Rules*, Feb 01

r. AFI 13-201, *U.S. Air Force Airspace Management*, Mar 00

s. AFI 13-212, *Weapons Range Management*, Aug 94

t. AFI 32-4002, *Hazardous Material Emergency Planning and Response Compliance*, Dec 97

u. AFI 32-7040, *Air Quality Compliance*, May 94

v. AFI 32-7042, *Solid and Hazardous Waste Compliance*, May 94

w. AFI 32-7086, *Hazardous Waste Management*, Aug 97

x. Air Force Policy Directive 91-2, *Safety Programs*, Sep 93

y. Air Force Manual (AFMAN) 91-201, *Explosive Safety Standards*, Mar 00

z. AFMAN 91-201/AFMC "Supplement 1," 1995, *Explosive Safety Standards*, Aug 00

aa. AFI 91-202, *The U.S. Air Force Mishap Prevention Program*, Aug 98

bb. Air Force Occupational Safety and Health Standard (AFOSHSTD) 48-8, "Controlling Exposures to Hazardous Materials," Sep 97

cc. Air Force Policy Directive 32-70, *Environmental Quality*, Jul 94

dd. Draft SOPs for Environmental Protection During Recovery Actions for WSMR, Mar 00

ee. *WSMR Unexploded Ordnance Hazards and Munitions Management Plan and Implementation Guide*, 22 Feb 99

1.8 Environmental Justice

This action has been reviewed in accordance with Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (11 February 1994). Executive Order 12898 requires federal agencies to identify and address disproportionately, high-adverse effects of their activities on minority and low-income populations.

The Proposed Action has no substantial negative environmental, health, or economic effect on surrounding populations. The flight test program would take place in large geographic area. The majority of the area that underlies the Proposed Action is government land that is set aside for this specific use. Therefore, there is no disproportionate impact to minorities or low-income populations.

2.0 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

2.1 Introduction

This section provides discussion on the criteria used to select the range of reasonable alternatives, the Proposed Action, and the alternatives.

2.2 Selection Criteria

2.2.1 Environmental Restrictions

The environmental criteria used to select a range of reasonable alternatives were developed in a context that maximizes air safety and takes into consideration environmentally sensitive areas. These selection criteria include locating JASSM EMD/OT flight test program:

a. Within airspace specifically designed for military operations;

b. Within airspace where it is possible to avoid inhabited areas, specially designated federal and state lands, including national parks and monuments, national wildlife refuges, wilderness study area, state parks, etc. by 3,000 feet (914 meters) AGL and laterally (see figure 2-1 next page);

c. Within airspace where civilian aircraft corridors, ground transportation routes, and large populations centers can be avoided;

d. Within isolated areas where the JASSM's payload can be safely tested; and

e. Where test missions would not adversely impact sensitive habitat and species, and important cultural sites, as well as limit the need for extensive construction or ground clearing activities.

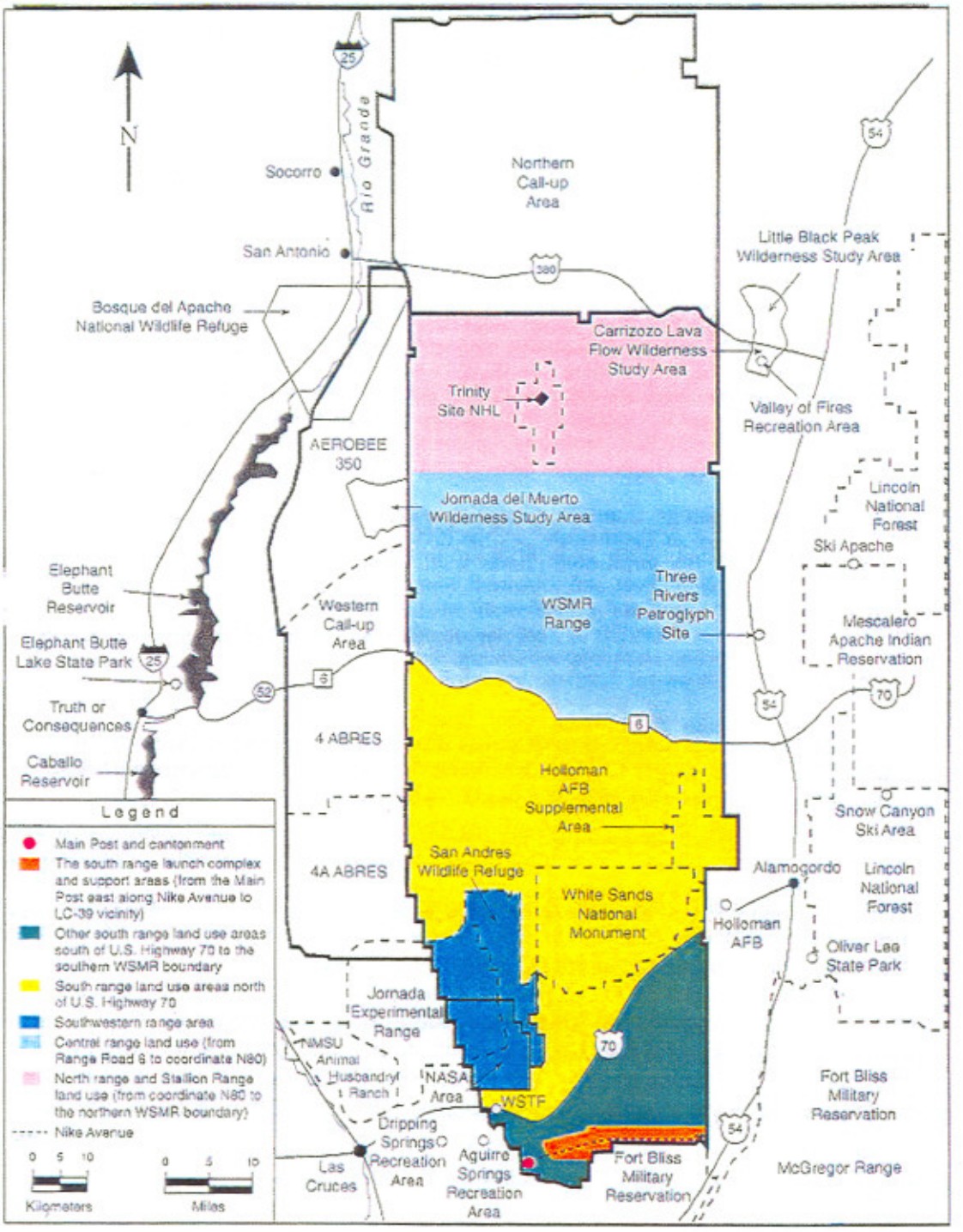


Figure 2-1. Land Use Areas on WSMR.

2.2.2 Operational Requirements

While developing selection criteria, it was necessary to ensure alternative locations had the military assets needed for the JASSM EMD/OT test program to attain its objectives. These operational requirements include locating the JASSM flight test program:

a. At DoD facilities with flight test operations, available secure aircraft ramp space and runway capacity to support test aircraft;

b. At DoD bases and test ranges with the ability to thoroughly test and record the JASSM's range, endurance, airspeed, maneuverability, flight envelope, navigation accuracy, and telemetry data through a network of range instrumentation devices;

c. At DoD facilities and test ranges with existing hardened target structures suitable to program requirements can be maintained and instrumented; and

d. At DoD facilities and test ranges where the storage and use of munitions containing high explosives is permitted.

2.2.3 Technical Requirements

The technical requirements of the JASSM program are to comply with all applicable federal and state environmental laws, including, but not limited to, those listed in Section 1.7, Regulatory Requirements.

2.3 Description of Proposed Action and Alternatives

2.3.1 Description of the Proposed Action

The U.S. Air Force proposes to conduct captive-carry and launch tests of the JASSM at WSMR near Alamogordo, New Mexico. WSMR is located in Otero, Socorro, Dona Anna, Lincoln and Sierra Counties in southern New Mexico (figure 1-1). The entire WSMR complex is approximately 150 miles in length (in the north/south direction) and approximately 42 miles wide (in the east/west direction).

All flight tests would terminate in existing target impact areas that are used for activities consistent with the proposed JASSM activities. Due to the research and development nature of the JASSM program, exact flight profiles for the proposed tests are influenced by the previous test's outcome. Therefore, exact profiles are not included in this document. However, all nominal missions would impact in an established weapon impact area on WSMR regardless of flight profile. The program is committed to working closely with the White Sands Environment and Safety Directorate (WS-ES) to coordinate these activities. Using the best available information, the potential project impacts areas are the following two areas described below:

The Drew Site is the proposed site for the separation test series (see below). Drew Site is located approximately 5 miles east of Range Road 7, and approximately 2.5 miles northwest of the White Sands Space Harbor Area. This site is approximately 43 miles north-northeast of the WSMR Post Area, and approximately 30 miles northwest of Alamogordo, New Mexico (figure 2-2). The Drew Site is proposed for ST series of due to the ease of access, low animal and vegetation populations, void of cultural resources, and being centrally located in the range.

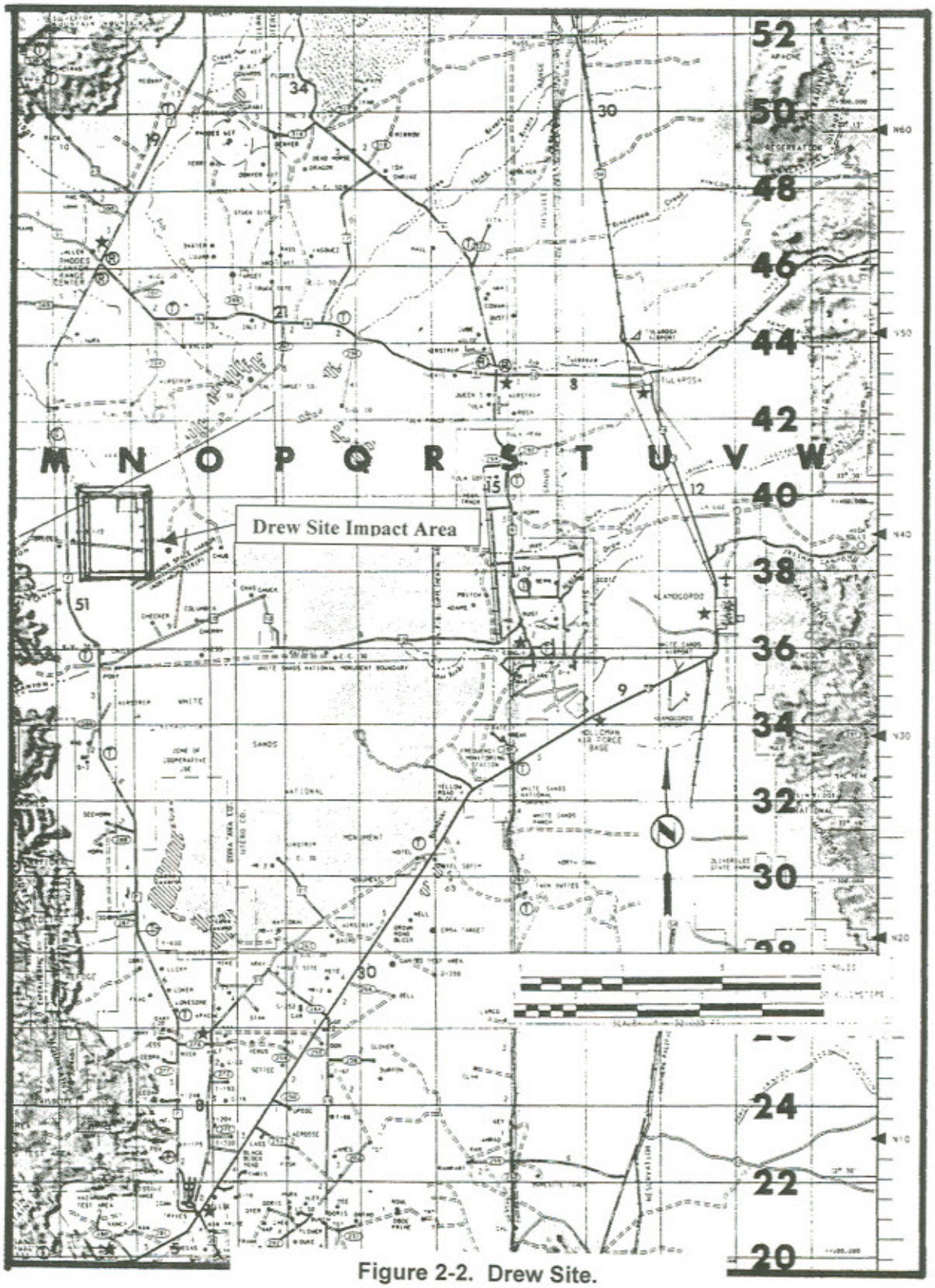


Figure 2-2. Drew Site.

The LSTB on the PHETS, located approximately 2.5 miles east of Range Road 7 and approximately 15 miles south of State Highway 380, is the other proposed test impact site. This site is approximately 35 miles southeast of Socorro, New Mexico, and approximately 90 miles north of the WSMR Post Area. The target structures for the JASSM program are confined to a one-mile square area within the LSTB (see figure 2-3).

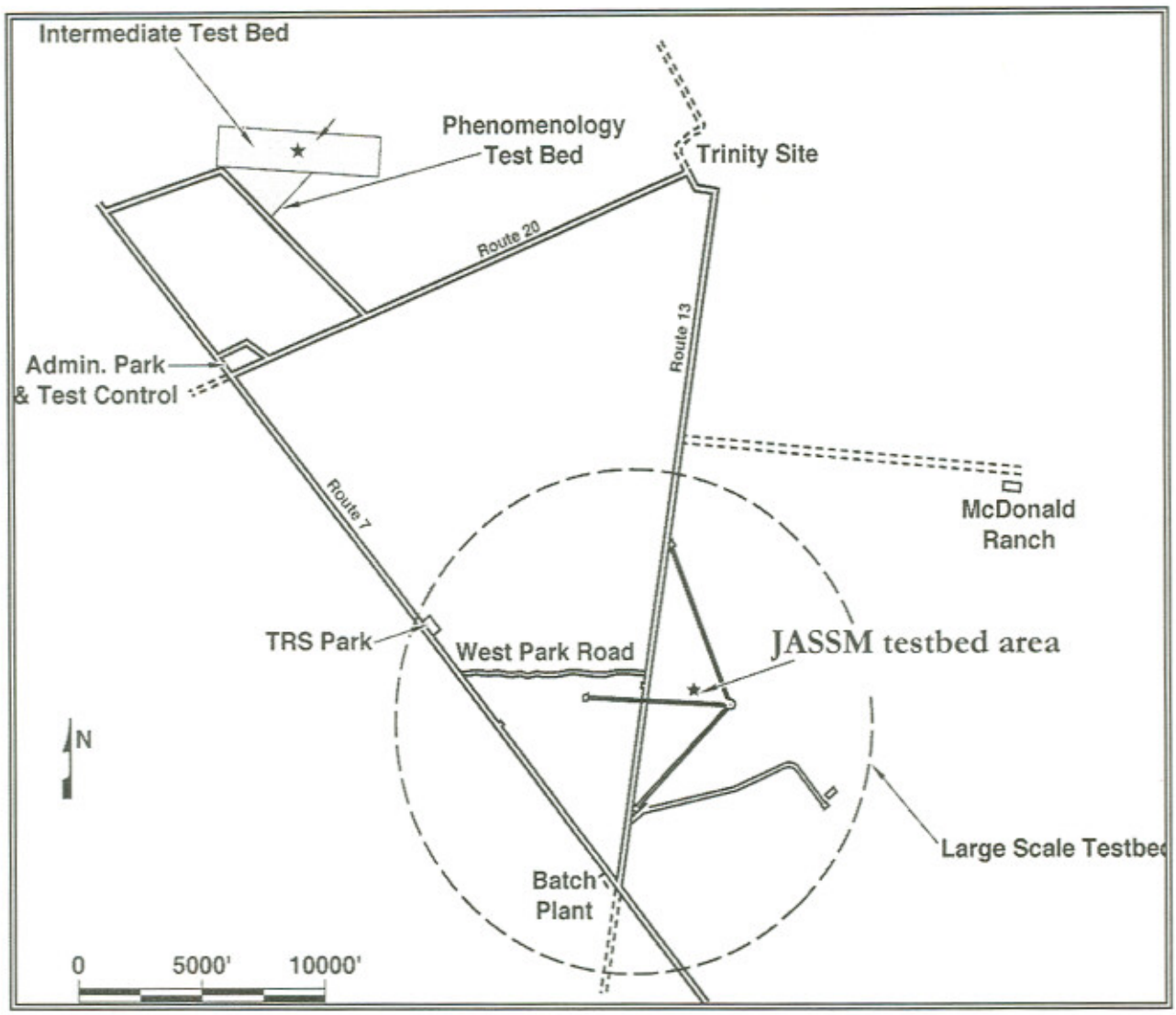


Figure 2-3. PHETS/ Large Scale Test Bed.

The Proposed Action would include three types of flight tests: (1) captive-carry tests, in which the JASSM would be attached to the carrier aircraft and then the carrier aircraft would fly around the test airspace (test flight profile) but not launch the missile; (2) dress rehearsal flights, in which the carrier aircraft and safety chase aircraft would all fly their assigned routes (test flight profile), but the JASSM would not be launched; and (3) hot mission, in which the carrier aircraft and the safety chase aircraft would fly their designated routes and then release and launch the JASSM. The JASSM would then fly a preprogrammed route

and impact into the designated target area. An F-16, B-52, B-1, or B-2 could be used as the carrier aircraft. An F-16, T-38, or F-15 could be used for the safety chase aircraft. Most often there would be one carrier aircraft and two safety chase aircraft. For a given test event, a captive-carry test and dress rehearsal will precede the hot mission. The JASSM is a stand-off (launched from a great distance from planned targets) weapon. All weapon releases flight tests would be conducted at or above 3,000 feet AGL.

WSMR is an excellent location for this type of weapons testing. The WSMR supports missile development and test programs for the Army, Navy, Air Force, the NASA, and foreign countries. The WSMR 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 (U.S. Army 1991a). The surveillance and evaluation equipment needed for the JASSM project is already in place or available. No new construction of optics, cables, communication cables or radar and telemetry hardware equipment would be required for the JASSM testing at WSMR.

The missile carrying aircraft and the safety chase aircraft would take off from HAFB for the F-16 tests. The missile carrying aircraft for the B-52, B-2, and B-1 would take-off from EAFB or BAFB, while the safety chase would take off from HAFB and join the other aircraft once it enters the WSMR airspace. For normal operations, the carrier and safety chase aircraft would return back to their host base (i.e., the base that they took off from) following the completion of the missile test. For normal test missions, the missile will fly the preprogrammed route and impact the target area. Recovery personnel, staging just outside of the evacuation area, would immediately enter the impact area to clean up debris left from the missile testing. For normal tests, the debris would consist primarily of the test missile and the target structure. The JASSM is classified, and thus most of the missile (typically about ninety- percent) is located and recovered after testing. The proposed JASSM testing would not involve a release of toxic compounds, reactive chemicals or nuclear (i.e., radioactive) materials; therefore, hazardous materials spill response or remediation will not be required following the missile tests other than a nominal flight termination charge and/or a very small quantity of unspent fuel, or fuel simulant. Although very rare, emergency situations do arise during weapons testing programs. Such cases could occur with the proposed JASSM test program. If anything went wrong with the carrier aircraft or safety chase aircraft prior to missile launch, then the test would be aborted and all aircraft would return to their home base. If an emergency arose with the carrier aircraft or safety chase aircraft after missile launch, then the effected aircraft would still return to the home base. The missile would be allowed to follow its route until impact and the recovery team would recover the missile debris, as normal.

Testing planning activities include planning the flight test profiles to ensure that critical phases of flight (wings deployment, engine start, etc.) occur over areas that are not sensitive habitat areas or where access would be very difficult should an emergency situations occur. Specifically, flight profiles are developed to avoid the Salt Creek Basin area, and other known habitat of the White Sands pupfish (Malpais and mound springs), during these phases of flight. In accordance with WSMR 385-18, *WSMR Safety Regulation*, the JASSM uses a flight termination system (FTS) that is controlled by the WSMR range safety officer (RSO) on the ground. If a missile malfunctions after firing, then it would be destroyed. The FTS ordnance would cause the missile to break in half, rendering the two pieces

aerodynamically unstable. As a result, the missile would impact somewhere below the route path.

Based on results from previous tests, no surface fires are expected with termination of flight and ground impact. A combination, of impact velocity (buries itself) and the small amount of fuel in the missile (less than 5 gallons), reduces the likelihood of a surface fire during in a normal or aborted test. Most the fuel in the missile is normally consumed in flight. If a malfunctioning missile were destroyed, then its remaining fuel would normally burn or evaporate prior to ground impact. Thus, recovery teams would not have to deal with unspent fuel following an aborted missile test. In the unlikely event of a spill WS-ES will be immediately notified. All response activities would be performed in compliance with the *WMSR Installation Spill Contingency Plan*.

2.3.2 Description of Alternatives

The considerations required to safely and effectively flight test new military technology are complex. Few locations are considered appropriate for stand-off missile testing. While developing the JASSM EMD/OT flight test program, several approaches and test sites were reviewed. The availability of restricted airspace and the capabilities of test ranges were analyzed and evaluated.

The following is a list of alternatives considered during the planning of the test program:

a. Delay of the Proposed Action. Existing missile systems would have to be used during the delay, which would in effect deprive U.S. warfighters of threat reducing ground attack capability. Utilization of other inferior missiles would require a larger number of missiles, at increased procurement costs and risk to aircraft and crew, in order to provide the USAF with the same degree of lethality and target suppression that the JASSM technology is designed to provide. In addition, a delay in JASSM testing now would cause future JASSM testing and missile production to be more expensive due to inflation. Therefore, the implementation of project delays is not desirable.

b. Decrease number of flight tests. The JASSM program is employing a robust modeling/simulation- based acquisition program to minimize the number of flight tests required to verify the missile's performance. This simulation-based acquisition approach minimizes test schedules, reduces costs, and minimizes environmental impacts. Historically, missile test programs have included a larger number of flight test events to demonstrate capability and verify performance specifications. For example, in order for a weapon system to receive a flight clearance on an F-16, over 20 all-up-round (AUR) flight tests would normally be required, yet the JASSM DT program is only planning 4 actual AUR flight tests to achieve the same result. Decreasing the number of test flights below the currently proposed low numbers would limit the contractor's and the Government's ability to collect data that would establish performance characteristics and jeopardize the program by increasing risk of performance failure. Failing to meet the requirement to test and verify the missile's performance is not desirable.

c. Selection of another test range. Although JASSM testing could be conducted on another test range, the ability to collect flight data would be curtailed by reduced range size or tracking system coverage. These reductions in range capability would reduce the amount and quality of testing and evaluation of missile performance. Because WSMR has existing target structures, the JASSM program reduces costs and environmental impacts by not having to construct additional targets at the other ranges. The environmental impact of placing the required tracking equipment and target

structures on a new site usually has greater impacts than utilizing existing tracking systems and structures. In other words, the JASSM testing program can be conducted and evaluated at WSMR more efficiently than at any other range. As a result, the alternative of moving the JASSM test program to another range is not desirable.

d. No Action. The no action alternative would involve not conducting any JASSM testing at WSMR. This would result in a significant delay in and/or possible cancellation of the JASSM program. Existing missile systems would have to be used, which deprive U.S. aircraft of threat reducing ground attack capability. Utilization of other inferior missiles would require a larger number of missiles, at increased procurement costs and risk to aircraft and crew, in order to provide the USAF with the same degree of lethality and target suppression that the JASSM technology is designed to provide. This alternative is not recommended since the operational requirements for the United States Air Force and the United States Navy for the next 15 years would not be satisfied.

The need for a missile with the capabilities of the JASSM is critical to support future planned strategic requirements critical to national interest. The JASSM is a developmental weapon system requiring demonstration and performance verification testing. Not conducting the tests would not meet program requirements and impact national defense needs.

Table 2-1 displays a matrix of range requirements against the capabilities of five ranges considered by the test program. While each range offers unique qualities, WSMR is the only range that can meet all of the selection criteria specifically required for the JASSM program, without undesirable expense and/or delay.

Table 2-1. Test Range Selection Matrix 1

Range Requirement	WSMR	Western Test Range	Utah Test & Training Range	China Lake	Eglin Test Range
Airfield Facilities	Yes	Yes	Yes	Yes	Yes
JASSM Verified Telemetry Systems	Yes	Yes	No	No	Yes
Existing Targets	**Yes**	No	No	No	No
Avoidance of Inhabited and Special Use Area by 3,000 ft. AGL and laterally	Yes	Yes	Yes	Yes	No
HE Testing Permitted	Yes	Yes	Yes	Yes	Yes
Restricted Use Airspace	Yes	Yes	Yes	Yes	Yes

2.3.3 Recovery

Procedures for recovery would be in accordance with WSMR Environmental and Safety Directorate guidelines, as well as the JASSM Security Test Plan.

The JASSM recovery team would be staged outside of the safety footprint for the flight profile. The recovery team will include at least the following personnel:

- ⇒ WSMR Explosive Ordnance Disposal (EOD) team (2)
- ⇒ DTRA/LMIS Safety and project personnel (3)
- ⇒ JASSM ESH/Project representatives (4)
- ⇒ JASSM Security Officer (1)
- ⇒ 586th Test Squadron support personnel (2)
- ⇒ WSMR Environmental (as necessary)

EOD/safety will survey the impact area for any unexploded ordnance. Once the area is cleared by WSMR EOD and the area declared safe to enter, the recovery team will begin the process of recovering (picking up the pieces) the missile system. This will involve collecting items scattered on the surface, as well as items that might be buried in the impact crater. To ensure that all of the components from the missile are properly recovered, recovery personnel will use a system checklist. While it is impossible to recover every piece, the recovery team will attempt to recover any hazardous materials and non-hazardous materials as range time allows. Recovery of components in previous tests resulted in over 90% of the system being recovered.

In a concerted effort to preserve area soil and vegetation, the recovery team would be limited to the absolute lowest number of personnel necessary to effectively accomplish the task, as well as restricting the number of vehicles and restricting vehicular activity to established roads and shoulders. The planned impact area for the DT tests is in a well-defined area with a network of roads already in place providing ample access to all test targets. If necessary for recovery at the Drew Site, a helicopter may be used to locate debris and pick up items that travel down range. These actions would minimize the extent of off-road travel required by the recovery team. If the use of established roads were not possible, then vehicles would use a single route both in and out of the recovery area. If necessary, qualified representatives from WS-ES would accompany the recovery team to assist in the selection of the entry path that would minimize the potential for adverse effects caused by road entry. It is understood that this may entail regulatory coordination and consultation, and/or the development of additional NEPA documentation.

A backhoe would be used to pick up the warhead and other heavy parts of the missile. Once again, the above-mentioned measures would be employed to minimize potential impact. Post-recovery reports would be provided to WS-ES.

In the unlikely event of a fire, associated with the Proposed Action, EOD requirements prevent the recovery team from approaching the impact area until the fire is completely exhausted (burns itself out). Once EOD has cleared the area for entry, an assessment of the area will be performed to determine what, if any additional precautions need to be used by the recovery team to protect human health and the environment. If the composite body

of the missile caught fire, then a light application (using a small garden sprayer) of a diluted (50/50) mixture of water and acrylic floor wax may be applied to the to pieces of the composite body that were burnt. This action would agglutinate loose fibers for recovery handling. As mentioned above, previous flight test activities have not caused a fire, and this procedure is precautionary planning in the unlikely event of a fire.

All proposed recovery actions would be in accordance with guidance from WS-ES and in accordance with *WSMR Standard Operating Procedure for Environmental Protection During Recovery Operations* (see appendix A) and the JASSM Security Test Plan. Additional recovery discussions are included in Section 4.0, Environmental Consequences, as they relate to potential impacts on specific resources.

2.3.4 Flight Tests

The JASSM program is proposing two series of tests. The first of the two series is separation testing. As previously explained each test event may have three risk-reducing phases that involve a captive-carry flight, a dress rehearsal flight, and a hot mission flight (however these flights may be combined into a single mission flight in which all three phases are accomplished). Separation tests (STs) would involve the separation of the JASSM test vehicle from the launch aircraft, deployment of the flight surfaces, followed by a non-powered controlled glide to a designated impact area (Drew Site), followed by missile recovery. A typical ST flight test profile proposed for WMSR is shown in figure 2-4. Table 2-2 lists the 3 separation flight tests in the test program. The only difference between the various STs would be launch altitude and airspeed, as well as launch platform.

Table 2-2. Separation Flight Tests

Event Test Parameter	ST-4	ST-7	ST-8
Launch Aircraft	F-16	B-1	B-1
Release Altitude (MSL)	>12,000	>12,000	>12,000
Impact area	Drew	Drew	Drew
Warhead	Inert	Inert	Inert

Separation test vehicles (STVs) are non-powered, non-fueled (the fuel is replaced with a 50/50 mixture of biodegradable propylene glycol [antifreeze] and water which simulates the weight of the fuel) variant of a standard test vehicle. Since the STV is a non-powered system, developed mainly to test aerodynamic separation characteristics of the JASSM vehicle when released and launched from the carrier aircraft, many of the JASSM subsystems (i.e., engine, electronics, seeker, etc.) are replaced with metal (aluminum) weight simulates to minimize the cost of the test vehicle, as well as the minimizing the overall environmental footprint. Additionally, all STVs would have an inert warhead and fuze.

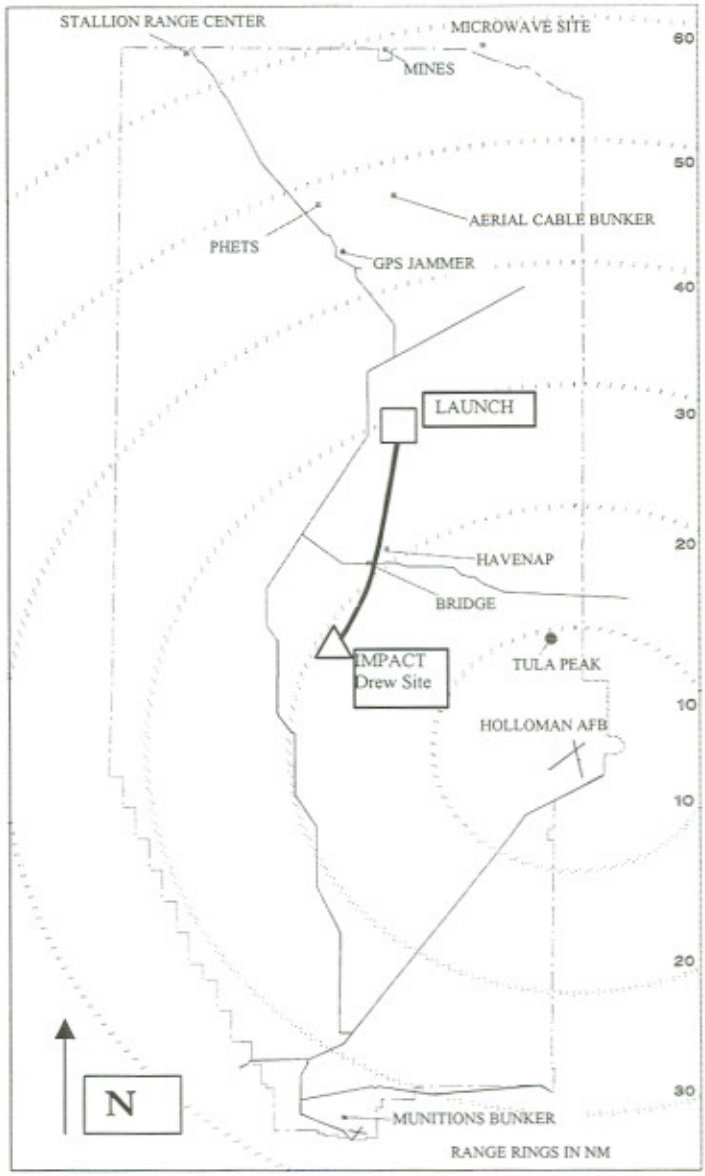


Figure 2-4. Typical ST Flight Profile.

The second series of flight tests are the developmental tests (DT), AUR, operational tests (OT). These are all very similarly structured tests, with the main difference being release altitudes and which targets that the test vehicles will impact. Nevertheless, all proposed tests would have the missile released from the test aircraft, fly a pre-programmed flight profile over WSMR and impact a target structure within the LSTB on the PHETS. One of the tests, OT-4, would involve two missiles being released during a single mission; however, only one missile would be flying on the range at a time. Table 2-3 provides a breakdown of these flights.

Mission planning for each proposed test, will be evaluated by the WS-ES, (should the final flight profile differ greatly from that depicted in figure 2-4) to determine if additional NEPA review (REC/EA/EIS) or regulatory coordination and/or consultation is required, as required by AR 200-2, *Environmental Effects of Army Actions*.

Table 2-3. Developmental/Operational Flight Tests

Event Test Parameter	DT-3	DT-4	DT-7	DT-8	AUR-1	AUR-2	AUR-3	AUR-4	OT-1	OT-2	OT-4	OT-4*
Launch Aircraft	B-52	B-52	F-16	F-16	B-2	B-2	B-1	B-1	B-52	F-16	B-52	B-52
Cruise Altitude (MSL)	>12K	>12K	>12K	>13K	>12K	>12K	>12K	>12K	>12K	>12K	>12K	>12K
Cruise Airspeed (M)	.4 -.8	.4 - .8	.4 - .8	.4 - .8	.4 - .8	.4 - .8	.4 - .8	.4 - .8	.4 - .8	.4 - .8	.4 - .8	.4 - .8
Impact Site	LSTB	LSTB	LSTB	LSTB	LSTB	LSTB	LSTB	LSTB	LSTB	LSTB	LSTB	LSTB
Warhead	Live	Live	Live	Live	Inert	Inert	Inert	Inert	Live	Live	Inert	Live

* multi-missile test

A typical flight profile for a developmental flight, AUR, and OT is shown below in figure 2-5. It is expected that there would be slight changes to the actual flight test profiles, as the outcome (data collected) of one test may influence the succeeding flight test profile. Nevertheless, the termination point for all tests would be in the LSTB located at the PHETS and the actual flight profiles would remain over WSMR at all times and be coordinated with Range Safety.

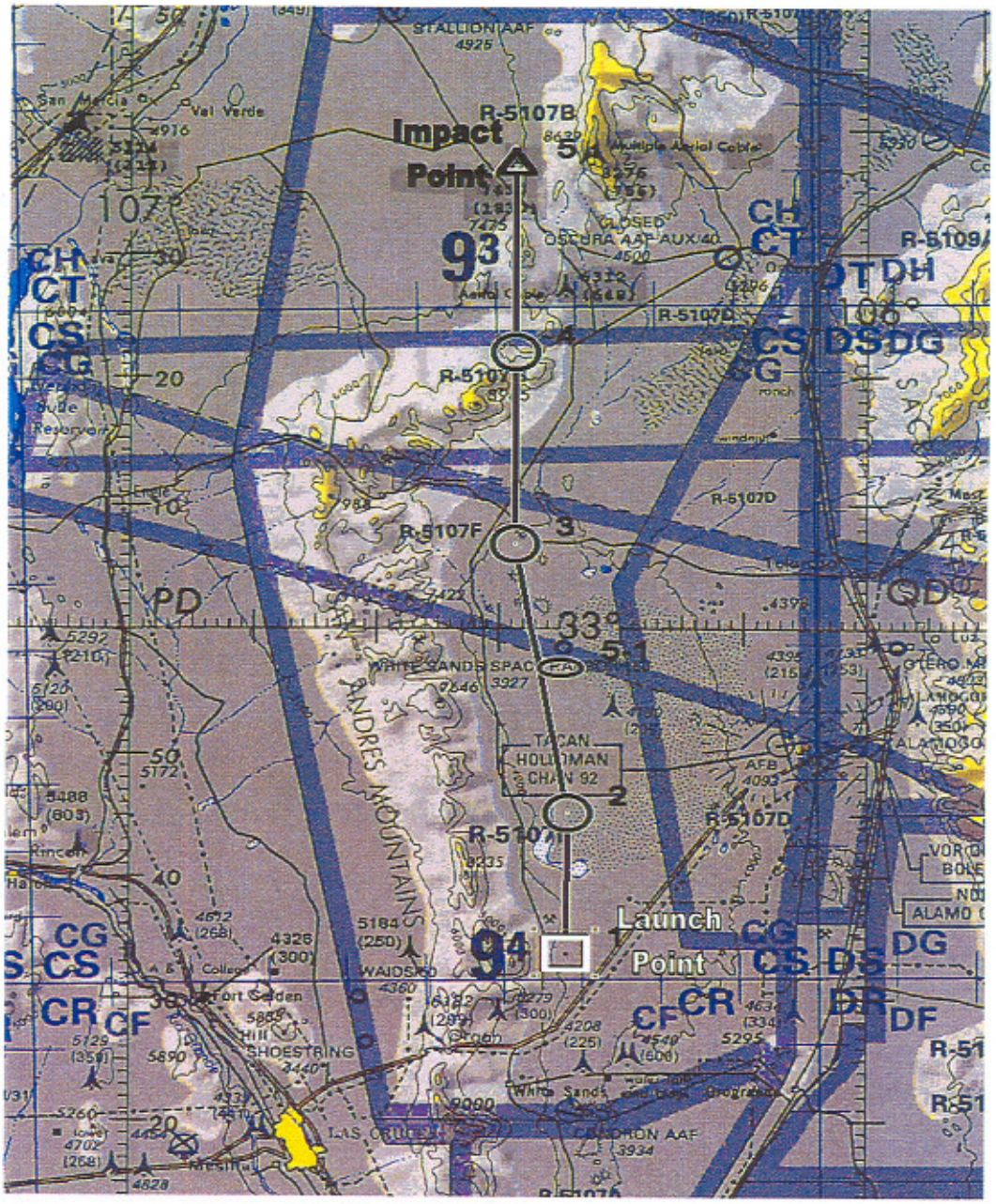


Figure 2-5. Typical JASSM Test Flight Profile.

During the Program Definition Risk Reduction (PDRR) phase, two JASSM STVs, two FTVs (similar to an AUR) tests, and one DT were successfully conducted on WSMR. Each of the STVs and one non-powered FTV terminated at the Drew Site; the powered FTV terminated at G-25, and the DT in the LSTB. These test activities were reviewed under the following REC control numbers:

RC99004a, JASSM (Joint Air-to-Surface Missile) Testing

RC00046a, Joint Air-to-Surface Missile (JASSM) Separations Tests

RC01019a, Joint Air-to-Surface Missile (JASSM) DT-1

RC01033a, JASSM ST-2 and ST-3

2.4 Special Issues

The flight test missions use a multi-layered approach to safety. Below are details pertaining to the JASSM flight test program.

a. The contractor has carried out a system safety analysis so that the design of the JASSM does not introduce any hazards beyond those experienced with any other air-to-air or air-to-ground store.

b. During the Program Definition Risk Reduction (PDRR) phase, two JASSM STVs, two FTVs (similar to an AUR) tests, and one DT were successfully conducted on WSMR. Each of the STVs and one non-powered FTV terminated at the Drew Site; the powered FTV terminated at G-25, and the DT in the LSTB. These test activities were reviewed under the following REC control numbers:

RC99004a, JASSM (Joint Air-to-Surface Missile) Testing

RC00046a, Joint Air-to-Surface Missile (JASSM) Separations Tests

RC01019a, Joint Air-to-Surface Missile (JASSM) DT-1

RC01033a, JASSM ST-2 and ST-3

c. Prior to the start of the JASSM flight test mission, an Air Force Safety Review Board would analyze all aspects of the Test Directive.

d. The JASSM test program will only utilize airspace restricted for military operations.

e. Land underlying the proposed JASSM free flights and impact areas would be under the control of WSMR Range Safety.

f. All free-flight missions flown would have a planned impact point on WSMR in an established weapon impact area.

g. FTS would be used for flight tests.

2.5 Hazardous Materials

Hazardous materials/items present in a JASSM include JP-10 aviation fuel, the thermal battery, the Ni-Cd AA batteries, lead ballast material, and the flight termination ordnance. No radioactive materials would be present in any of the proposed missile tests at WSMR. The JP-10 is the greatest single volume hazardous material that is in the JASSM (only in the AUR, DT and OT vehicles). The flight profiles for the tests would be designed to fly the system as long as possible; therefore, the majority of JP-10 would be consumed during most flight profiles. Other hazardous items (batteries, lead and ordnance) would be collected during recovery operations following the test. Recovery efforts for earlier tests have demonstrated that these items are easy to identify and recovery. Once again, due to the security classification of the JASSM all items of reasonable size (2-3 inches) will be recovered, regardless of hazard classification.

Environmental sustainability is a design consideration with the JASSM. A minimal amount hazardous materials are used the manufacturing of the JASSM. Some of the JASSM materials of construction contain toxic compounds containing chromium, cadmium, nickel, or

lead. These metals are used to provide corrosion protection to the some of the JASSM system. Additionally, most STVs would have approximately 25-30 pounds of lead used as ballast material. The lead would be recovered and recycled through proper DoD channels. Additional hazardous materials are used in the production of the system, but area present only in trace amounts in the actual system, if at all, include methyl-isobutyl-ketone, toluene, xylene, and methyl chloride. Once again, the JASSM program would recover and properly dispose of as much of the system as possible in order to minimize impacts to the environment from hazardous materials and to meet program security requirements. As required by AR-201, a post-recovery report would be provided to WS-ES.

Additionally, the coating system as a whole, including the composite fuselage (body) has been tested in accordance with EPA Method 11311 (*Toxicity Characteristic Leaching Procedure*), and has been found not to exhibit hazardous characteristics.

3.0 AFFECTED ENVIRONMENT

3.1 Climate

The climate at WSMR is typical of a southwest desert. It is generally sunny, dry, and warm with frequent spring dust storms. On the average, temperatures range from a mean daily high of 76° F to a mean daily low of 45° F (see table 3-1).

Annual amount of total precipitation at WSMR varies from 7 to 11 inches, with an annual average of 7.90 inches. Most precipitation occurs as rainfall from July to October. Thunderstorms usually average about 45 per year, and can produce locally heavy rainfall and strong wind gusts. Hail and tornadoes are rare.

Table 3-1. WSMR Meteorological Averages and Records

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Avg. High	57 °F	62 °F	69 °F	76 °F	85 °F	93 °F	94 °F	91 °F	85 °F	77 °F	66 °F	57 °F
Avg. Low	26 °F	29 °F	35 °F	42 °F	51 °F	60 °F	66 °F	64 °F	57 °F	44 °F	33 °F	27 °F
Mean	42 °F	46 °F	52 °F	60 °F	68 °F	77 °F	80 °F	78 °F	72 °F	61 °F	50 °F	42 °F
Avg. Precip.	0.50 in	0.40 in	0.20 in	0.20 in	0.30 in	0.70 in	1.40 in	2.30 in	1.40 in	0.90 in	0.50 in	0.70 in
Record High	78 °F	84 °F	90 °F	96 °F	101 °F	110 °F	107 °F	104 °F	100 °F	93 °F	87 °F	77 °F
Year	(1970)	(1986)	(1989)	(1965)	(1996)	(1994)	(1994)	(1980)	(1995)	(1997)	(1988)	(1987)
Record Low	-10 °F	10 °F	11 °F	24 °F	27 °F	43 °F	55 °F	51 °F	40 °F	22 °F	-4 °F	5 °F
Year	(1962)	(1963)	(1965)	(1973)	(1967)	(1971)	(1983)	(1970)	(1965)	(1970)	(1976)	(1976)

Source: weatherchannel.com, 2001

Visibility in the region around WSMR is excellent, averaging 48 to 80 kilometers (km). During spring, intermittent but strong west and north winds may cause dust storms, which can lower visibility to 2 km. WSMR averages 35 day per year when winds cause the visibility to fall below 10 km. However, mean annual wind speed averages only 5 nautical miles per hour (NM/H). A southwest wind prevails throughout most of the year. (WSMR, 1998)

3.2 Geology

3.2.1 Physiography

WSMR is located in the northern, central, and western sections of the Tularosa Basin; the northern section of the Jornada del Muerto Basin; and the San Andres Mountain Range physiographic provinces. The WSMR region is an area consisting of generally north-south trending elongated mountain ranges and high mesas separated by wide, very gently sloping basins. The San Andres Mountains lie on the western side of WSMR and form a continuous chain with the Oscura Mountains in the north-central part of WSMR. This mountain range separates the Tularosa Basin from the Jornada Del Muerto Basin on the west.

3.2.2 Tularosa Basin Geology

The Tularosa Basin is a large north-south trending graben, bounded by sharply uplifted fault blocks composed of sedimentary rocks. The basin is approximately 120 miles long and 35 miles wide. It extends from the southern end of the Chupadera Mesa, in central New

Mexico to the Texas border. The basin is bound on the south by a low topographic divide near the New Mexico-Texas state line; on the west by the Organ, San Andres, and Oscura Mountains, and the Chupadera Mesa; on the north by the Mesa Jumanes; and on the east by the Jarilla, Sierra Blanca and Sacramento Mountains. The interior basin has low relief, with altitudes ranging from 4,000 feet on the south and west sides to about 4,400 feet on north and east sides. The surrounding mountains rise abruptly to altitudes of 7,000 to 12,000 feet. Geologically striking features within the basin include White Sands National Monument with extensive gypsum sand dunes in the central area of the basin, and the Malpais, a massive basalt lava flow 45 miles north of HAFB (Walk, Haydel, and Assoc. 1989).

Surface geology of the Tularosa Basin consists mostly of alluvial sediment, which originated from Yeso formation erosion. The basin began filling by early Miocene times. Streams flowing into the center of the basin deposited coarse alluvial fans near the mountain front and fine-grained alluvium towards the center of the basin. Eroded sediments from the higher surrounding mountains have filled the basin with nearly 4,000 feet of unconsolidated alluvial sediments.

Basin sediments are predominantly Tertiary in age covered with a thin layer of Quaternary sediments. The Tertiary fill is virtually all clay and generally contains little material coarser than fine-grained sand. Caliche (cemented calcium carbonate) occurs throughout the fill both as disseminated flakes or nodules and as beds ranging from about one inch to several feet in thickness. (Walk, Haydel, and Assoc. 1989).

3.2.3 San Andres Mountain Geology

The San Andres Mountains form a portion of a geologic feature known as the Rio Grande Rift. This complexly faulted rift, varying in width from 200 to 280 km, extends from Colorado into Mexico. As the earth's crust was pulled apart during the Cretaceous period, a number of relatively narrow tilted blocks of layered sedimentary rock, ranging in age from Precambrian to Permian, were formed. The vertical slip planes of collapsed San Andres Fault block are visible as a steep fault scarp on the east side of the San Andres uplift. The San Andres Mountains rise abruptly to 7,000 feet in elevation on the western side of the Tularosa Basin (WSMR EIS, 1998).

3.2.4 Jornada del Muerto Basin Geology

Jornada del Muerto Basin is a broad, dry, closed and relatively flat basin bounded on the east by the Oscura and San Andres Mountains, and the Chupadera Mesa; on the north by the Los Pinos Mountains; and on the south and east by a series of small faulted and intruded ranges which are located east of the Rio Grande River. The Jornada del Muerto Basin is considered part of the Rio Grande Rift (WSMR, 1998).

The basin's Cretaceous sedimentary rocks were covered by Cenozoic sediments consisting primarily of gravel eroded from surrounding mountains, unrelated gravel carried into the basin during flooding of the Rio Grande River, lake deposits, and alluvial sands. A few Cretaceous outcrops and small lava flows are present in the basin.

3.3 Soils

Soils in the WSMR region are varied in many aspects. They range from deep sands on the desert floors to rock outcrops on various mountains ranges. Mountains make up largest single group of soils in the WSMR region. Since there is no true soil on these mountains they are referred to as rock lands and rock outcrops. These areas are steep with a very rough topography consisting of sedimentary and igneous rock formations.

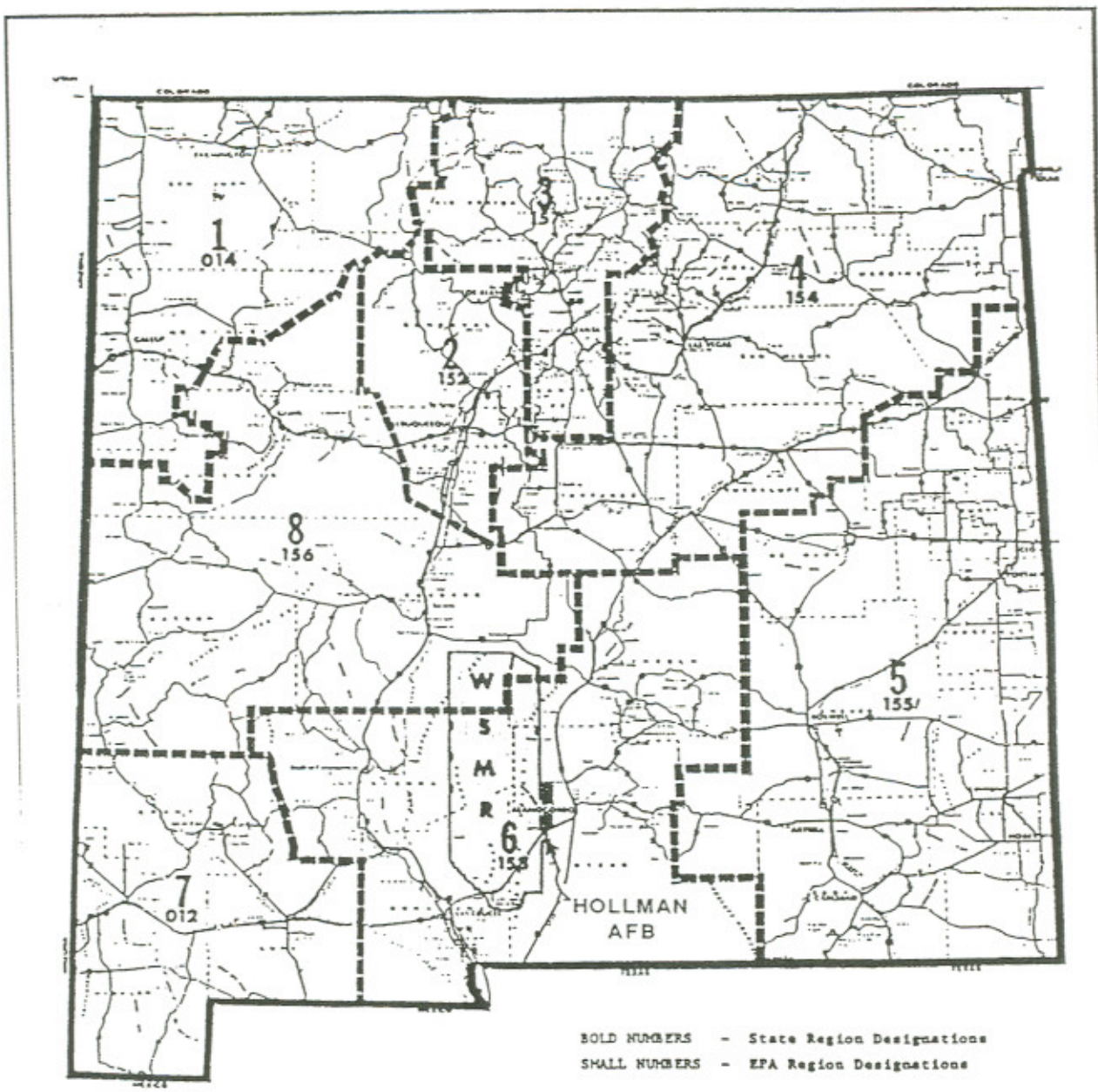
The Drew Site is located at an elevation of approximately 4500 ft MSL on Yesum Holloman fine sandy loam, which is the largest true soil association, and occupies approximately 12 percent of WSMR. These soils usually have a shallow surface and are underlain by gypsum beds.

The PHETS is located at an elevation of approximately 4900 ft MSL on alluvial soils in the northern portion of the Jornada del Muerto Basin, geologically described as a syncline. The test area is quite flat and the nearest mountains are approximately 8 km east. Copper, lead, and other mineral deposits exist in the nearby mountains and large amounts of gypsum are present. (*PHETS EA*, 1987)

3.4 Air Quality

The EPA, in conjunction with the individual states, has divided all geographic areas of the country into designated areas for air quality planning and management purposes. These planning districts, termed Air Quality Control Regions (AQCRs), are based either on political boundaries or on the air shed characteristics and may consist of interstate or major intrastate areas.

Almost all of WSMR is located in New Mexico AQCR 6. New Mexico AQCR 6 includes Dona Ana, Otero, Sierra and Lincoln counties (see figure 3-1). These counties, along with six counties in Texas, also are part of the EPA El Paso-Las Cruces-Alamogordo Interstate AQCR 153 (*Code of Federal Regulations*, 40 CFR 81.82). The northern part of the range is located in Socorro County, New Mexico.



Source: USAF 1990a

Figure 3-1. USEPA and State of New Mexico Air Quality Control Regions.

The air quality of an area is most frequently evaluated by compliance with national ambient air quality standards (NAAQS) established for six pollutants, labeled "criteria" pollutants, by the EPA. They are carbon monoxide, ozone, nitrogen dioxide, sulfur dioxide, respirable particulate matter (PM10), and lead. Primary NAAQS define levels of air quality to protect human health with a margin of safety. Secondary NAAQS area intended to protect the public welfare from any known or anticipated adverse effects of a pollutant.

For each criteria pollutant, an area is classified "attainment" if the area meets the NAAQS for that pollutant, and "non-attainment" if it does not. All of WSMR is located in areas designated attainment for all six federal criteria pollutants (NMED 1991b; 40 CFR 811.332). The closest non-attainment areas to WSMR are Anthony, NM (PM10), Sunland Park, NM (ozone), and El Paso, TX (ozone, carbon monoxide, and PM10).

In addition to the federal standards, the state of New Mexico has set forth, 20 New Mexico Administrative Code (NMAC) 2.03, ambient air quality standards that are more stringent than the NAAQS. In addition to protecting human health, the New Mexico standards are designed to protect against air pollution that injures animals and vegetation, corrodes building materials and works of art, reduces visibility, and generally diminishes the quality of life.

The New Mexico Environment Department maintains a state wide ambient air-monitoring network. However, the network does not include monitoring sites that are intended to be representative of air quality at WSMR. Current state monitoring is focused on providing representative air quality information for Las Cruces, New Mexico, the PM10 non-attainment area in Anthony, NM and the ozone non-attainment area in southern Dona Ana County around Sunland Park, NM. The monitor that is closest to WSMR is a PM10 monitor in La Luz, NM immediately north of Alamogordo, NM. The monitor was sited in 1995 at an elementary school for the purpose of measuring PM10 generated by nearby sand and gravel operations. No exceedances of the PM10 NAAQS have been recorded at this site.

3.5 Biological Resources

WSMR has a variety of vegetation and habitat types that support a diversity of wildlife. These habitats are widely dispersed and form a mosaic of scrubs, grasslands, savannas, woodlands, forests and wetlands. WSMR wildlife resources include mammals, birds, reptiles, amphibians, and numerous kinds of invertebrates. This section provides a general description of these habitats.

3.5.1 Vegetation

While soils, aspect, slope and other factors play a role in determining the vegetation present at a given location, the climatic effects of increasing elevation are the predominant environmental factors. At elevations above the desert scrub and grasslands regions, plains-mesa grasslands may occur. These grasslands and the plains-mesa and scrub are indicative of the location of WSMR near the western edge of the prairies that characterize the central portion of the continent. Both desert and plains-mesa grasslands form a broad savanna-like ecotone at higher elevations with the coniferous woodlands that dominate the cooler highlands of the Oscura and San Andres Mountains. Junipers (Juniperus spp.) characterize the tree story of this transitional area. As slopes become steeper, the savanna develops a more woodland character and montane scrub vegetation forms part of the

habitat mosaic. Gradually, pinyon pines (Pinus edulis) become more common until, near the summits of both mountain ranges, the coniferous woodlands are dominated by pinyon. Montane scrub continues to be present in to the highlands. On Salinas Peak, montane coniferous forest dominated by ponderosa pine (Pinus ponderosa) is present. (WSMR, 1998)

The lowest elevations of the closed-basin environment of the Tularosa Basin, which included the Drew Site, are characterized by extensive flats with low vegetative cover and by playa lakebeds. These barren lands may be referred to as salt or alkali flats. Barren lands occur under similar topographic conditions throughout the Chihuahuan Desert. Soil salt levels that may exceed 5 percent combined with periodic flooding produce a highly restrictive physical environment. Plant species growing on these barren lands are highly adapted to growth and reproducing under these conditions. Because relatively few species are capable of growing and reproducing under these conditions, the species diversity on the barren lands in low. Plant species diversity tends to increase toward the edge of the barren land habitat where salt levels and periods of inundation are lower. (WSMR, 1998) The designated impact areas on the Drew Site have little to no vegetation.

As detailed the PHETS EA, the LSTB lies within the Sonoran Life Zone of the northern extension of the Chihuahuan Desert and further explains that the site is a combination of sand grassland and semi-desert shrub vegetation types. In general, the sand grassland vegetation type demonstrates greater plant species diversity and, therefore a greater diversity of animal species than the semi-desert shrub type vegetation. However, in the immediate area surrounding the target structures the majority of vegetation as been removed due to previous testing and construction events. No additional vegetation would be required to be removed to support the Proposed Action.

3.5.2 Fish

The White Sands pupfish (*Cyprinodon tularosa*) is the only native fish known to occur on WSMR. This species is listed as threatened by State of New Mexico (19 NMAC 33.1) and as a federal species of concern (50 CFR 17:64481-64485). (Pittenger and Springer, 1999)

The White Sands pupfish is known to live in Salt Creek, Malpais Spring and its associated outflow, Mound Springs, and Malone Draw/Lost River. This species occupies shallow pools and calm springs runs, which are characterized by high fluctuations in daily temperatures, can be brackish with an average concentration of total dissolved solids (TDS) of about 5,000 mg/L. (Ortiz and Lange, 1997)

The designated impact areas for the Proposed Action do not include known habitat of the White Sands pupfish.

3.5.3 Reptiles

Reptiles comprise an abundant and diverse group of inhabitants at WSMR, being ubiquitous throughout the range. The success of reptiles within the desert ecosystem can be attributed to their unique ecological roles, which are different than those of mammals and birds. Reptiles are exothermic; body temperature varies with the environment. This results in activity patterns associated with specific temperature ranges, which vary daily and seasonally. Reptiles can thermo-regulate their own activity and metabolic need by seeking areas of preferred temperature within the region. This reduces metabolic energy

requirements, which explains the ubiquitous and diverse nature of reptiles in the arid and resource-limited WSMR.

Common reptiles in the closed-basin scrub include the side-blotched lizard (*Uta stansburiana)*, roundtail horned lizard (*Phrynosoma modestum)*, New Mexico whiptail (*Cnemidophorus neomexicanus*), desert striped whipsnake (*Masticophis taeniatus)*, common kingsnake (*Lamporpeltis getula*) and the western rattlesnake (*Crotalus viridis helleri*). (WSMR, 1998)

Several reptile species are restricted to specific habitat types on WSMR. The bleached earless lizard (*Holbrookia maculata ruthveni*) is restricted to the gypsum dunes and alkali flats of the closed basin scrub habitat. The southern plateau lizard (*Sceloporus undulatus tristichus*) is only known from the lava beds of the Chihuahuan desert scrub/lava habitat type. The White Sands prairie lizard (*Sceloporus undulatus cowlesi*) is restricted to the gypsum dunes of the closed-basin scrub habitat type. The New Mexican whiptail is restricted primarily to the plains mesa grassland habitat and the arroyo riparian areas of the closed-basin scrub habitat type. The New Mexico garter snake (*Thamnophis sirtalis dorsalis*) is known to occur in the arroyo riparian/wetland portions of the closed-basin scrub habitat type. The lyre snake (*Trimorphodon biscutatus*) should be found in pinyon juniper habitats and the creosote portions of the Chihuahuan Desert scrub habitat type.

As mentioned above, reptiles are ubiquitous on WSMR, and are expected to be present in or near the designated impact areas for the Proposed Action.

3.5.4 Amphibians

Since most amphibians normally require water or extreme moisture during the early stages of their life cycle, and water resources are limited at WSMR, amphibian populations at WSMR are limited. Available surface water resources are scarce due to the low annual rainfall and high rate of evapotranspiration. Numerous playas and temporary drainages form as the result of intermittent periods of heavy rainfall. Isolated permanent water sources consist of gypseous ponds and saline waters at Lake Lucero, Salt Creek, Malpais Spring, and Mound Spring. These limited aquatic resources provide habitat for amphibian species. (WSMR, 1998)

The amphibians of WSMR include one genus of salamander, the tiger salamander (*Ambystoma tigrinum marvortium).* This salamander requires stock tanks or temporary ponds and pools in the mountains or lowlands. Additionally, other amphibians listed as commonly occurring are couch's and the western and plains spadefoot toads (*Scaphiopus couchi, S. hammondi, S. bombifrons,* respectfully). Potential habitat for each species occurs sparsely at WSMR. There are no state- or federal-listed sensitive amphibians present on WSMR. (WSMR, 1998)

While amphibians are present at WSMR, due to severely limited water resources in or near the proposed impacts areas the potential for any of the above listed amphibians to be present in the proposed impact areas is unlikely.

3.5.5 Birds

Over 300 bird species are presumed to occur within the WSMR region (Kamees and Burkett, 1996). This large number of species is due primarily to the very diverse habitat types that occur within the WSMR region.

Although no specific survey for birds were conducted during this project, the following bird species have been observed in the vicinity of the Drew Site area: turkey vulture (*Cathartes aura*), red-tailed hawk (*Buteo jamaicensis*); Swainson's hawks (Buteo swainsoni); northern harrier (*Circus cyaneus)*; scaled quail (*Callipepla squamata)*; mourning dove (*Zenaida macroura*) ; black-chinned hummingbird (*Archilochus alexandri*); western kingbird *(Tyrannus verticalis)*; Chihuahuan raven (*Corvus cryptoleucus*); cactus wren (*Campylorhynchus brunneicap*); black-throated sparrow *(Amphispiza bilineata)*; lark bunting (*Calamospiza melanocorys*); and western meadowlark *(Sturnella neglecta)*. (AMRRAM EA, 1992)

Other common birds that are expected to occur on WSMR include the northern mockingbird *(Mimus polyglottos)*; rock and Bewick's wren *(Salpinctes obsoletus* and *Thryomanes bewickii,* respectfully); curve-billed thrasher *(Toxostoma curvirostre)*; loggerhead shrike *(Lanius ludovicianus)*; canyon towhees *(Pipilo fuscus)* ; white-crowned *(Zonotrichia leucophrys)* and vesper sparrows *(Pooecetes gramineus)*; and house finch *(Carpodacus mexicanus)*. Other common insectivorous birds probably include ladder-backed woodpecker *(Picoides scalaris)*, Say's phoebe *(Sayornis saya)*, ash-throated flycatcher *(Myiarchus cinerascens)*, horned lark (*Eremophila alpestris*), and lesser nighthawk *(Chordeiles acutipennis)*. (AMRRAM EA, 1992)

3.5.6 Mammals

The diversity of land forms and vegetation types found on WSMR accounts for the relatively high number of mammals (both numbers and species). A list of 86 mammals found or that can possibly be found on WSMR is included in the WSMR EIS, appendix B.

The majority of mammals (in both numbers and number of species) are comprised of smaller rodents and insectivorous mammals. These species largely comprise the basis of the food supply of larger carnivores, including raptors. Numerous species, such as Ord's and Merriam's kangaroo rats (*Dipodomys ordii and Dipodomys merriami*, respectfully), black-tailed jackrabbit (*Lepus californicus),* desert cottontail, (*Sylvilagus audubonii*), and the cactus mouse (*Peromyscus eremicus eremicus*), occur in the northern part of WSMR. Other small mammals that presumably occur within the proposed impact areas are listed in table 3-2 .

Table 3-2. Bats and Rodents Commonly Occurring within WSMR

Species	Habitat Use Areas
California myotis (*Myotis californicus*)	mine tunnels, loose rocks, hollow trees, buildings, and bridges
Hoary bat (*Nycteris cinerea cinerea*)	wooded areas
Townsend's big-eared bat (*Plecotus townsendii pallescens*)	caves, mine tunnels, and buildings
Pallid bat (*Antrozous pallidus pallidus*)	caves, mine tunnels, crevices in rocks, buildings, and trees
Brazilian freetail bat (*Tadarida braziliensis mexicana*)	caves, crevices in rocks

Species	Habitat Use Areas
Spotted ground squirrel (*Spermophilus spilosoma marginatus*)	open forests, scattered brush, grassy parks, mainly in sandy soil
Rock squirrel (*Spermophilus variegatus grammurus*)	rocky canyons, boulder-strewn slopes, and lava beds
Southern pocket gopher (*Thomomys umbrinus*)	varied, valleys and mountain meadows, oaks and pines, sandy, loamy, clayey, gravelly, or rocky soils
Plains pocket mouse (*Perognathus flavescens apache*)	open areas with sparse vegetation and sandy soil, and also pinon-juniper
Desert pocket mouse (*Perognathus penicillatus eremicus*)	open, sandy desert floor, and sparse vegetation
Banner-tailed kangaroo rat (*Dipodomys spectabilis baileyi*)	arid or semi-arid grassland with scattered brush, mesquite, or juniper
Deer mouse (*Peromyscus maniculatus blandus*)	all habitat types
White-footed mouse (*Peromyscus leucopus tornillo*)	woody or brushy areas preferred, sometimes open areas
Brush mouse (*Peromyscus boylei boylei*)	chaparral areas in arid and semi-arid regions, and rocky situations
Pinon mouse (*Peromyscus truei truei*)	rocky areas in pinon-juniper
Southern plains wood rat (*Neotoma micropus canescens*)	semi-arid brushlands, cacti, mesquite, thornbush, low valleys, and plains
White-throated wood rat (*Neotoma albigula albigula*)	brushland and rocky cliffs with shallow caves, and lava beds
Mexican wood rat (*Neotoma mexicana scopulorum*)	rocks, cliffs, and mountains

Carnivorous mammals also are well represented on WSMR. The most commonly observed carnivorous mammal is the coyote (*Canis latrans*). The coyote can be found in almost any portion of WSMR. Additionally, the gray fox (*Urocyon cinereoargenteus*) is found primarily in the mountains and foothills, as well as the kit fox (*Vulpes macrotis*), which inhabit open areas of the grassland and desert shrub land habitats. (WSMR, 1998)

Other mammals that are found on WSMR are the mountain lion (*Felis concolor*), the bobcat (Lynx rufous), mule deer (*Odocoileus hemionus*), pronghorn (*Antilocapra americana*), desert bighorn sheep (*Ovis canadensis mexicana*) (restricted primarily to the San Andres Mountains), and elk (Cervus elaphus), feral *horse (Equus caballus*), and oryx (*Oryx gazella*). (WSMR, 1998)

At the LSTB there is a low potential for species to be present at the impact site at the time of testing. Test set-up activities commence a number of weeks before the actual test, and continue right up to just hours before the missile impacts the test structure. This continued presence of human activity would contribute to further minimize the potential number of mammals moving into the impact site at the time of testing.

3.6 Threatened and Endangered Species

The following subsections briefly discuss the threatened and endangered species that inhabit the WSMR and may inhabit the proposed impact areas.

3.6.1 Plants

There are five federal-listed plant species and sixteen state-listed species documented on WSMR. The five federal-listed species are also state-listed species. Therefore, a total of sixteen plant species are currently documented as growing on WSMR that have some degree of federal or state status.

Species listed as federal threatened or endangered continue to be protected under the Endangered Species Act of 1973. WSMR has no plant species in the candidate category at present. This list deals with species where strong scientific evidence indicates they are likely to be in need of listing as endangered or threatened in the future. All of the federal-listed species are subject to consultation, when encountered at or near project sites on WSMR, with the U.S. Fish and Wildlife Service. (Anderson D., 2000)

Plants on the New Mexico State endangered list are protected from unauthorized collection or take under the *New Mexico Endangered Plant Species Act* (9-10-10 NMSA) and attendant regulation 19 NMAC 21.2. State statute or policy does not protect species of concern. The impact areas for the Proposed Action are in established impact areas that have been reviewed under previous NEPA documentation (see para. 1.4.2c).

3.6.1.1 Federal-listed Species

Threatened species: None

Endangered species:

1. Todsen's pennyroyal (*Hedoema todsenii)*

3.6.1.2 State-listed Species

Endangered species:

1. Night blooming cereus *(Peniocereus greggii)*
2. Organ Mountain pincushion cactus *(Escobaria organensis)*
3. Todsen's pennyroyal *(Hedeoma todsenii)*
4. Mescalero milkwort *(Polygala rimulicola var. mescalerorum)*

The impact areas have little to no vegetation. The designated impact sites on the LSTB are man-made structures that are free of vegetation, built on a test bed that have been established and cleared for testing purposes for a number of years. However, there may be species in areas that are directly adjacent to the LSTB or Drew Site but would not be affected during the course of normal test events.

3.6.2 Wildlife

WSMR provides a habitat for a number of state- and federal-listed threatened and endangered wildlife species protected under the *Endangered Species Act* (federal) and the *Wildlife Conservation Act* (state). There are 70 sensitive wildlife species that are known to occur or with potential to occur on WSMR (BISON-M). Of these, 10 are federal and 22 are state-listed threatened and endangered species, 3 are federal candidate species and 32 are state-listed sensitive species.

3.6.2.1 Federal-listed Species

Endangered:

Brown Pelican (*Pelecanus occidentalis carolinensis*)

Brown pelicans have been observed at Malpais Springs, WSMR on 11 Oct 93, by Gerri Smith (NMNHP, 1996). However, the reliable records are all of solitary birds, generally in subadult plumages and near water. One would presume that most occurrences in the state would be of storm-driven birds that moved inland under duress. (BISON-M) No suitable habitat exists in the in designed impact area.

Northern Aplomado Falcon (*Falco femoralis septentrionalis)*

The historic range of the northern aplomado falcon reached its limits in the southeastern Arizona, southern New Mexico, and southern Texas. In New Mexico, most sightings and collections of this falcon were made before 1924 in the extreme southwestern corner of the state. Aplomado falcons were generally associated with desert-yucca grasslands. (*PHETS EA*, 1995)

The existence of the falcon on WSMR has been confirmed, although it is not currently known to be a resident in the vicinity of WSMR. Suitable falcon habitat may occur in many areas around the PHETS, however, the lack of sightings of the bird in the general area does not necessarily indicate that PHETS test beds are preferred or desired habitat. (PHETS EA, 1995)

According to the PHETS EA of 1995, it is DNA's understanding that typical vegetative land cover on PHETS (sand grassland and semi desert shrub) suggests that much of the PHETS does not contain likely or desirable habitat for the Northern Aplomado Falcon. The LSTB on the PHETS was not considered to be likely or desirable habitat for the Northern Aplomado falcon by Dr. Buck Cully and Ms. Janice Richardson, USFWS, during a 1992 visit to PHETS area. (PHETS EA, 1995)

The Aplomado falcon was listed as an accidental species at the WSMR (Kamees and Burkett, 1996) and the barren land of the Drew Site does not contain suitable habitat for the Northern Aplomado falcon.

Interior least tern *(Sterna antillarum)*

Least terns are accidental transient on HAFB from May to July (MVAS, 1996). This colonially nesting water bird is a species that seldom swims, spending much of its time on the wing (Hubbard 1985). The flight is light, swift, and graceful, and it is developed to the point that it is the major means of foraging -- allowing the birds to snatch fish, crustaceans, and insect food from the surface, almost without missing a beat. The least tern nests on the ground, typically on sites that are sandy and relatively free of vegetation. Such areas as sandbars are used in rivers, as are beaches and spits in coastal areas. In New Mexico and other parts of the southern Great Plains, alkali flats are selected as nesting areas (Marlatt 1984). The species is accidental on WSMR.

Whooping crane *(*Grus americana)

The principal use areas of the Rocky Mountains whooping crane population include the middle Rio Grande Valley of New Mexico, the lower San Luis Valley of Colorado, and summering areas in southeastern Idaho and western Wyoming. The portion of the middle Rio Grande Valley involved includes a few miles on either side of the Rio Grande ranging from the town of Belen, New Mexico, to Bosque del Apache National Wildlife Refuge, 15 miles south of Socorro, New Mexico.

In New Mexico the whooping cranes generally stay on Bosque del Apache National Wildlife Refuge or state game refuges during fall and winter (Fed. Reg., 1996). No documented occurrences on WSMR. (BISON-M)

Black-footed ferret *(Mustela nigripes)*

The last confirmed report of a black-footed ferret in New Mexico was in 1934. The primary causes of extirpation of the species from the state were habitat alteration and predator control. Black-footed ferrets live in burrows dug by prairie dogs on which it preys. A large expanse of prairie supporting a large population of prairie dogs is required to support a very small number of ferrets. It is estimated that it wakes 100 to 140 acres of prairie dog colony to support on black-footed ferret. No known wild population of black-footed ferrets survives in

New Mexico. This species is extirpated in New Mexico, having been last confirmed there in 1934 (NMDGF, 1991).

Southwestern willow flycatcher *(Empidonaz traillii extimus)*
This species inhabits thickets, riparian woodlands, pastures, and brush areas. These habitats are typically characterized by the presence of surface water, moist soil, and dense riparian vegetation, such as willow or tamarisk, often with an overstory of cotton wood. It is a sparrow sized, olive green flycatcher with a dark head, whitish throat, olive breast, and yellow belly. It has not eye ring and its wings have two white bars.

Threatened:
Bald eagle *(Haliaeetus leucocephalus)*

The bald eagle requires large rivers and lakes since fish is its primary prey. Consequently, Lake Lucero (located at the southern end of WSMR) occasionally attracts bald eagles, although this lake does not provide a food source for the eagles due to its non-permanent status. These individuals, therefore, are only transient and sporadic.

Mexican spotted owl (Strix occidentalis lucida)

Mexican spotted owls are common year-round residents in the Sacramento Mountains of the Lincoln National Forest (USFS, 1995). (BISON-M). The species is not known to occur on WSMR.

Mountain plover *(Charadrius montanus)*

In New Mexico, it breeds locally in dry, open short grass prairie habitats from the eastern plains west locally to central-western areas, and migrates through the state (NMDGF, 1994). Mountain plovers are accidental transients on HAFB during the months of June and August (MVAS, 1996). No known habitat has been identified in the impact areas.

Piping plover *(Charadrius melodus)*

In New Mexico, this plover is known only as a rare spring (April) migrant, having been verified at Springer Lake (Colfax Co.) and reliably reported at Bosque del Apache National Wildlife Refuge (Socorro Co). Transitory to the WSMR area. No documented occurrence of the species on WSMR.

Federal Candidates:

Swift fox (Vulpes velox velox)

Vulpes velox is uncommon within the WSMR. It is a lowland desert/grassland species but is not commonly found on the range.

Black-tailed prairie dog (Cynomys ludovicianus)

Black-tailed prairie dog is rare in the WSMR. According to the PHETS EA, possible burrows have been found on the PHETS; however, no positive identification of the species has been recorded. (BISON-M)

3.6.2.2 State-listed Species

State Endangered:

1. **Brown pelican** (*Pelecanus occidentalis carolinensis*)
2. **Northern Aplomado falcon** (*Falco femoralis septentrionalis)*
3. **Interior least tern** *(Sterna antillarum)*
4. **Whooping crane** *(*Grus americana)
5. **Black-footed ferret** *(Mustela nigripes)*
6. **Southwestern willow flycatcher** *(Empidonaz traillii extimus)*
7. **Piping plover** *(Charadrius melodus)*

Common ground dove *(Columbina passerina pallescens)*
Accidental in the Bosque del Apache NWR (USFWS, 1990). (BISON-M), and listed as rare and transitory in the five counties that comprise WSMR.

Trogon elegant *(Trogon elegans canescens)*

Trogon elegants are known to nest in New Mexico in only one canyon of the Peloncillo Mountains, where first documented by Department (NMDGF) surveys in 1991 and where one to two pairs have been present annually, with young produced in 1992, 1993, and 1995. Non-breeding vagrants rarely occur elsewhere in southwest New Mexico, including in the Animas Mountains and in Grants, Catron, Sierra, and Otero counties. (BISON-M).

State Threatened:

Peregrine falcon (Falco peregrinus anatum)

The peregrine falcon was listed as a rare species, occurring mainly in the breeding months (March-August), at the WSMR (Kamees and Burkett, 1996). The breeding territories of peregrine falcons center on cliffs that are in wooded/forested habitats, with large "gulfs" of air nearby in which these predators can forage (Hubbard 1985). The impact areas for the Proposed Action are in the basins/lowlands of the WSMR, away from the normal habitat of the peregrine falcon. Although a falcon has free reign over that range and may make its way into the proposed impact areas, it is not likely to remain in the area for an extended period of time.

Costa's hummingbird (Calypte costae),**Oscura Mtns Colorado chipmunk** (Tamias quadrivittatus oscuraensis),**Rock rattlesnake** (Mottled Crotalus lepidus lepidus,) **Organ Mtns. Colorado chipmunk** (Tamias quadrivittatus australis,) **Lucifer hummingbird** (Calothorax lucifer) **Violet-crowned hummingbird** (Amazilia violiceps ellioti)

The above species are predominately found in montane habitats. The Proposed Action region of influence excludes impacts to montane areas.

Bell's vireo (Vireo bellii)

Bell's vireo was listed as a rare species, occurring mainly in the breeding months, at the WSMR (Kamees and Burkett, 1996). (BISON-M)

Gray vireo (Vireo vicinior)

The gray vireo was listed as a rare species, occurring mainly in the breeding months (Mar. - Aug.), at the WSMR (Kamees and Burkett, 1996). The breeding habitat of this species is generally open woodlands/shrub lands featuring evergreen trees and shrubs of various kinds. Junipers (Juniperus spp.) are the dominant element in most areas of occurrence in New Mexico, although oaks (Quercus spp.) are also frequent in the southern part of the range (Hubbard 1985). This vireo, like other members of this family, is an insectivore, and it occurs in New Mexico only in the warmer months (April-September). (BISON-M)

Baird's sparrow (Ammodramus bairdii)

Baird's sparrows are rare winter residents at the White Sands National Monument, in Dona Ana and Otero counties. Baird's sparrow was listed as a possible rare species, occurring mainly in winter months (late Oct. - Feb.), at the WSMR (Kamees and Burkett, 1996). Baird's sparrows are accidental transients on HAFB during the months of September and October (MVAS, 1996). In New Mexico it has been found in a variety of habitats, ranging from desert grasslands in the south to prairies in the northeast and mountain meadows in the San Juan and Sangre de Cristo Mountains.

Varied bunting (Passerina versicolor)

The varied bunting is a plum-colored species of finch that eats seeds and insects. They summer in the vicinity of WSMR, preferring dense stands of mesquite and the vegetative growth of canyon bottoms, and generally build nests in shrubbery. (NMGFD, 1998) The varied bunting was listed as an accidental species at the WSMR (Kamees and Burkett, 1996).

White Sands pupfish (Cyprinodon tularosa)

The White Sands pupfish is known to live in Salt Creek, Malpais Spring and its associated outflow, Mound Springs, and Malone Draw/Lost River. This species occupies shallow pools and calm springs runs, which are characterized by high fluctuations in daily temperatures, can be brackish with an average concentration of total dissolved solids (TDS) of about 5,000 mg/L. (Ortiz and Lange, 1997)

The designated impact areas for the Proposed Action do not include known habitat of the White Sands pupfish.

Neotropic Cormorant (Phalacrocorax brasilianus)

The species breeds and is variably resident in the Rio Grande Valley at Elephant Butte and Caballo lakes, and it also occurs regularly at Bosque del Apache National Wildlife Refuge (Hubbard 1978, etc.) -- all of which are key habitat areas. The species also occurs occasionally in the valley northward to the Bernalillo area and southward to Las Cruces, plus in the Gila Valley; it is a vagrant to southern Hidalgo County, near Alamogordo, and in the lower Pecos Valley (Bitter Lake National Wildlife Refuge southward) (NMDGF, 1988). The neotropic cormorant is an accidental transient on HAFB during the month of September (MVAS, 1996).

Common black hawk (Buteogallus anthracinus anthracinus)

It is characteristically found in the Southwest in cottonwood (Populus spp.) and other woodlands along permanent lowland streams (Hubbard and Eley 1985). Common black hawks occur in riparian woodlands, desert riparian, deciduous woodland, marsh woodlands, especially in cottonwoods that occur where desert streams provide sufficient moisture for a narrow band of trees and shrubs along the margins. Breeding common black hawks require mature, well-developed riparian forest stands (e.g., cottonwood bosques) that are located near permanent streams where principal prey species are available (NMDGF, 1996). Common black hawks are rare accidental (or casual) summer residents and breeders at the White Sands National Monument, in Dona Ana and Otero counties. The designated impact areas for the Proposed Action do not include known habitat of the common black-hawk.

Broad-billed hummingbird (Cyanthus latirostris magicus)

In New Mexico, where the first record dates from 1893 (Bailey 1928, Ligon 1961), the broad-billed hummingbird is a regular summer resident only in Guadalupe Canyon, where most of these hummingbirds nest in hackberry thickets and similar vegetation. There are also recent reports from elsewhere in Hidalgo County plus from several additional counties, including confirmed records for Grant and Dona Ana counties (NMDGF, 1996). The species is often pugnacious and feeds on both nectar and a variety of small arthropods. Nests found in Guadalupe Canyon have been in a variety of trees, shrubs, and even forbs (Baltosser 1980, 1983).

Spotted bat (Euderma maculatum)

Spotted bats are a "probable" species within the WSMR. Although this species has not been recorded on WSMR, collections near Socorro and Mesilla Park indicate wanderers through WSMR are likely (Burkett and Kamees, 1996)

New Mexican jumping mouse (Zapus hudsonius luteus)

Meadow jumping mice captures (in a study at Bosque del Apache) were often associated with a grass perennial forb community with at least 65% vegetative cover (Zwank, 1994). They are usually found in marshes, moist meadows and riparian habitats in open prairie (Finch, 1992). Jumping mice are members of a small family that is confined to the holarctic region (Hall 1981). The species in New Mexico characteristically occur in mesic habitats dominated by rank, herbaceous vegetation. In both the Jemez Mountains and the Rio Grande Valley, Morrison (1985, 1988) found that preferred habitat for the meadow jumping mouse contained permanent streams, moderate to high soil moisture, and dense and diverse streamside vegetation consisting of grasses, sedges, and forbs. Such habitats were characterized by wet meadows in the Jemez Mountains, while they included the edges of permanent ditches and cattail stands in the Rio Grande Valley (NMDGF, 1988). New Mexico Z.h.luteus habitat in the Guadalupe River drainage of the Jemez Mountains may be characterized as the narrow grass-forb-willow streamside riparian zone along permanent waterways, and is described in Morrison (1990). Populations of the subspecies along the El Rito and Rio Chama inhabit areas with vegetation similar to the higher-elevation streamside riparian zones, but the meadows are larger and not always adjacent to the river. In some areas, such as Bosque del Apache NWR, the subspecies inhabits narrow riparian zones along irrigation ditches (Morrison, 1992). No documented occurrence of species on WSMR.

3.7 Cultural Resources

The archaeological program currently being implemented by the U.S. Army at WSMR is being conducted in accordance with NEPA Army Regulation AR 200-2, AR 420-40, Executive Order 11593, Section 106 (36 CFR 800) of the *National Historic Preservation Act* (NHPA of 1966, and the *Archaeological Resource Protection Act of 1979*. Other regulations that must be taken in to account to include the *Archaeological and Historic Preservation Act*, the *American Indian Religious Freedom Act*, and the *Native American Graves Protection and Repatriation Act* (NAGPRA).

WSMR entered into a Programmatic Memorandum of Agreement (PMOA) with the Advisory Council on Historic Preservation, and the New Mexico State Historic Preservation Office (SHPO) in 1985. The PMOA implements provisions of the NHPA of 1966 and addresses the protection and management of historic and prehistoric properties on the range.

In addition to the PMOA, WSMR has entered into a Memorandum of Understanding (MOU) with SHPO specifically addressing land use management for the Trinity National Historic Landmark located in the northern portion of the range. WSMR also has entered into a MOU with the National Park Service regarding overflight and recovery activities within WSNM, as well as the data-sharing agreement with the New Mexico SHPO, signed 1986.

The Trinity National Historic Landmark is the only nearby cultural resource to the proposed impact sites. Additionally, over the past 20 years a number of archaeological surveys have been conducted within the PHETS area, all significant sites have been mark and flagged for avoidance and will not be impacted by activities associated with the Proposed Action.

4.0 ENVIRONMENTAL CONSEQUENCES

This section describes potential consequences of the Proposed Action under analysis. Potential environmental consequences for each resource are presented in the same order as they were discussed under Section 3.0, Affected Environment.

4.1 Climate

The Proposed Action does not include extensive construction activities, which could affect the area's climate (e.g., massive losses of vegetation or construction development of large wind barriers). Furthermore, the Proposed Action would be of short duration (less than 3 weeks of actual range time) and with limited interaction on resources that would affect on the area's climate. Consequently, no measurable effects to the area's climate conditions as they presently exist would be anticipated to occur as a result of the Proposed Action.

However, the operations associated with the Proposed Action could be affected by climatic conditions, which influence visibility (e.g., cloud cover, wind, etc.). Test missions would not be conducted during times when conditions were unsafe or inconsistent with required test parameters.

The No Action alternative would allow for continued flight operations and test activities at WSMR, which would have similar effects as the proposed action.

4.2 Geology

Geologic resources within the proposed test areas, specifically areas outside the PHETS and LSTB, would not be affected due to the small size of the explosive events scheduled for this proposed action in comparison to actions that have occurred in this same area without effect. Furthermore, the potential for overpressures generated by supersonic flight activity is not relevant, since all proposed flight activities associated with the JASSM test program would be subsonic.

The Proposed Action does not require construction of buildings, hangers and/or runways that might have an effect on geologic resources. Given the above statements, it is believed that no significant effects to geologic resources, or specifically the San Andres fault area, would be expected from the Proposed Action.

The No Action alternative would allow for continued flight operations, even those in the supersonic range, as well as other construction and testing activities, which may have an effect on geologic resources.

4.3 Soils

Impact of the missile and recovery operations would account for the majority of impacts to the soils for the Proposed Action.

All of the ST missions would result in a very shallow missile impact angle into the established target area. The flight profile is such that the missile will continue to fly at a level attitude until it essentially runs out of altitude and impacts the ground. As observed in previous tests, it is expected that the missile would make an initial impact crater 3-4 meters long, 1-2 meters wide, and approximately 1-meter deep. Most of the missile would be contained in the crater with various missile body parts scattered on the surface within 25-50 meters forward of the crater. Normally, the inert warhead would separate from the missile

upon impact and will travel down range approx. 300-500 meters and come to rest on the surface.

For AUR and DT missions, the missile impact angle will be much larger, and therefore result in a more localized impact site. However, these missions will impact in an actual target structure. By design the structure will absorb most of the energy from the missile and therefore the impacts to the soils around the targets would be primarily affected by post-test recovery operations.

Recovery operations may cause soil compaction when accessing the site, recovering the missile debris, and filling in the depressions (if required). In a concerted effort to minimize impacts to the soil and vegetation, the recovery team would be limited to the absolute lowest number of personnel necessary to effectively accomplish the task, as well as restricting the number of vehicles and restricting vehicular activity established roads and shoulders. Additionally, helicopters may be used to locate debris and pick up items that travel down range. These actions would minimize the extent of off-road travel required by the recovery team. If the use of established roads were not possible, then vehicles would use a single route both in and out of the recovery area. If necessary, a qualified representative from the WS-ES would accompany the recovery team to assist in the selection of the entry path that would minimize the potential for adverse effects.

Despite the above efforts, there may be some soil compaction and trenching caused the missile impact and recovery operations. A backhoe would be used to retrieve heavy missile parts from the impact craters and target structures, as well as the inert warhead recovery operations. Disturbance to the surrounding area will be minimized to the greatest extent possible. While these activities may result in an increase in eolian erosion, this increase is minimized by the above-mentioned mitigation measures, the relatively small impact areas, and use of previously disturbed and established weapon impact areas.

No action alternative would result in similar impacts due the fact that test activities will continue at WSMR, and specifically in the designated impact areas.

4.4 Air Quality

The largest source of air pollutant emissions that would originate from JASSM tests is generated by launch and chase aircraft. Additional emissions would be generated by the missile (both in-flight and as a reaction to missile impact on the surface/target), surface vehicles (trucks, cars, vans, equipment), electric power generators, and helicopters. Missile emissions can be generated by its jet engine, unburned and evaporated jet fuel, open air burning of jet fuel, burning epoxy-graphite composite body shell, and warhead explosion. The missile impact would also lead to short-term smoke, flame, and dust.

Typical combustion products of aviation fuels are carbon dioxide, carbon monoxide, water, nitrogen oxides, hydrocarbon compounds, and particulate matter. Jet engines do not emit ozone but do emit ozone precursors: nitrogen oxides and some hydrocarbons. However, due to natural atmospheric dispersion, distribution of the emissions along many miles of flight path, low numbers and infrequency of tests, limited flight time and low population density in the test areas, the flight operations should have a negligible impact on air quality.

The missile burns JP-10, a high-density aviation fuel. JP-10 is a synthetic hydrocarbon fuel composed solely of *exo*-tetrahydrodi-cyclopentadiene. Most of the JP-10 would to be consumed in flight; estimated less than 5 gallons would be left at impact. Most JP-10 that is in the missile at impact would evaporate upon exposure to air, burn quickly, or dissipate

over time. Once again, overall impact of this small amount of emissions would have an insignificant effect on air quality.

Ground impact of the missiles with inert warheads would generate bursts of fugitive dust. These bursts would be infrequent and of short duration and are considered insignificant.

Decomposition by products of AFX-757 hydrogen chloride, nitrogen oxides, carbon monoxide, carbon dioxide, aluminum oxides, and a small amount of hydrogen cyanide. Given the isolated setting of the impact areas away from public areas, the closure of these areas to personnel during the test, and the air dispersion properties of the emission generated the air quality effects from explosive detonations should be considered insignificant.

Particulate matter in the form of fugitive dust is expected during target site setup and impact site cleanup. Significant dust generation would not be expected due to limited number of vehicles involved in test activities, the short duration of the test program, and the fact that most sites proposed could be used in their current state. Dust that is generated would be localized to the test beds and temporary. Vehicle engine emissions would be similar to those already occurring at all test sites. Since the test site tempo will not be increased by JASSM activities, the levels of pollutants in the air due to vehicle travel would not increase.

JASSM missions may require the use of existing portable generators to power tracking devices, telemetry equipment, and other instrumentation at remote sites. Generators will be fueled with diesel or gasoline. Combustion products from diesel and gasoline are nitrogen oxides, carbon monoxide, hydrocarbons, particulate matter, and sulfur oxides. Exhaust emissions from generators, whether diesel or gasoline, are not anticipated to cause exceedances of visible emissions limits established in *20 NMAC 2.61, Smoke and Visible Emissions*, or result in air pollutant concentrations that exceed national or state ambient air quality standards. The generators will be operated in compliance with the New Mexico Air Quality Bureau regulations and the State Implementation Plan (SIP). The use of all portable generators would be coordinated with WS-ES prior to the start of the Proposed Action.

Dust from missile flight termination impacts in target area, smoke and dust from five warhead detonations, exhaust from generators and recovery equipment and smoke small fires and other emissions associated with the proposed activity. These are smaller emissions than those evaluated in the "Addendum to the EA of the Long-Term High-Explosive Testing at WSMR PHETS," dated July 1995. Therefore, all emissions associated with the Proposed Action would not be considered significant.

The No Action alternative would result in similar impacts to local air quality as the proposed action, since flight operations and test activities of a very similar nature are currently ongoing at WSMR and are planned to continue in the future as well.

4.5 Biological Resources

4.5.1 Vegetation

Flight paths of captive-carry and launch missions would involve flying over or near three primary vegetation types, the semi-desert shrubs, the pinyon juniper mountains, and the semi-desert hills and rock land at WSMR. However, physical contact with the vegetative resources would be limited to a small area within the designated impact areas. Widespread effects to the vegetation is very unlikely, due to the small size of the missile system and the use of previously disturbed area and lack of vegetation in the impact areas.

At the target site destruction of plants from missile impact may occur, however, the amount of destruction would be minimal since the designated impact areas are virtually free from vegetation. Nevertheless, there is a potential for associated ecological effects of vegetation loss involving a potential decrease in food availability and cover for small animals (e.g., insects and rodents) and subsequently a decrease in food availability for larger predators (e.g., birds, reptiles, and mammals). However, these effects would be insignificant due to the proposed recovery planning and execution efforts outlined in section 2, use of previously established impact areas, as well the likelihood of similar habitat adjacent to the proposed impact areas.

There is a potential that vegetation near the target site may be damaged or destroyed by recovery vehicles or under human foot. There is a potential impact from the JASSM hazardous materials (batteries, fuel, propylene glycol, etc.) on plant species present at the target area. However, the impact from hazardous materials on plants should be considered minimal since the majority of these materials would either be consumed in flight (i.e., the fuel), dispersed over the immediate impact area in very low concentrations and volumes, or removed during the recovery of missile debris (remaining fuel, metals, batteries, etc.) immediately following the test. The proposed recovery planning would minimize these impacts, and the use of previously established impact areas that have little or no vegetation in the designated impact areas.

Actions at the LSTB or Drew Site would not require land clearing. No construction activities are associated with the Proposed Action. In fact, one benefit of conducting the proposed action at WSMR is that the targets and weapon impact areas are already built and in place and would thereby eliminate potential impacts associated with land clearing and construction activities that would be required at other ranges.

The Proposed Action is similar to actions that were evaluated in the NEPA documents listed below and were found not to have any significant effect on the vegetative resources on the LSTB in the PHETS:

- *Environmental Assessment of Long-Term, High-Explosive Testing at WSMR PHETS*, dated 15 September 1987 (HE Testing 1987-2007).
- "Addendum to the EA of Long-Term Testing at WSMR PHETS," dated July 1995 (Addressed air delivery, static detonations, Davis Gun testing 1995-2005).
- "Supplement to the Long-Term Testing EA for Collateral Effects Test Series," dated October 1995 (Addressed using taggants, tracers, and special test materials, biological simulates Bg and Bt, plume tracking).

The No Action alternative would result in similar impacts to local vegetative resources as the Proposed Action, since flight operations and test activities of a very similar nature are currently ongoing at WSMR and are planned to continue in the future in these same areas.

4.5.2 Fish

While the Proposed Action involves flight operations over the habitat of the White Sands pupfish, all proposed missile impacts are in areas that are established impact areas that do not contain the White Sands pupfish or pupfish habitat.

While there is always a potential for an unplanned occurrence with a test program, great efforts are made by the program to minimize that risk. Careful test planning and pre-flight system testing will assist in minimizing a flight failure risk, and will provide the highest degree of mission success possible. However, should an uncontrollable accident occur, the FTS may be exercised by the RSO to prevent the missile from leaving the range. This may involve the destruction of the missile over WS pupfish habitat. However, the likelihood that the system would actually impact the WS pupfish or effect its habitat is very low, since proposed impact areas are well away from known habitat, the missile is small in size, and there has been no known hazardous waste spills in the Salt Creek over the past 50 years of testing. (BISON-M)

Direct short-term and indirect long-term effects due to aircraft or weapons accidents in close proximity to Salt Creek could involve direct impact into the creek or tributary arroyos, possibly causing exposure to hazardous materials. The Proposed Action could adversely affect the White Sands pupfish over the short or long term if hazardous materials are introduced into Salt Creek. Information to develop a probability factor for predicting the occurrence of an accident/spill is not readily available. However, the probability for the reasons stated above appears to be very low.

Despite the best planning and test execution efforts, the White Sands pupfish may be affected by an accidental system malfunction that results with the system impacting in the known habitat area of the White Sands pupfish. However, due to the mitigation efforts mentioned above and in section 2, the Proposed Action may affect, but would not significantly affect the White Sands pupfish.

The No Action alternative would be to continue the daily flight operations and test activities occurring over White Sands pupfish habitat with the potential to affect the White Sands pupfish.

4.5.3 Amphibians, Reptiles, Birds and Mammals

The number of animals that could be directly affected by a missile impacting the ground would be directly related to variables such as animal densities at the impact point. In addition, the time of day and year would be determining factors as to the magnitude of animal population effected. Due to the high human activity levels at the impact sites just prior to testing, it is unlikely that a large animal would be close enough the impact area to be injured without being noticed and driven away. Any serious injuries and death to animals should be limited to small animals (primarily rodents and lizards) that remain in the impact area vicinity during test set-up and test execution. Pre-test activities at the target areas occur as late as 45 minutes prior to impact, depending on the established evacuation safety plan. The presence of humans and equipment at the target site may further discourage animals from remaining in or entering the target area during the actual test event, thus minimizing the potential to harm the animals.

The *Migratory Bird Treaty Act* (MBTA) prohibits the taking of migratory, nests, and eggs, except as permitted. To minimize the likelihood of adverse impacts to all birds protected under the MBTA, test activities will be scheduled outside of the general migratory bird nesting season of March through August when possible. If not, the proposed test areas will be surveyed and, and if necessary, avoided until nesting is complete. These actions will be coordinated with WSMR Environmental Services Directorate.

Overall, it is highly unlikely that a significant portion of the population would be adversely affected due to the presence of similar habitat adjacent to designated impact areas, and pre-test activities occurring at the impact sites up to a very short period before the actual test event.

The No Action alternative would result in similar impacts to local animal resources as the Proposed Action, since flight operations and weapon test activities are currently ongoing at WSMR and are planned to continue these same target areas.

4.5.4 Threatened and Endangered Species

The flight paths may cross over the habitats of species listed by the USFWS as threatened and endangered on WSMR including: Todsen's pennyroyal, whooping crane, bald eagle, Northern Aplomado falcon, southwest willow flycatcher, black-footed ferret, Mexican spotted owl, mountain and piping plover, and the interior least tern. Physical contact with these species as a result of the Proposed Action would only occur from an aircraft/weapons accident, fallout impact on the ground, or a collision with a bird in flight.

Todsen's pennyroyal would not likely be affected by the Proposed Action since the designated impact areas are established areas that are nearly free from all vegetation. An aircraft or a missile impact outside the designated areas is highly unlikely, but not out of the question, therefore the Proposed Action would have a potential to affect but not significantly affect the Todsen's pennyroyal.

Endangered and threatened bird species may be encountered on WSMR. American peregrine falcons, Northern Aplomado falcons and Mexican spotted owls are presumed to occur in the area surrounding WSMR. The bald eagle, interior least tern and whooping crane may be temporarily attracted to semipermanent water sources at WSMR; however, they would not be expected to remain due to their transient migratory status and absence of appropriate food sources, and/or nesting habitat.

The probability of encountering any of these rarely observed endangered species as a result of the proposed action is considered to be extremely low due to the number of scheduled missions, the remote possibility of accidents, and the transitory status of the bald eagle, interior least tern, Mexican spotted owl and whooping crane. There is a potential to affect these species, but not to significantly affect them by the execution of the Proposed Action.

The White Sands pupfish is the only fish known to occur at WSMR, however it is not present in the proposed impact areas. Nevertheless, the Proposed Action will be flying over habitat areas for the White Sands pupfish. This fish is protected by the State of New Mexico. In the event of a system malfunction that impacts within the critical habitat of the pupfish population (i.e., Salt Creek) it would have a detrimental effect upon the species. In the unlikely event that an accident occurs within the immediate area of Salt Creek, response time would be of critical importance in minimizing effects to the pupfish populations. The project team will incorporate all necessary support from the WSMR Installation Response Team (IRT) operating in accordance with the *WSMR Installation Spill Contingency Plan* (ISCP) to ensure a proper and quick response.

Critical phases of each flight test will be restricted from occurring over the Salt Creek, Malpais, and Mound Spring areas, which would greatly reduce the possibility of any adverse impact to the White Sands pupfish. There is a potential to affect the White Sand pupfish from the Proposed Action, but not significantly affect.

The JASSM program personnel would continue to coordinate with WS-ES, as early as possible, throughout the duration of the Proposed Action to ensure flight activities avoid sensitive habitat areas for listed species, sensitive species, and other species of concern, with the understanding that additional NEPA evaluation may be required if flight profiles and activities are significantly different from those proposed in this document.

4.6 Hazardous Materials

All test vehicles would terminate their flight in approved target impact areas. The JASSM vehicles would be severely damaged upon impact. The hazardous materials that would be recovered during recovery operations include the thermal battery, AA Ni-Cd batteries, and lead ballast material.

JP-10 is the largest quantity HazMat in the JASSM. In the 10 JASSM missions that will involve powered flight, a nominal flight profile would result in the majority of the JP-10 to be consumed during flight. It is estimated less than 5 gallons of fuel would remain in the system upon impact. The force of the impact would cause the aluminum fuel tanks to burst and spray any remaining fuel over the crater and the immediate area. Efforts will be made to clean up heavily contaminated soil area, however, as indicated in the *PHETS EA* of 1987, the area will be will be returned to its original condition when testing in the area ceases permanently and specific restoration measures will then be coordinated with WSMR at that time.

For all non-powered flight tests, a fuel simulant of 50/50 biodegradable propylene glycol and water (approx. 40 gallons) would replace the JP-10 to allow for proper weight and balance requirements, while minimizing the impacts to the environment from the unnecessary release of fuel at the impact site. The aluminum fuel tanks would burst upon impact and spray the liquid over the surface of the crater and the surrounding area. The normal scatter pattern is about 100-200 feet in length and approximately 60 feet wide.

The probability of any fuel being released near or in a water body is very small given the following:

a. The scarcity of surface water features in or near the designated impact;

b. The use of a fuel simulate (50/50 biodegradable propylene glycol/water) on all test vehicles that do not require powered flight (STVs only);

c. The nominal flight profile would involve flying the vehicle a duration that would result in less than 5 gallons of fuel on board at impact; and

d. All flight profiles would be structured to ensure that those few water resources on WSMR are avoided as much as possible.

The JASSM thermal battery is encased in a large aluminum heat sink. Not only does the heat sink absorb the heat produced by the operation of the battery but also serves as an excellent shield to protect the battery from damage. To date, none of the batteries used in flight-testing have been damaged to the extent where the reactive lithium core of the battery is exposed. Nevertheless, the JASSM thermal battery would be recovered and stored at HAFB for engineering analysis. Once it is determined that there is not further need for the

battery, it will be disposed of in accordance with proper handling, transportation, and storage procedures.

Forty-six AA-size Ni-Cd batteries are included in each test vehicle to provide back- up power to the TIK. The AA batteries do not contain Mercury. The batteries would be recovered with the rest of the vehicle debris for engineering analysis, and then disposed of as a universal waste. All lead ballast material will be recovered and turned into the HAFB recycling center.

The airframe is constructed of carbon/graphite epoxy composite material with an organic/inorganic coating. The coating, including the composite, has been tested in accordance with EPA Method 11311, *Toxicity Characteristic Leaching Procedure,* and exhibits no hazardous characteristics. As mentioned above, the recovery team will make every practical effort to recover as much of the vehicle as possible. Previous recovery efforts have collect approximately 90% of the recoverable portion of the vehicle.

All reasonable efforts will be made to recover as much of the system as possible, thereby minimizing the immediate impact the range, as well as furthering the long-term sustainment of the designated impact locations.

4.6.1 Minimization and Environmental Measures

The Proposed Action is structured to minimize the potential impacts to WSMR natural resources.

⇒ All flight profiles would be constructed such that critical (engine start, flight surfaces deployment, and engine start) phases of the flight would avoid environmentally sensitive areas (i.e., Salt Creek, the Malpais, Mound Springs, San Andres Mountains, and WSNM).

⇒ All flight profiles would be developed to ensure aircraft and the missile system remain greater than 3000 AGL during all aspects of the test profile, with the exception of the terminal maneuver

⇒ The planned termination of all proposed tests would occur in previously established and designated weapon test areas; the LSTB and the Drew Site.

⇒ The JASSM program would make every reasonable effort to recover all missile debris and leave the impact area, as close to its original condition as possible.

⇒ The Proposed Action will follow Air Force and WSMR standard spill control and recovery measures. These measures are designed to contain the fuel and other hazardous materials (as necessary), clean up any residual materials, and address specific security requirements.

⇒ All recovery activities would be coordinated with WS-ES and in accordance with the *Draft Standard Operating Procedures for Environmental Protection During Recovery Actions* (December 1997), and the JASSM Security Test Plan.

4.7 Cultural Resources

The Proposed Action has been discussed with and reviewed by WSMR archaeologists. The Proposed Action involves all planned flight tests terminating in established, surveyed, and approved weapon impact areas. As planned, the Proposed Action would not impact known cultural resources on WSMR. In the unlikely event that an impact and subsequent recovery

action is necessary in an unsurveyed area, proposed entry routes and projected related disturbance areas will be reviewed with WS-ES. If deemed necessary, an archaeologist or other qualified representative of the WSMR Environmental Services Division will accompany the recovery team. This individual will assist in the selection of the entry path that will minimize the potential for adverse impacts and will identify and assist in avoiding or otherwise record any activity with potential impacts on cultural resources. All actions will be in accordance with Section 106 (36 CFR 800) of the *National Historic Preservation Act*.

4.8 Cumulative Impacts

Cumulative impacts are defined as those impacts that would result form the incremental impacts of the Proposed Action when added to other activities. Cumulative impacts from the JASSM EMD/OT flight test program are the additional air emissions, which would result from the use of military aircraft and the JASSM vehicle itself. However, due to the need to restrict normal flight operations over the range during the test period, it is believed that overall emissions would be greatly reduced for the given period of time, under normal training and testing operations.

The JASSM missions would be planned to terminate in areas that have been previously impacted by similar test activities. There is potential for additional impacts in these areas from the JASSM program (i.e., eolian erosion, devegetation, soil compaction, etc.). Without using these designated test locations, the potential impacts for the Proposed Action would be more widely dispersed. However, the impacts would likely fall in more sensitive areas. Therefore, the careful selection of the missile impact areas along with adherence to the *Draft Standard Operating Procedures for Environmental Protection During Recovery Actions for WSMR* (December 1997) would be specifically established to minimize the potential of long-term cumulative impacts to the WSMR environment.

Coordination with WSMR-ES-C and DTRA would be performed to determine what monitoring requirements would be required due to the JASSM testing. DTRA is the managing party of the PHETS/LSTB area will assist the program is adhering any and all monitoring requirements to assess if any adverse impacts are occurring to biological resources, from the proposed testing of the JASSM as well as continued test operations on the LSTB by other programs. The monitoring plans are briefly outlined in the *Environmental Assessment for the PHETS*.

4.9 Socioeconomic

Potential concerns for socioeconomic impacts voiced in the WSMR EIS include changes to population, employment, and income in surrounding communities and demand for housing. As well as, economic impacts that effect range operations on the budget for the White Sands National Monument as well as and the San Andres National Wildlife Refuge. The Proposed Action is judged to have no measurable negative impacts on the regional socioeconomic setting or on the monument or refuge.

However, the Proposed Action would have a generally positive impact on the surrounding area. The local communities would be readily able to support the temporary influx of project personnel (15-20 per mission) that would be required to support the Proposed Action.

It is estimated that over the life of the proposed test program approximately $200,000 would be brought into the local area in the form of temporary duty costs (lodging and food).

Furthermore, it is estimated 7.6 million dollars would be directed towards WSMR and HAFB directly in range fees and other support costs.

4.10 Unavoidable Adverse Effects

Unavoidable impacts would be the release of air emission and the disturbance to the soils and vegetation during the termination and recovery operations of the JASSM, and the potential for taking an animal during missile impact.

4.11 Irreversible and Irretrievable Commitment of Resources

The use of fossil fuels for operations of aircraft and the JASSM being tested would be the only irreversible commitment of natural resources.

4.12 Relationship of Short-Term Use and Long-Term Productivity

The Proposed Action's short-term use of the environment would not negatively impact the long-term productivity of the environment.

5.0 REFERENCES

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APPENDIX A - Standard Operating Procedure for Environmental Protection During Recovery Actions

WHITE SANDS MISSILE RANGE

STANDARD OPERATING PROCEDURE FOR ENVIRONMENTAL PROTECTION DURING RECOVER ACTIONS

December 1997

White Sands Missile Range, New Mexico
National Range
Directorate of Environment and Safety
WSMR, New Mexico 88002

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SUMMARY

WSMR annually tests a significant number of missile and other weapons systems. Missile, aircraft, and full- and sub-scale target debris resulting from these testing activities must be recovered from the Range. Standardized environmental protection measures as a Standard Operating Procedure (SOP) were developed to ensure that sensitive natural and cultural resources are protected while facilitating the Range mission. WSMR recovery activities must be in compliance with Federal, State, Department of Defense, and U.S. Army regulatory requirements. It is emphasized that the first priority of these protective measures is personnel safety with a next two highest priorities being security (related to both the test item and the area) and mission support. Environmental protection must be accomplished with these priorities in mind.

The SOP is based on existing procedures and guidance for recovery previously developed by the National Range and Materiel Test Directorates, National Range Directorate of Environment and Safety (NRES) general environmental protection guidelines for WSMR operations, WSMR Range-Wide Environmental Impact Statement mitigation requirements, Naval Air Warfare Center, Weapons - White Sands (NAWCWPNS-WS) recovery actions instructions, and other WSMR guidance. The SOP focuses on guidelines for avoidance of known sensitive areas on WSMR (e.g., Salt Creek and other White Sands pupfish habitat, San Andres National Wildlife Refuge, and Trinity Site National Historic Landmark) but also provides specific guidance for recovery in areas of unknown natural and cultural resources sensitivity. Sensitive areas are delineated in the text of the SOP and are graphically depicted as areas to be avoided or treated with higher levels of caution and review approval.

Accompanying the SOP is a standardized format (Recovery Data Form) for recording recovery activities including:

- test sponsor and proponent,
- type of weapon system,
- target type,
- planned impact sites for weapon and target debris,
- actual impact sites (Global Positioning System [GPS] derived universal transverse mercator [UTM] coordinates, if available),
- distance driven off-road by recovery team,
- type and number of vehicles used during recovery (including helicopter use),
- weather and soil surface conditions during recovery,
- number of recovery personnel,
- notations of sensitive natural or cultural resources, and
- other pertinent technical or environmental protection information.

Information from the SOP Data Reporting Form is captured in an electronic data base which is maintained by the National Range Directorate of Environment and Safety.

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STANDARD OPERATING PROCEDURE FOR ENVIRONMENTAL PROTECTION DURING RECOVERY ACTIONS

1.0 PURPOSE

This Standard Operating Procedure (SOP) for Environmental Protection During Recovery Actions defines standard procedures, instructions, and compliance requirements for missile, target, and other debris recovery. The goal of this SOP is the protection of sensitive environmental resources while supporting the WSMR research, development, test, and evaluation mission. It is emphasized that the first priority of these protective measures is personnel safety with the next highest priorities being security and mission support. Environmental protection must be accomplished with these priorities in mind.

2.0 SCOPE

The contents of this SOP are generally applicable to all Range users involved in missile, target, and other debris recovery actions, but in particular are directed to Explosives Ordnance Disposal (EOD)/Recovery personnel and other organizations directly involved in recovery operations. The SOP will be administered by the National Range Directorate of Environment and Safety (NRES). WSMR impact areas and warhead impact targets (WIT) are shown on Figure 1. Although these areas are specified for debris impacts, debris can, in reality, land anywhere on the Range.

3.0 GENERAL

The following are general requirements specified by this SOP.

3.1 Responsibilities

Ensuring that the requirements of this SOP are carried out is the overall responsibility of the WSMR Commander, delegated to the NRES Director. The NRES authority for ensuring compliance for individual test activities may be delegated to NRES Environmental Services Division (NRES-E) or Customer Support Office (NRES-C) representatives. The EOD/Recovery authority for compliance with this SOP will be assigned to the EOD/Recovery Environmental Protection Lead (as assigned by the Chief, Range Support) and to the Senior EOD Team Leader for each test activity. The NAWCWPNS-WS Environmental Protection Specialist (EPS) has the specific responsibility of ensuring that compliance with this SOP is met by U.S. Navy test projects. All personnel involved in recovery activities are responsible for knowing what is required to protect the environment while supporting the WSMR mission. This responsibility extends to military personnel, WSMR civil servants and contractor staff, and off-WSMR civil servants and contractor staff.

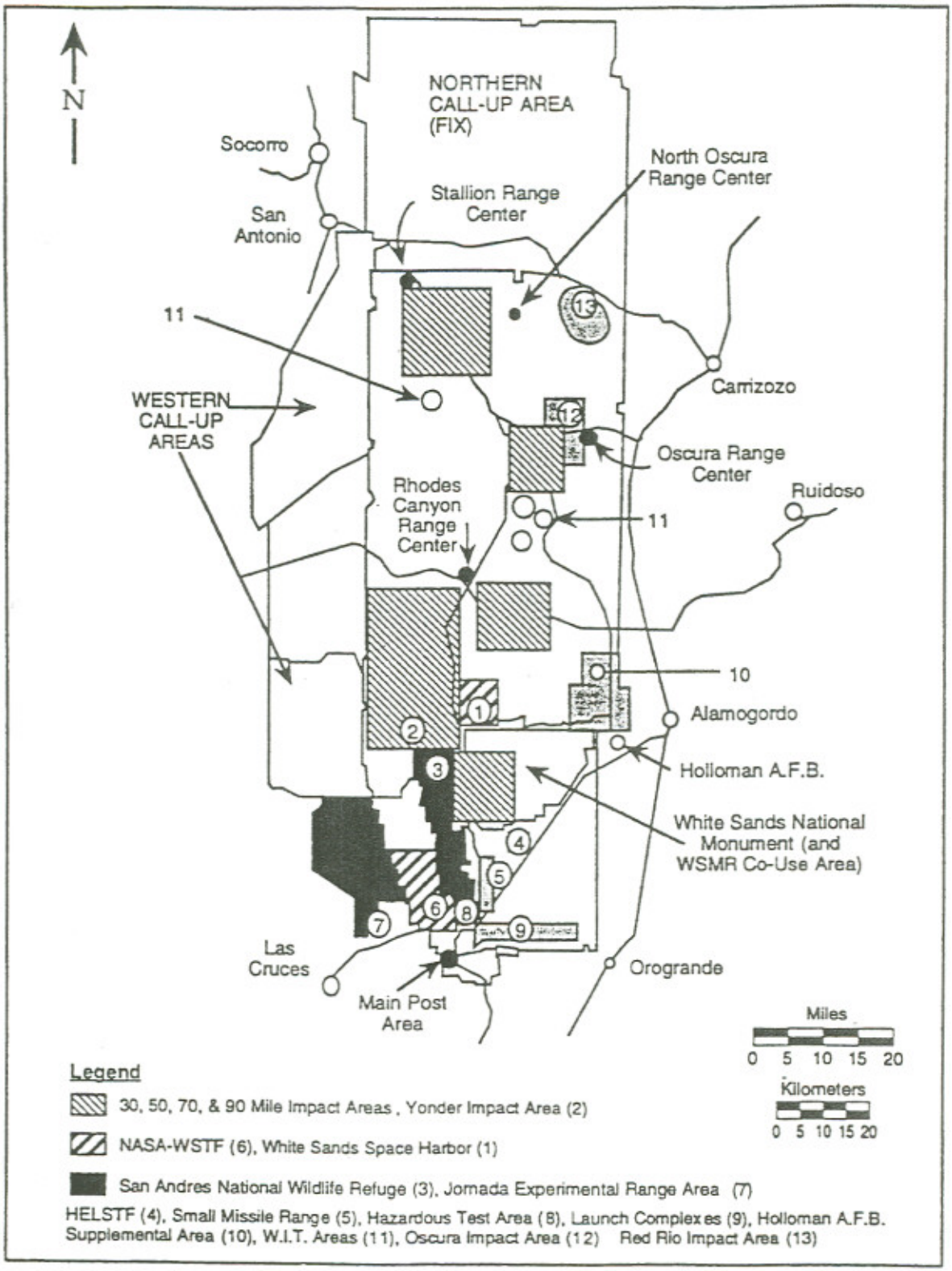

Figure 1. WSMR Impact Areas and Warhead Impact Targets

NRES is responsible for offering training (additionally see Section 7) to ensure that all groups and individuals understand the SOP requirements for environmental protection. The responsibility for taking advantage of this training is incumbent upon the EOD/Recovery Environmental Lead, the NAWCWPNS-WS EPS, and the project sponsor.

3.2 EOD Recovery Classes

The following recovery classes may be individually specified or combined to meet the test agency's goals for both normal and malfunctioning tests.

Recovery 1: Missiles or test material and/or impacts both classified and unclassified, that the Range user desires to inspect before recovery. The Range user's representative must be present to accept any classified materials present during this class of recovery. Use of this recovery class is mandatory if classified materials are to be recovered.

Recovery 2: Missile or test material and/or missile impact that the Range User desires immediate recovery, but does not desire to inspect prior to recovery. The Range user must designate a specific location where items are to be delivered and must provide a representative to accept recovered items at that location.

Recovery 3: Test material will be recovered by project personnel under escort by personnel from the EOD Section, Operations Control Division, National Range Operations Directorate (NRO-CS-E).

Recovery 4: Project Recovery. Recovery of test hardware by the Range user (or representative) with no escort required. Use of this recovery class must be approved by the Chief, NRO. The Range user is required to attend a Range safety briefing prior to gaining access to impact areas.

Recovery Class Combinations: The combination of two recovery classes can be scheduled to meet the Range user's needs in regard to normal or malfunctioning tests (e.g., Class 2/1). In this example, the Range user anticipates a normal test of an unclassified missile , but if a malfunction occurs, the user will inspect the impact prior to recovery. The first class in the example designates the normal class desired; the second designates the class desired if the item malfunctions.

Unrecovered Item: An item which was not accounted for during the initial search period, but which is of potential interest to the Range user. The Range user is responsible for establishing priority for additional search and recovery efforts. With consideration to the Range user's request, the extent of search and recovery efforts will be determined by the Chief, NRO-C for unclassified items and, with concurrence of the Chief SD-S, for classified items.

3.3 Sensitive Areas and Resources

The following is a discussion of resources in and locations of designated sensitive areas on WSMR. Much of the information is taken directly from signed from Memoranda of Understanding or Agreement between WSMR and land managing or regulatory agencies responsible for the administration of sensitive areas and resources.

3.3.1 White Sands Pupfish Habitat

The White Sands pupfish (*Cyprinodon tularosa*) is a federal Category 2 candidate and a state endangered (group 2) species that is found in shallow, calm, highly mineralized water charged by alkali salt springs and sand and/or gravel bottoms. This species is endemic to the Tularosa Basin of New Mexico and is known to exist at Malpais Spring, Mound Spring, and Salt Creek (Figure 2). Detailed maps of the pupfish habitat are available at NRES-E. Protection from toxicants and human disturbances and the maintenance of the habitat diversity at existing pupfish locations will permit the long-term survival of the populations. WSMR entered into a cooperative agreement for the protection of the White Sands pupfish (among the U.S. Army, U.S. Air Force, WSNM, USFWS, and NMDGF). This agreement commits to the creation of limited use areas around the White Sands pupfish habitat as well as a variety of other measures to avoid harm to this species. This agreement protects the habitat at Malpais Spring, Mound Spring, and Salt Creek on WSMR (Figure 2).

Essential WSMR pupfish habitat and activity exclusion areas consist of:

- Salt Creek and all tributaries with perennial flow or perennial springs between Range Road 6 and Range Road 8, including a corridor 200 m (660 ft) wide, extending 100 m (330 ft) from either side of the center of the stream or perennial tributary channel and all land within 100 m (300 ft) of any tributary spring.

- Mound Spring, including the area within 100 m (330 ft) of the perimeter of the spring ponds.

- Malpais Spring, including:

    - The area within 100 m (330 ft) of the perimeter of the spring pond;
    - Its outflow stream, including a corridor 200 meters (660 ft) wide, extending 100 m (330 ft) from either side of the center of the stream channel; and
    - The associated wetlands and playas, including all land within 100 m (330 ft) of the high water boundary of the wetlands and playas associated with Malpais Spring.

3.3.2 White Sands National Monument

White Sands National Monument (WSNM) comprises approximately 596 km^2 (230 mi^2), is administered by the National Park Service (NPS), U.S. Department of the Interior, and is surrounded by WSMR on its south, west, and north boundaries (Figure 3).

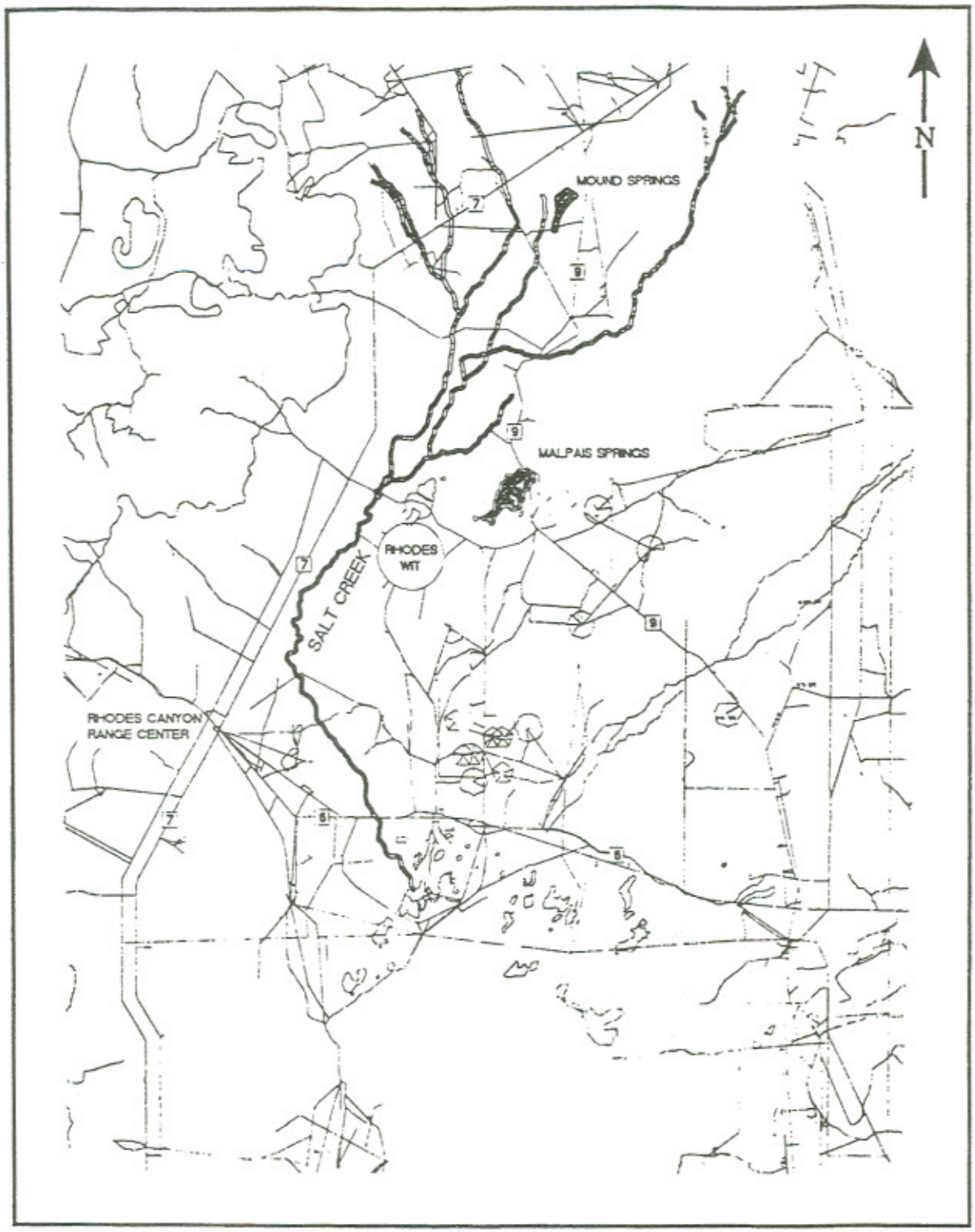

Figure 2. White Sands Pupfish Habitat

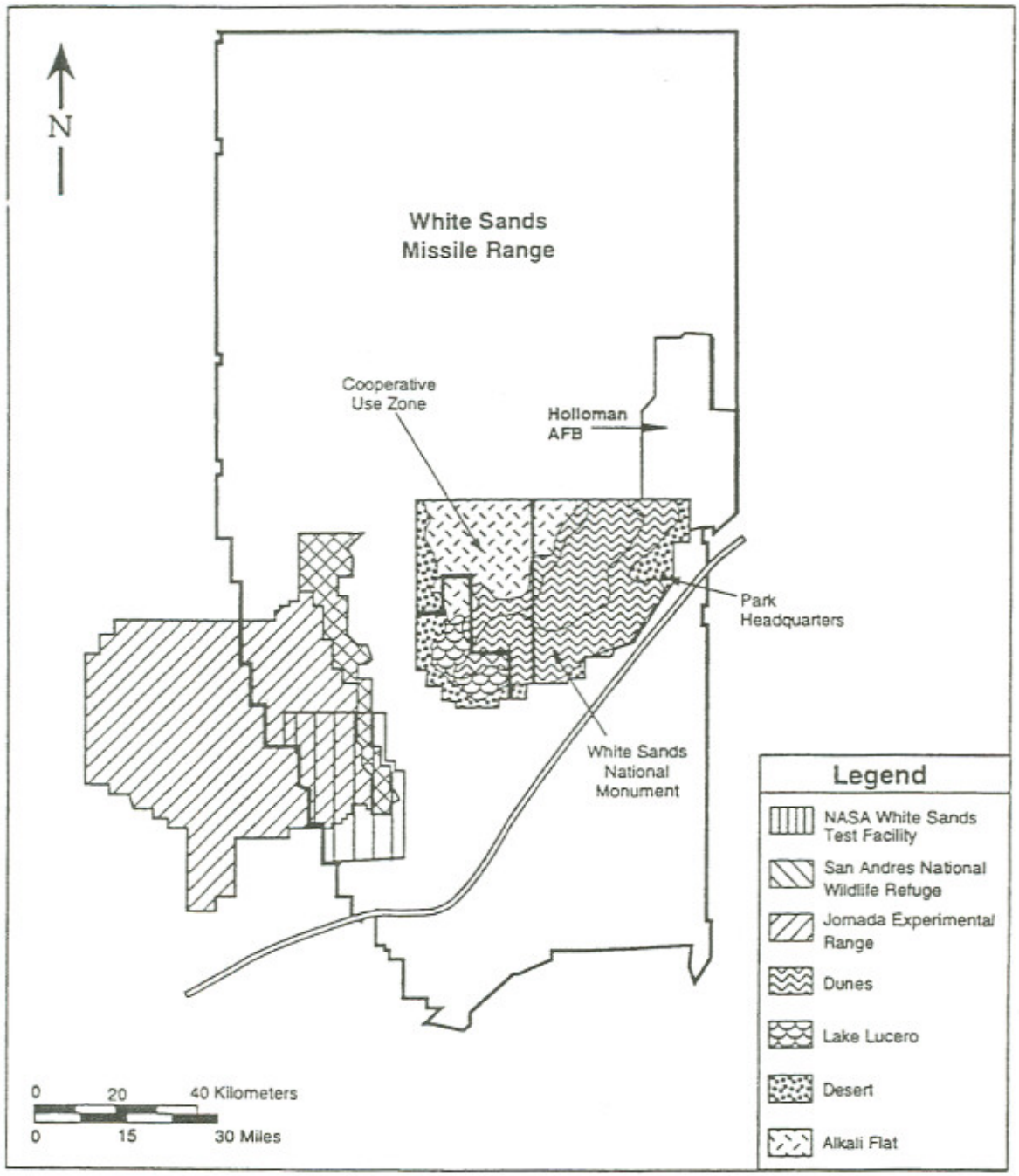

Figure 3. White Sands National Monument, San Andres National Wildlife Refuge, and Jornada Experimental Range

The western half of WSNM is under a co-use agreement with WSMR as a controlled impact area for missile material. Planned impacts within the co-use area of WSNM are only considered when the conditions of a test cannot be met otherwise. This western section of the WSNM has limited public use; approximately 100 persons per year are permitted by NPS personnel for travel in this area.

WSNM is a natural area. Removal or disturbance of archeological or natural objects, sand, selenite crystals, plants, or animals is prohibited. Impact recovery ground operations sometimes involve heavy equipment that travels both on roads and cross-country and can disturb the flora. Consequently, ground vehicle recovery is used by WSMR only when helicopter recovery is not feasible.

Zone of Cooperative Use

The area of White Sands National Monument affected by the provisions of this permit is termed the "zone of cooperative use" and lies west of a north-south line described as: Beginning at the north one-quarter corner of Section 4, T. 17 S., R. 6 E., New Mexico Prime Meridian, a point on the north boundary of White Sands National Monument; thence south through the center of Sections 4, 9, 16, 21, 28, and 33, T. 17 S., R. 6 E., New Mexico Prime Meridian; Sections 4, 9, 16, 21, 28, and 33, T. 18 S., R. 6 E., New Mexico Prime Meridian; and Section 4 T. 19 S., R. 6 E., New Mexico Prime Meridian; then terminating at the one-quarter corner common to Sections 4 and 9, T. 19 S., R. 6 E., New Mexico Prime Meridian, at a point on the south boundary of White Sands National Monument.

The area of Lake Lucero is specifically excluded from the zone of cooperative use described above. Lake Lucero is specifically described as: beginning at the corner common to Sections 34 and 35, T. 17 S., R. 5 E., and Sections 2 and 3, T. 18 S., R. 5 E.; thence west two miles to corner common to Sections 32 and 33, T. 17 S., R. 5 E., and Sections 4 and 5, T. 18 S., R. 5 E.; thence south three miles to the corner common to Sections 16, 17, 20 and 21, T. 18 S., R. 5 E.; thence west to intersection of Range Route 7 east right of way; thence south to intersection with the White Sands National Monument boundary on section line between Section 5, T. 19 S., R. 6 E.; and section 8, T. 19 S., R. 5 E.; thence east and south along the White Sands National Monument boundary to corner common to Sections 7, 8, 17 and 18, T. 19 S., R. 6 E.; thence north three miles to corner common to Sections 29, 30, 31 and 32, T. 18 S., R. 6 E.; thence west three miles to corner common to Sections 26, 27, 34 and 35, T. 18 S., R. 5 E.; thence north five miles to the point of beginning.

The archeological areas in Section 6, T. 17 S., R. 5 E., and in Section 5, T. 19 S., R. 5 E., are also excluded from the Zone of Cooperative Use.

3.3.3 San Andres National Wildlife Refuge

The San Andres National Wildlife Refuge, located within the WSMR boundary, was established in 1941 to protect the desert bighorn sheep and hosted limited ranching activity as recently as

1951 (Figure 3). WSMR currently uses the refuge as a buffer and safety zone. A cooperative agreement between WSMR and the USFWS exists for management of this area.

3.3.4 Trinity National Historic Landmark and Associated Features

Trinity Site National Historic Landmark, located in the Stallion Range area of WSMR, encompasses 14,736 ha (36,480 ac), and includes Ground Zero (detonation site), various instrumentation bunkers, the McDonald Ranch, a nearby base camp, and "Jumbo" – a huge steel vessel designed to enclose the plutonium in the event of an unsuccessful test. The McDonald Ranch complex consists of a stone farmhouse and several stone outbuildings. The ranch house has been renovated and includes restoration of test-era graffiti on the interior walls.

Two land use zones (Figure 5) within Trinity Site were established for the *Memorandum of Understanding* (MOU) *Between New Mexico Historic Preservation Division and Department of Army White Sands Missile Range Regarding Trinity Site Protection and Land-Use Management*. The Historic Zone includes the major known structures, features, or remains of the Trinity Test as identified in the WSMR Historic Preservation Plan and a buffer of 400 m (1,312 ft) around these features. The Historic Zone is strictly off-limits for mission activity except for the use of existing roads and trails with written concurrence from NRES. A Limited Compatible Land Use (LCLU) Zone at Trinity Site includes all those areas within the NHL area not specifically within the Historic Zone. Project use within the LCLU zone is allowed, subject to the stipulations of the MOU and the WSMR Historic Preservation Plan. All LCLU zone land use is subject to cultural resources survey and specific consultation with the New Mexico State Historic Preservation Officer to assess effects on the Trinity Site.

3.3.5 Sensitive Biological Resources and Habitat and Known Concentrations of Cultural Resources

Numerous areas on WSMR present sensitive biological resources and habitat (Figure 6), and known concentrations of cultural resources (Figure 7). Most of these areas are poorly defined and consequently poorly mapped. It is assumed that all programs and projects will be screened through the WSMR NEPA and Decision Analysis System review process well in advance of the mission leading to a recovery action. Planned activities will, as a result of this process, avoid sensitive environmental resources in compliance with the NEPA review process. However, the program or project sponsor is responsible for awareness of WSMR environmentally sensitive areas and to work closely with NRES to ensure that these resources are protected. Impact reduction procedures for recovery are specified in the NEPA compliance documentation accompanying the approval process for all projects and programs at WSMR. These procedures (also known as mitigation) must be applied throughput the recovery action. Unplanned debris impacts in environmentally sensitive areas and subsequent proposed recovery actions must be reviewed by NRES as soon as possible to ensure protection of the resource.

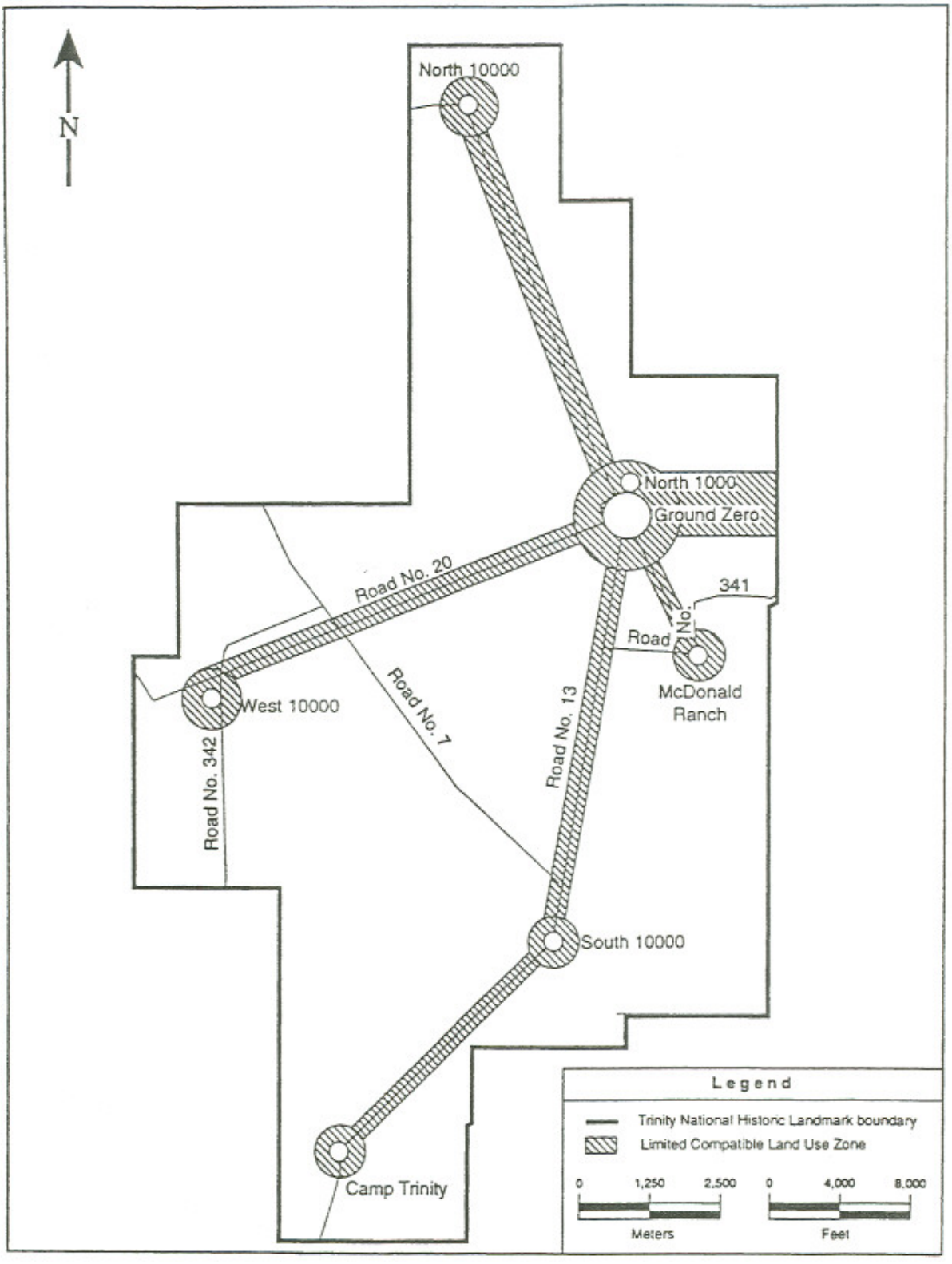

Figure 4. Trinity Site National Historic Landmark

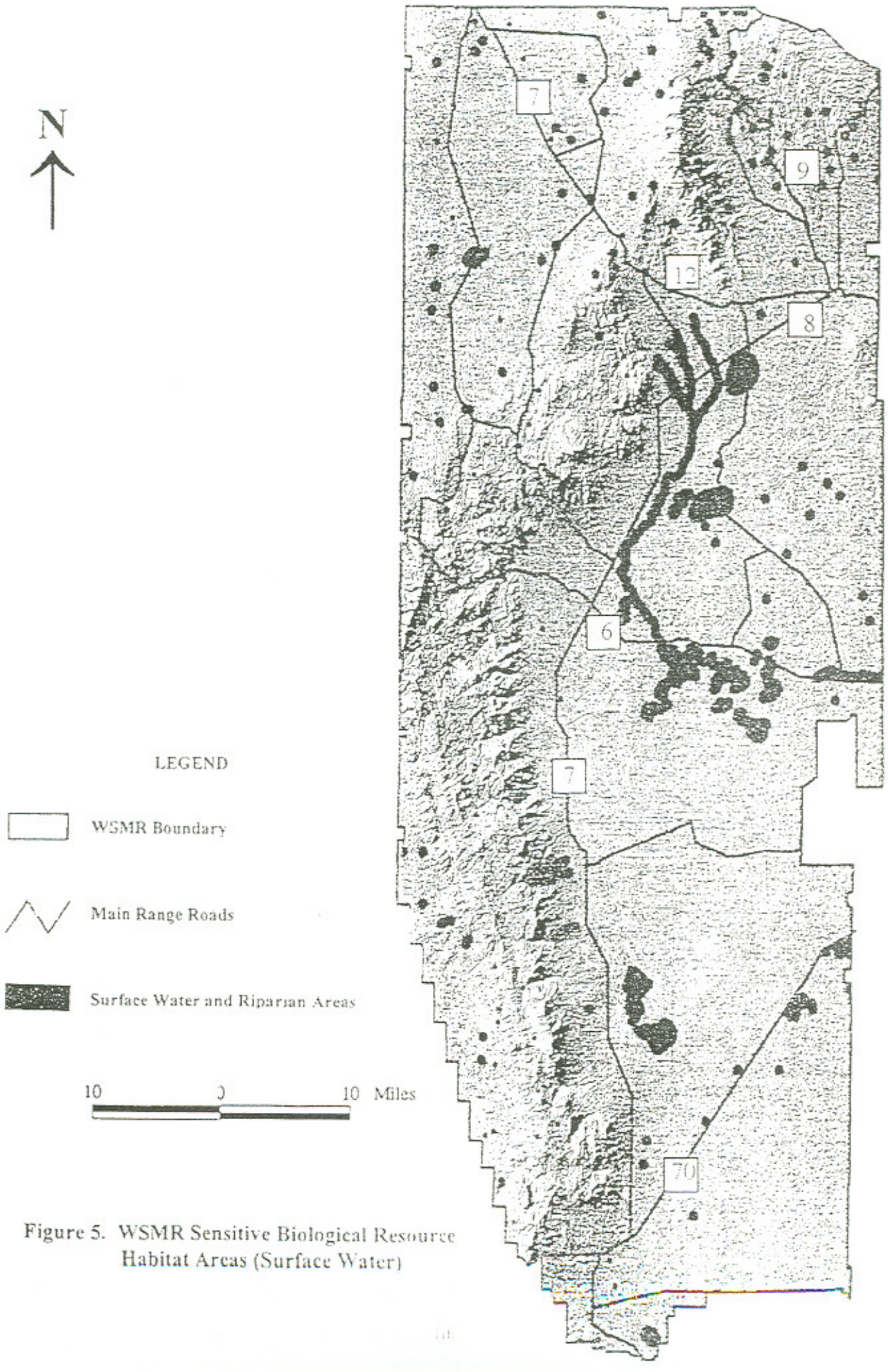

Figure 5. WSMR Sensitive Biological Resource Habitat Areas (Surface Water)

Figure 6. Known Concentrations of Cultural Resources on WSMR

4.0 PROCEDURES

The following are standard recovery action procedures that must be followed to ensure that environmentally sensitive resources are protected while supporting the WSMR research, development, test, and evaluation mission. All standard recovery action procedures concerning operations and safety contained in WSMR Standing Operating Procedures for EOD Operations in the Warhead Impact Areas (SSOP 57-83), WSMR Desk Top Procedures: Recovery, NRES general environmental protection guidelines for WSMR operations, WSMR EIS mitigation requirements, NAWCWPNS-WS recovery actions instructions, and other WSMR guidance must be applied while implementing the SOP for Environmental Protection During Recovery Actions. Specific guidelines for standard recovery actions, recovery actions in designated sensitive areas, and procedures for special areas or circumstances are provided in the following sections.

4.1 General Recovery Actions

All general requirements for conduct of U.S Army, U.S. Navy, and Department of Defense activities will be maintained during recovery operations.

4.2 Recovery Actions in Designated Sensitive Areas

The following sections address recovery actions in designated sensitive areas and responsibilities for administering environmental protection. Specific requirements for each of the designated sensitive areas are delineated as follows. Many of the specifications are summarized from the Memoranda of Understanding or Agreement between WSMR and land managing or regulatory agencies responsible for the administration of sensitive areas and resources.

White Sands Pupfish Habitat

White Sands pupfish habitat exists on WSMR at Malpais Spring, Mound Spring, and Salt Creek. As specified in Section 3.3.1, Essential Habitat for the pupfish must be protected. Recovery actions must remain outside of a 100 m (330 ft) buffer area (Figure 2) set for pupfish protection around these habitat locations. Unplanned debris impacts within this buffer area must be reviewed by NRES-C and NRES-E at least 24 hours before entry for purposes of recovery unless required for purposes of safety or security, or in cases of hazardous materials spills as specified below. All coordination with regulatory agencies will be conducted by NRES.

In cases where hazardous materials or fuels and other petroleum products were accidentally introduced into the pupfish habitat, emergency response procedures will be instituted as specified in the WSMR Spill Plan. These procedures consist of controlling the spill, containing the spill, and cleaning the impacted area to the degree necessary to prevent subsequent damage to the pupfish and their habitat. Contacts for emergency response and other contingencies are found in Section 8.0.

White Sands National Monument

Planned impacts will not be permitted within White Sands National Monument. Specific program needs may be addressed to the Superintendent. The areas noted in Section 3.3.2 are to be avoided. It is understood, however, that unplanned impacts may occur and that occasional debris may fall within monument boundaries.

White Sands Missile Range will render harmless and remove all duds, unexploded materials, other space or aerial vehicle/device or missile material , and other debris (to include all material impacted through military testing action in the past years) which may fall or be deposited anywhere within the boundaries of WSNM through the conduct of tests on space or missile programs. This clean-up will be accomplished to the satisfaction of the Superintendent.

Physical use of the Monument east of the zone of cooperative use is not permitted by the MOA except for certain specified facilities which are located outside the Zone. The entire Monument may, at times, be under the path of projectiles with intended points of impact outside the Monument boundaries.

While operating within WSNM, WSMR personnel will adhere to, and comply with, all National Park Service regulations, as published in Title 36 of the Code of Federal Regulations. Of Particular interest are the prohibitions on the removal of the selenite crystals from the Lake Lucero area, the removal of archeological materials from sites scattered across the monument, and on the absolute limiting of traffic to already established roads.

WSMR will remove missile debris within WSNM and continue to remove all materials that have impacted since the establishment of the testing program. WSMR assistance will also be provided in recovering weather balloons, metal spheres, and other material of undetermined origin when located during Monument operations or recovery activities. The recovery and removal process will include the following:

- Recovering operations will be initiated as soon as possible following the notification of an impact on Monument lands. Recovery operations will be coordinated with the Superintendent, WSNM, and will include a WSNM representative at all time. Recovery operations will be completed to the satisfaction of the Superintendent, WSNM.

- In the event classified material impacts within the Monument, WSNM personnel will accompany the recovery team and will determine the routes of travel and the method of recovery. At the site, WSNM personnel may be required to maintain a minimum distance, as determined by the on-site project representative, until recovery of the classified portion is complete, or the item is placed undercover or otherwise protected from view. Photography of the impact area by WSNM personnel is prohibited until the classified item is so protected.

- All recovery operations will require that WSMR restore the site to as close to its original condition as possible, with final approval of the restoration to be given by the Superintendent, WSNM. The commitment to restore the land will include the use of hand tools if deemed necessary.

- Helicopters will be the primary, and preferred, recovery vehicle. If ground recovery is the only feasible alternative, as determined by the Superintendent, WSNM, the number of vehicles will be kept to a minimum, and the routes to the site will be selected by WSNM. In these cases, restoration requirements will also include obliteration of the track to the site.

- Where removal or destruction of explosive ordinance is required, EOD personnel will determine whether safe removal can be accomplished or on-site destruction is required. All concerns involving safety and operation of the helicopter are the responsibility of, and will be determined by, the pilot.

- In the event of an impasse between field representative of WSNM and WSMR regarding a recovery operation, action will cease until the Superintendent, WSNM, and the Director, NR, resolve the issue.

Trinity Site National Historic Landmark

As described in Section 3.3.4, the Historic Zone at Trinity Site is off limits for all mission activity, unless extreme necessity for entry resulting from safety or security needs arises. All entry into this area must be coordinated with the NRES-E Range Archaeologist who will coordinate with the State Historic Preservation Officer as required under the MOU and the WSMR Historic Preservation Plan.

Entry into and off-road travel within the LCLU zone will be coordinated with the Range Archaeologist before any recovery actions may proceed in this area. Unless extreme safety or security requirements must be met, the Range Archaeologist must be informed 24 hours in advance of the desired entry so that all effects of the action may be adequately assessed.

San Andres National Wildlife Refuge

As required in the Memorandum of Agreement between the USFWS and WSMR (29 August 1995), all unauthorized Range personnel are prohibited from entering the San Andres National Wildlife Refuge (SANWR). All authorized Range personnel are granted access to and through the Refuge for justifiable, mission-related activities to include work-related and security requirements. All actions requiring Range personnel access to the Refuge, including debris removal, will first be coordinated with the Refuge Manager, except in emergency situations (as determined by the Director of National Range) when the Refuge manager will be notified as soon as possible. All military activities that directly target the Refuge are prohibited.

Recovery operations of mission-related debris will be subject to prior coordination with Refuge representatives and may include a Refuge representative, when recovery missions are deemed non-emergency and/or unclassified. In cases of emergency, Range personnel will proceed to the Refuge for on-site recovery and in all cases, will contact the Refuge as soon as possible as to the nature of the recovery operation. After emergency and classified recoveries, Range personnel will escort Refuge representatives to the recovery site at a time convenient to both parties.

To initiate recovery of existing military debris determined by the Refuge Manager or Range personnel to impact natural resources of the Refuge, both parties will coordinate the identification of the debris of concern and evaluation of removal options.

4.3 Recovery Actions in Other Biologically Sensitive Areas and in Known Concentrations of Cultural Resources

A number of biologically sensitive areas and areas of known concentrations of cultural resources are located on WSMR. These areas are not formally designated and, in most cases are not delineated with accurate boundaries. Due to this lack of specific area designation, the following will be applied were practicable.

- Training provided by NRES will indicate the type, scale, and locations of these areas.
- Planned recovery actions will be reviewed by NRES-C/E on a case-by-case basis. NRES-C/E shall be contacted in advance of planned off-road travel or other major surface disturbing activities in these sensitive areas. NRES-C/E shall also be contacted, if at all possible, when unplanned off-road travel or other major surface disturbing activities are required in these sensitive areas unless safety or security concerns preempt environmental protection measures.
- Existing roads and other previously disturbed routes shall be used to access the general recovery location; vehicles must travel in single file where practicable in previously un-traveled accesses. Plant life must be avoided where practicable. When practicable, final routing to the debris and significant surface disturbing recovery activities shall be coordinated in advance with NRES-C/E.
- An assessment of the debris impact and recovery action effect on known sensitive resources shall be performed in the field by NRES-C/E, if at all practicable. If it is concluded that the debris caused a significant impact to a sensitive resource or if recovery would either exacerbate that impact or cause a new impact, additional analysis may be required and mitigation measures applied.

4.4 Recovery Actions in Previously Unsurveyed or Undocumented Areas

- Recovery actions in all planned and probable impact areas will be reviewed by NRES-C/E on a case-by-case basis. The NEPA review process will screen planned or probable impact areas and determine areas that must be surveyed for sensitive natural and cultural resources.
- Previously undisturbed routes (off-road) in unsurveyed areas that present an obvious potential for sensitive habitat or location of cultural resources (as specified in

NRES-provided training) shall be assessed in the field, when practicable, by NRES-C/E to determine if a survey is required.

- Existing roads and other previously disturbed routes must be used to access the general recovery location; final routing to the debris shall be coordinated with NRES-C/E, if practicable, in advance of ingress.
- If the recovery team determines that sensitive natural or cultural resources were damaged, a post-recovery assessment of the debris impact and recovery action effect on sensitive resources shall be performed in the field by NRES-C/E. If it is concluded that the action caused a significant impact, additional analysis may be required and mitigation measures applied.

4.5 Hazardous Materials, Spill Response, and Reporting Requirements

The following is a summary of hazardous materials and spill response and control responsibilities, and general procedures concerning hazardous materials management and spill control. Specific and in-depth spill response procedures are found in the WSMR *Environmental Spill Plan, Annex G to WSMR Disaster Control Plan* (29 September 1997).

For minor spills under 38 L (10 gal), spill response and management is the overall responsibility of NRES. For sizable spills in excess of 38 L (10 gal), spill response is specified in the *Environmental Spill Plan.* The following are general WSMR procedures for spill prevention and for the handling of oil and hazardous substances.

Petroleum Products: All petroleum products will be handled, used, and stored to avoid or minimize the possibility of an accidental spill or discharge and pollution of land and water at this installation.

Hazardous Substances: Immediate action should be taken for spills of hazardous substances to eliminate the source and contain the spill, and prompt initiation of efforts to mitigate the damage. Remedial actions to clean up or neutralize spills that could result in additional damage, will be taken only after consultation with NRES-E.

Disposal Procedures: Contracts for disposal of petroleum or hazardous wastes will contain provisions that require the disposal method to be in accordance with Federal, State, and/or local regulations.

Spill Assessment

Based on the information from the spill report, a spill assessment as specified in the *Environmental Spill Plan* will be conducted which requires determination of hazards involving evaluation of several criteria, including the following elements.

(1) Exposure: magnitude of actual or potential exposure to facility personnel, the

general public, and the environment; duration of human and environmental exposure; pathways of exposure.
(2) Toxicity: types of adverse health or environmental effects associated with exposures; the relationship between the magnitude of exposure and adverse effects.
(3) Reactivity: hazardous substances involved in an incident will be assessed for reactivity through accessing the Material Safety Data Sheets (MSDS) for the affected material and the recommended method(s) for managing such waste.

Spill Classification

A spill incident will be categorized as a Condition I, II, III, or IV Spill as described in the WSMR *Environmental Spill Plan*. Most spills resulting from debris impacts will be *CONDITION I* which is the release of oil or hazardous substance of less than 3,785 L (1,000 gal), or a discharge of any hazardous substance in a quantity that does not pose an immediate threat to human health or the environment. A potential exists during missile or target debris impacts for a *CONDITION II* release of oil or hazardous substances of 3,784 L to 37,850 L (1,000 to 10,000 gal), or a release of any hazardous substance in a quantity that poses a threat to human health or the environment.

Spill Response and Control and Response Priorities And Procedures

The user of this SOP is referred to the *Environmental Spill Plan* for specific spill response and control and response priorities and procedures. Safety of human life must be given the top priority during every response action.

4.6 Fire Control and Suppression Activities

All fire control and suppression activities are under the management of the WSMR Fire Department. In the case of recovery actions wildfire control and suppression is managed under the WSMR *Disaster Control Plan* and WSMR Fire Department SOP 25, *Natural Cover Fire Fighting, Range Fires*. The Disaster Control Plan and SOP 25 are available for review at the WSMR Fire Chief's office and should be reviewed by all users of this Recovery Actions SOP.

4.7 Off-Range Recovery

Coordination with Federal and State of New Mexico land managing agencies and private land owners shall be completed before debris or other materials are recovered from off-Range areas (Figure 7) unless safety or security concerns supersede this requirement.

Federally administered lands (i.e., Bureau of Land Management [BLM], U.S. Fish and Wildlife Service [USFWS]Sevilleta and Bosque del Apache National Wildlife Refuges, U.S. Forest Service [USFS], U.S. Department of Agriculture [USDA] Jornada Experimental Range, and Bureau of Indian Affairs [BIA] for the Mescalero Apache Reservation) and State of New Mexico lands are protected from environmental impacts in varying degrees dependent on their management status (Figure 7).

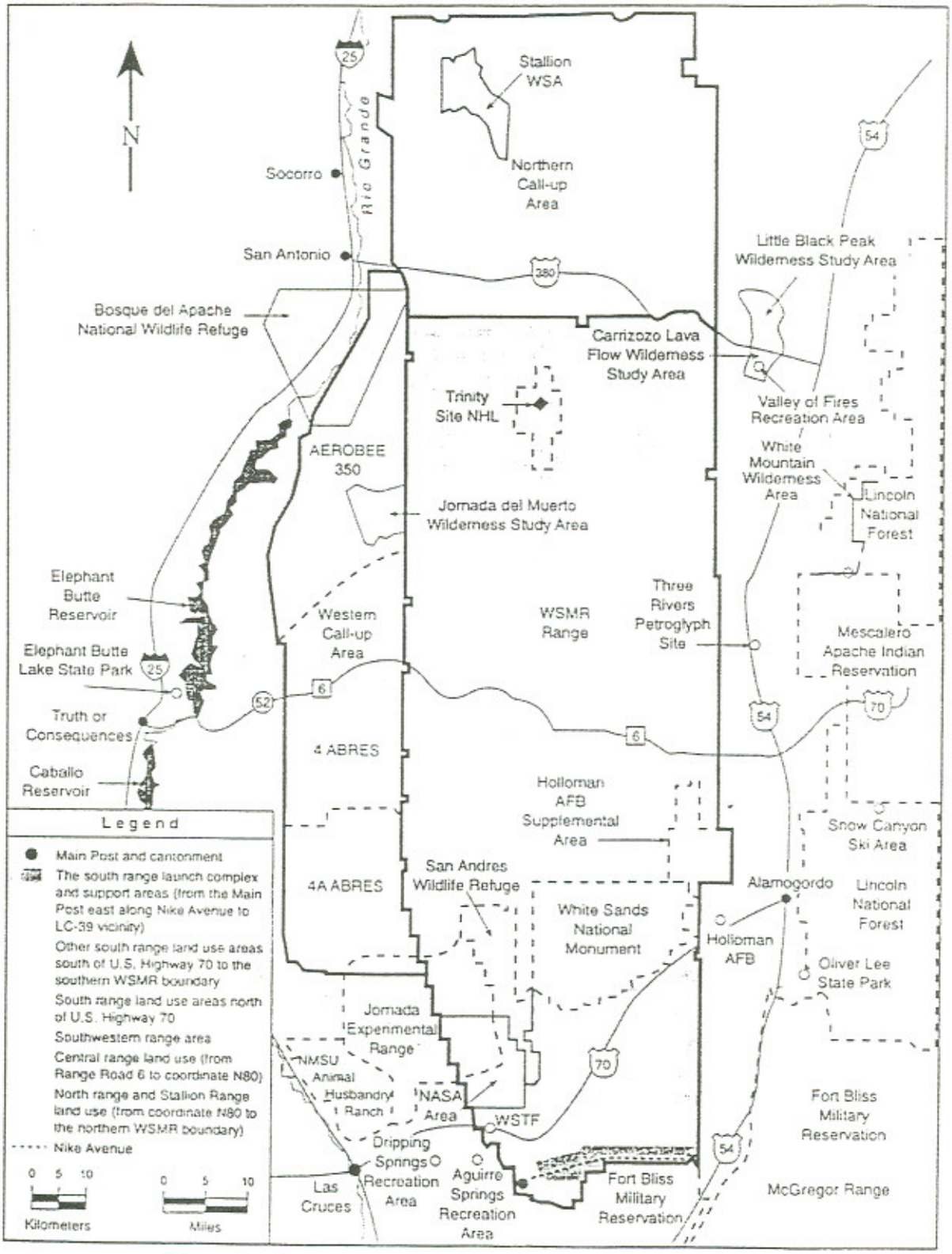

Figure 7. Off-Range Sensitive Areas and On-Range Land Use

Wilderness Areas and Wilderness Study Areas. The BLM, USFS and USFWS manage formally designated wilderness or wilderness study areas (WSA) which are managed with the same protection prescription as wilderness. These areas are completely off-limits to all motorized vehicles including the use of helicopters, unless the managing agency permits such entry for purposes of fire suppression, safety, rescue, or matters of national security. Coordination between WSMR (National Range and specifically NRES-C) and the land managing agency must be initiated before entry into the Wilderness areas or WSAs. The following is a list of wilderness areas and WSAs and managing agencies within 80 km (50 mi) of the WSMR boundary (Figure 7).

- White Mountain Wilderness Area (USFS)
- Organ Mountains Wilderness Area (BLM)
- San Pasqual Wilderness Area (BLM)
- Indian Wells Wilderness Area (BLM)
- Jornada del Muerto WSA (BLM)
- Little Black Peak WSA (BLM)
- Stallion WSA (BLM)

A programmatic memorandum of agreement (PMOA) exists between WSMR and BLM concerning the operational use of the Northern and Western Call-Up Areas. Specific environmental protection provisions are not documented in the PMOA. However, contact with the BLM offices in Socorro and Las Cruces must be made if the potential for a significant recovery action environmental impact may result or has occurred in the Call-Up Areas. The procedure has been arranged that coordination with BLM will be maintained before, during, and after a mission with potential effect on the Call-Up Areas by NRES. NRES-C has specific responsibility for this coordination.

Although private lands have no formal protection status, most owners of properties adjacent to the Range have specific agreements with the U.S. Army concerning entry for test or recovery purposes. These land owners shall be contacted before entry unless safety or national security are at issue.

4.8 Application of Mitigation and Impact Reduction Requirements in WSMR Range-Wide EIS and Project-Specific NEPA Documents

- Impact reduction requirements and Mitigation measures specified in the WSMR Range-Wide EIS and project-specific NEPA compliance documents must be applied.
- Compliance with mitigation measures shall be ensured by the project/program sponsor.
- The program/project sponsor will inform recovery action participants of the mitigation requirements in advance of the mission and will confirm that these measures were taken to protect sensitive resources where practicable.

5.0 Recovery Data Recording

A standardized format (Recovery Data Form) for recording recovery activities will be completed at the conclusion of each recovery action by the EOD/Recovery Team Leader or the NRES representative, or other designated project leads participating in the recovery action. The form will be submitted to NRES-C and the Project Sponsor. The form includes entries in all fields where the recorder has the information or knowledge to complete (a copy of the proposed Recovery Data Form is in the Appendix of this SOP). A map of the recovery area/site and a photograph of the specific debris recovery location should accompany the Recovery Data Form.

6.0 SAFETY PRECAUTIONS

Safety precautions as specified in WSMR General Safety Procedures, the WSMR *Standing Operating Procedures for EOD Operations in the Warhead Impact Areas (SSOP 57-83)*, and *WSMR Desk Top Procedures: Recovery* will be applied by all organizations and individuals involved in recovery actions.

7.0 TRAINING

All individuals involved in WSMR recovery actions must be generally familiar with the basic environmental setting on the Range and more specifically must be aware of the sensitivities presented by this environment. NRES will provide a general orientation to the WSMR environment and environmental protection to key project/program personnel and advanced level of training to recovery team personnel.

7.1 General Orientation

A general orientation to the WSMR environment and environmental protection will be provided to program and project sponsors before commencement of testing activities. This orientation (on a video or interactive computer program format) will consist of an introduction to the plants and animal on the Range, cultural resources, and the areas in which a designated sensitivity occurs (e.g., White Sands pupfish habitat and Trinity Site National Historic Landmark). Representatives from the NRES Customer Support Office will be available to answer questions concerning these resources and areas and will direct the individual receiving the orientation to Environmental Services Division experts for specific topics. A brochure outlining WSMR sensitive natural and cultural resources and their locations will be made available to project/program personnel for subsequent reference.

7.2 Recovery Team Training

Additional training will be mandatory for EOD/Recovery staff and other designated staff directly involved with recovery actions. This annual training will include a review of sensitive areas, guidance on environmental protection as specified in Section 4, and instruction of the completion of the Data Recording Form.

8.0 POINTS OF CONTACT

The following are primary and general points of contact for environmental protection and recovery action procedures.

8.1 Environmental Protection

Primary Contact

- National Range Directorate of Environment and Safety - Customer Support Office, NRES-C, Building 126, 678-5670

General

- National Range Directorate of Environment and Safety - Environmental Services Division, NRES-E, Building 163, 678-2224

- National Range Directorate of Environment and Safety - Director, NRES, Building 1510, 678-8966

8.2 Emergency Points of Contact

- WSMR Police Department/Security - ***Emergency 911***, 678-1234

- National Range Directorate of Environment and Safety - Fire and Emergency Services Division (WSMR Fire Department), NRES-F, Main Post Station #1, ***Emergency 117***, 678-4187

- Commander, U.S. Army McAfee Health Clinic (MCHM-MHC), 678-1138

8.3 Explosives Ordnance Demolition/Recovery

- National Range Operations Directorate, Operations Control Division, Explosive Ordnance Disposal (EOD) Section (NRO-CS-E), Building 360, 678-2035/2933/3922

9.0 ACRONYMS AND ABBREVIATIONS, UNITS OF MEASURE

AFB	Air Force Base
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
CG	Commanding General
CFR	Code of Federal Regulations
CERCLA	Comprehensive Environmental Response Compensation and Liability
EIS	environmental impact statement
EOC	Emergency Operations Center
EOD	Explosives Ordinance Disposal
EPA	Environmental Protection Agency
EPS	Environmental Protection Specialist
GPS	Global Positioning System
HAZMAT	hazardous materials
IC	Installation Commander
IOSC	Installation On-Scene Coordination
IRT	Installation Response Team
LC	Launch Complex
LCLU	Limited Compatible Land Use
MCHM-MHC	McAfee Health Clinic
MSDS	Material Safety Data Sheet
MOU	Memorandum of Understanding
NASA	National Aeronautics and Space Administration
NAWCWPNS-WS	Navel Air Warfare Center Weapons - White Sands
NEPA	National Environmental Policy Act
NHL	National Historic Landmark
NMDGF	N. M. Department of Game and Fish
NPS	National Park Service
NRES	National Range Directorate of Environment and Safety
NRES-C	National Range Directorate of Environment and Safety, Customer Support Office
NRES-E	National Range Directorate of Environment and Safety, Environmental Services Division
NRES-F	National Range Directorate of Environment and Safety, Fire and Emergency Services Division
NRC	Nuclear Regulatory Commission
NRO	National Range Operations
NRO-CS-E	National Range Operations Directorate - Explosives Ordnance Disposal Division
NRS	National Range Support
NHL	National Historic Landmark
PMOA	Programmatic Memorandum of Agreement
REC	Record of Environmental Consideration

SANWR	San Andres National Wildlife Refuge
SD	Law Enforcement and Security
SD-S	WSMR Security/Counterintelligence Division
SOP	Standard Operating Procedure
SSOP	Standing Operations Procedure
UDS	Universal Documentation System
USDA	United States Department of Agriculture
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
UTM	universal transverse mercator
WIT	Weapons (Warhead) Impact Target
WSA	Wilderness Study Areas
WSMR	White Sands Missile Range
WSNM	White Sands National Monument
WSTF	White Sands Test Facility

UNITS OF MEASURE

ac	acre
ft	foot
gal	gallon
ha	hectare
km	kilometer
km^2	square kilometer
l	liter
m	meter
mi	mile
mi^2	square mile

APPENDIX

RECOVERY DATA RECORDING FORM

WHITE SANDS MISSILE RANGE - STANDARD OPERATING PROCEDURE FOR ENVIRONMENTAL PROTECTION DURING RECOVERY ACTIONS

DATA RECORDING FORM

PROJECT NAME: _____ DATE: _____

REC or NRES-C REFERENCE NO._____ UDS NO. _____

TEST SPONSOR: _____ TEL. NO. _____

1. PROJECT SUMMARY - Provide a brief description of the project including type of weapons system (e.g., surface to air, surface to surface, air to surface), target type (e.g., BQM-34, WIT static target) and number, number of personnel participating in the project, vehicles involved overall in the project, and other pertinent information to add to the recovery actions data base.

Type of Weapon System: _____

Booster: _____

Target(s) Type: _____

Other Information: _____

_____

_____

_____

_____

2. PLANNED IMPACT SITE(S) for Weapon and Target Debris (Global Positioning System-[GPS] derived UTM coordinates, if available): _____

_____

3. ACTUAL IMPACT SITE(S) (GPS-derived UTM coordinates, if available): _____

_____

4. TYPE AND NUMBER OF VEHICLES used during recovery (including helicopter use):

_____

5. DISTANCE DRIVEN OFF-ROAD by Recovery Team: _____

_____

6. DESCRIPTION OF THE IMPACT SITE:

a. **Topography** (circle all that apply and explain if appropriate):

1) flat: dry lake bed (playa), level plain

2) dunes: gypsum (white), sand (red or tan), mesquite dunes

3) arroyo

4) foothills (bajada)

5) mountain

b. **Soils** (circle all that apply, list percentage, and explain if appropriate):

1) very fine silt - Percentage: ___10-20% ___20-40% ___40-60% ___60-80% ___80-100%

comments:_____

2) sandy - Percentage: ___10-20% ___20-40% ___40-60% ___60-80% ___80-100%

comments:_____

3) rocky (with cobbles less than 5 inches [in] diameter) - Percentage: ___10-20% ___20-40% ___40-60% ___60-80% ___80-100%

comments:_____

4) rocky (with cobbles greater than 5 in diameter or boulders) - Percentage: ___10-20% ___20-40% ___40-60% ___60-80% ___80-100%

comments:_____

5) rock outcrop - Percentage: ___10-20% ___20-40% ___40-60% ___60-80% ___80-100%

comments:_____

c. **Surface Water Type and Distance** _____

d. **Vegetation** (circle as many as apply and approximate percentage)

1) Close-basin Scrub (primarily on the floor of the Tularosa Basin and portions of the Jornada del Muerto Valley between 3,850 and 4,900 feet [ft]: fourwing saltbush, tarbush, iodine bush, and arroyo vegetation).

Percentage: ___10-20% ___20-40% ___40-60% ___60-80% ___80-100%

2) Desert Scrub (widespread on Range between 4,100 and 6,100 ft: mesquite, creosote bush).

Percentage: ___10-20% ___20-40% ___40-60% ___60-80% ___80-100%

3) Desert Grassland and Plains-mesa Scrub (on upper elevations east side of mountains and atop mesas, common on west side of Range, particularly Stallion area between 4,000 and 6,000 ft: grasses dominate with sage, yucca, sotol, ocotillo and Mormon tea).

Percentage: ___10-20% ___20-40% ___40-60% ___60-80% ___80-100%

4) Coniferous Woodland (upper elevations of mountains between 5,800 and 8,500 ft: one-seed juniper and piñon pine).

Percentage: ___10-20% ___20-40% ___40-60% ___60-80% ___80-100%

e. **Wildlife Observed** (birds, game animals, small mammals, snakes) _____

_____

f. **Cultural Resources Observed** (ranch, windmill, old fence, corral; prehistoric pottery, flaked rock or other materials) _____

_____

7. Weather Conditions During Recovery _____

_____

_____

8. Soil Surface Conditions During Recovery _____

_____

_____

9. Number of Recovery Personnel _____

10. SUMMARY OF RECOVERY ACTION AND ENVIRONMENTAL EFFECTS (upon sensitive natural or cultural resources, and other pertinent technical or environmental protection information; describe variables such as air or ground recovery, use of all-terrain-vehicles or foot travel, EOD recovery class and requirement to destroy debris at impact site,).

_____

_____

_____

_____

_____

_____

_____

_____

a. **Spills** (hazardous materials such as fuels, radioactive materials, batteries and of other materials such as hydraulic fluid and non-fuel oils/lubricants; note site coordinates, dimensions and response recommended or emergency action taken).

_____

_____

_____

b. **Area of Impact** (describe area of disturbance, size of debris, percentage of debris recovered, use of backhoe or other heavy equipment to remove debris).

_____

_____

_____

_____

c. **Fires** (describe all fires resulting from the impact or recovery operations including source, area of burn, time of day, burn times to control and suppression, type of suppression, and damage to structures or recovery vehicles).

_____

_____

_____

_____

11. Graphic depiction of impact site: ___map ___photo ___video ___none

Archived location: _____

NAME OF PREPARER (Please Print) _____

ORGANIZATION _____ TELEPHONE NO. _____

SIGNATURE OF PREPARER _____

APPENDIX B – JASSM Material Safety Data Sheets

Product Information Sheet

Panasonic Batteries
Panasonic Industrial Company
A Division of Matsushita Electric Corporation of America
Two Panasonic Way
Secaucus, NJ 07094
Toll Free: 877-726-2228
Fax: 847-468-5750
e-mail: pembatteries@panasonic.com
Internet: www.panasonic.com/batteries

Product: **Nickel Cadmium Batteries (NiCd)**

Applicable models/sizes: **All**

Revision: **A; Dated 6/2/99**

The batteries referenced herein are exempt articles and are not subject to the OSHA Hazard Communication Standard requirement. This sheet is provided as a service to our customers.

MSDS

Material Safety Data Sheets (MSDS) are a sub-requirement of the Occupational Safety and Health Administration (OSHA) Hazard Communication Standard, 29 CFR Subpart 1910.1200. This Hazard Communication Standard does not apply to various subcategories including anything defined by OSHA as an "article". OSHA has defined "article" as a manufactured item other than a fluid or particle: (i) which is formed to a specific shape or design during manufacture; (ii) which has end use function(s) dependent in whole or in part upon its shape or design during end use; and (iii) which under normal conditions of use does not release more than very small quantities, e.g. minute or trace amounts of a hazardous chemical, and does not pose a physical hazard or health risk to employees.

Because all of our batteries are defined as "articles", they are exempt from the requirements of the Hazard Communication Standard, hence a MSDS is not required.

The following components are found in a Panasonic Nickel Cadmium battery:

Component	Material	Formula
Positive Electrode	Nickel Oxyhydroxide	Ni(OH)2
Negative Electrode	Cadmium	Cd
Electrolyte	Potassium Hydroxide	KOH
	Sodium Hydroxide	NaOH (for high temp. versions)

The overall reaction is: $Cd + 2NiOOH + 2H_2O \Leftrightarrow Cd(OH)_2 + 2Ni(OH)_2$

Potential Health Hazards

Nickel Cadmium batteries do not leak electrolyte under normal usage conditions. Severely overcharged or abused batteries may leak small amounts of electrolyte. In the case of skin exposure, wash any exposed skin with copious amounts of water. It is advisable to wear gloves and safety glasses when handling leaking batteries.

Assure Proper Recycling!

All Panasonic Nickel Cadmium batteries are covered by the Rechargeable Battery Recycling Corporation's (RBRC) Nickel Cadmium Battery Recycling Program. Please call 1-800-8-BATTERY for information on recycling your used Nickel Cadmium battery or go to the RBRC web site at www.rbrc.org for additional information.

(continued)

Panasonic strongly recommends that all of its customers join the RBRC Nickel Cadmium Recycling Program thus, allowing you to use the following License Seal which meets all the labeling requirements of the 1996 Federal Battery Law.

Nickel Cadmium batteries destined for recycling can be managed under the federal *Universal Waste Rule* codified at 40 CFR Part 273.

In the event of disposal, dispose only in accordance with federal, state and local regulation. Batteries generated as a waste are subject to the Resource Conservation and Recovery Act (RCRA) as a D006 (cadmium) hazardous waste.

Transportation

Panasonic sealed nickel cadmium batteries are considered to be "dry cell" batteries and are unregulated for purposes of transportation by the U.S. Department of Transportation (DOT), International Civil Aviation Administration (ICAO), International Air Transport Association (IATA) and the International Maritime Dangerous Goods regulations (IMDG). As of 1/1/97 IATA requires that batteries being transported by air must be protected from short-circuiting and protected from movement that could lead to short-circuiting. We however recommend that these batteries be separated to prevent short-circuits and securely packaged in all modes of transportation.

All nickel cadmium batteries are classified as a D006 hazardous waste because of the presence of cadmium. This waste code is assigned because of toxicity, not corrosiveness. These batteries do not meet the definition of a corrosive waste.

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

MALLINCKRODT J.T.Baker

PROPYLENE GLYCOL

MSDS Number: P6928 --- *Effective Date: 12/08/96*

1. Product Identification

Synonyms: 1,2-propanediol; 1,2-dihdroxypropane; methyl glycol; methylethylene glycol
CAS No.: 57-55-6
Molecular Weight: 76.09
Chemical Formula: CH3CHOHCH2OH
Product Codes: J.T. Baker: 9402, U510 Mallinckrodt: 1925, 6263

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Propylene Glycol	57-55-6	99 - 100%	Yes

3. Hazards Identification

Emergency Overview

CAUTION! MAY CAUSE IRRITATION TO SKIN AND EYES.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 0 - None
Flammability Rating: 1 - Slight
Reactivity Rating: 1 - Slight
Contact Rating: 2 - Moderate
Lab Protective Equip: GOGGLES; LAB COAT

Storage Color Code: Orange (General Storage)

Potential Health Effects

Inhalation:
No adverse health effects via inhalation.

Ingestion:
Relatively non-toxic. Ingestion of sizable amount (over 100ml) may cause some gastrointestinal upset and temporary central nervous system depression. Effects appear more severe in individuals with kidney problems.

Skin Contact:
Mild irritant and defatting agent, especially on prolonged contact.

Eye Contact:
May cause transitory stinging and tearing.

Chronic Exposure:
Lactic acidosis, stupor and seizures have been reported following chronic ingestion.

Aggravation of Pre-existing Conditions:
Kidney disorders.

4. First Aid Measures

Inhalation:
Remove to fresh air. Not expected to require first aid measures.

Ingestion:
Not expected to require first aid measures. Give several glasses of water to drink to dilute. If large amounts were swallowed, get medical advice.

Skin Contact:
Remove any contaminated clothing. Wash skin with soap and water for at least 15 minutes. Get medical attention if irritation develops or persists.

Eye Contact:
In case of contact, immediately flush eyes with plenty of water for at least 15 minutes, lifting upper and lower eyelids occasionally. Call a physician if irritation persists.

Note to Physician:
In case of ingestion, monitor for acidosis and central nervous system changes. Exposed persons with previous kidney dysfunction may require special treatment.

5. Fire Fighting Measures

Fire:
Flash point: 99C (210F) CC Autoignition temperature: 371C (700F) Flammable limits in air % by volume: lel: 2.6; uel: 12.5 Material can support combustion.

Explosion:
Containers may explode in heat or fire.

Fire Extinguishing Media:
Dry chemical, foam, water or carbon dioxide.

Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Move exposed containers from fire area, if it can be done without risk. Use water to keep fire-exposed containers cool.

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer!

7. Handling and Storage

Protect container from physical damage. Store in a cool, dry, ventilated area away from sources of heat, moisture, and incompatible substances. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
AIHA Workplace Environmental Exposure Level (WEEL): Vapor and Aerosol = 50ppm; Aerosol, only = 10mg/m3.

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, a half-face respirator with an organic vapor cartridge and dust/mist filter may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece respirator with an organic vapor cartridge and dust/mist filter may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier.

whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:
Wear protective gloves and clean body-covering clothing.

Eye Protection:
Use chemical safety goggles. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Clear oily liquid.

Odor:
Odorless.

Solubility:
Miscible in water.

Specific Gravity:
0.0361 @ 20C/4C

pH:
No information found.

% Volatiles by volume @ 21C (70F):
No information found.

Boiling Point:
188.2C (370F)

Melting Point:
-59C (-74F)

Vapor Density (Air=1):
2.6

Vapor Pressure (mm Hg):
0.129 @ 25C (77F)

Evaporation Rate (BuAc=1):
0.01

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:

Carbon dioxide and carbon monoxide may form when heated to decomposition. Aldehydes or lactic, pyruvic or acetic acids may also be formed.

Hazardous Polymerization:
Will not occur.

Incompatibilities:
Strong oxidizing agents.

Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Oral rat LD50: 20g/kg. Skin rabbit LD50: 20.8g/kg. Irritation: Eye rabbit/Draize, 500 mg/24H mild. Investigated as a mutagen and reproductive effector.

--------\Cancer Lists\---

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Propylene Glycol (57-55-6)	No	No	None

12. Ecological Information

Environmental Fate:
When released into the soil, this material is expected to readily biodegrade. When released into the soil, this material is expected to leach into groundwater. When released into water, this material is expected to readily biodegrade. When released into the air, this material is expected to be readily degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life between 1 and 10 days.

Environmental Toxicity:
No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Not regulated.

15. Regulatory Information

```
--------\Chemical Inventory Status - Part 1\--------------------------------
Ingredient                                    TSCA  EC   Japan  Australia
---------- ----------------------------------- ---- ---  -----  ---------
Propylene Glycol (57-55-6)                     Yes  Yes   Yes      Yes

--------\Chemical Inventory Status - Part 2\--------------------------------
                                                      --Canada--
Ingredient                                    Korea  DSL   NDSL   Phil.
---------- ----------------------------------- -----  ---   ----   -----
Propylene Glycol (57-55-6)                     Yes   Yes   No      Yes

--------\Federal, State & International Regulations - Part 1\----------------
                                            -SARA 302-      ------SARA 313-----
Ingredient                                  RQ    TPQ       List  Chemical Catg.
----------------------------------------- ---   -----     ----  ---------------
Propylene Glycol (57-55-6)                  No    No        No          No

--------\Federal, State & International Regulations - Part 2\----------------
                                            -RCRA-     -TSCA-
Ingredient                                  CERCLA     261.33      8(d)
----------------------------------------- ------     ------     ------
Propylene Glycol (57-55-6)                  No         No          No

Chemical Weapons Convention:  No     TSCA 12(b):  No     CDTA:  No
SARA 311/312:  Acute: Yes     Chronic: No   Fire: No  Pressure: No
Reactivity: No          (Pure / Liquid)
```

Australian Hazchem Code: No information found.
Poison Schedule: No information found.

WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: 0 **Flammability:** 1 **Reactivity:** 0

Label Hazard Warning:
CAUTION! MAY CAUSE IRRITATION TO SKIN AND EYES.

Label Precautions:
Avoid contact with eyes, skin and clothing. Wash thoroughly after handling.

Label First Aid:
In case of contact, immediately flush skin or eyes with plenty of water for at least 15 minutes. Call a physician if irritation develops or persists.

Product Use:
Laboratory Reagent.

Revision Information:
Pure. New 16 section MSDS format, all sections have been revised.

Disclaimer:
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****
Prepared by: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)

ASHLAND CHEMICAL -- JP-10
MATERIAL SAFETY DATA SHEET
NSN: 9150010485280
Manufacturer's CAGE: 34897
Part No. Indicator: B
Part Number/Trade Name: JP-10

****
General Information
****

Company's Name: ASHLAND CHEMICAL CO
Company's P. O. Box: 2219
Company's City: COLUMBUS
Company's State: OH
Company's Country: US
Company's Zip Code: 43216
Company's Emerg Ph #: 800-274-5263
Company's Info Ph #: 800-325-3751
Record No. For Safety Entry: 005
Tot Safety Entries This Stk#: 006
Status: SMJ
Date MSDS Prepared: 05JAN96
Safety Data Review Date: 03DEC97
MSDS Serial Number: CFSYN

****
Ingredients/Identity Information
****

Proprietary: NO
Ingredient: 4,7-METHANOINDAN, HEXAHYDRO-, EXO-; (EXO-TETRAHYDRO DICYCLOPENTADIENE)
Ingredient Sequence Number: 01
Percent: 100
NIOSH (RTECS) Number: PB9600000
CAS Number: 2825-82-3
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

Proprietary: NO
Ingredient: SUPP DATA:DIFFICULT, ADMINISTER OXYGEN. KEEP PERSON WARM & QUIET; SEEK IMMEDIATE MEDICAL ATTENTION.
Ingredient Sequence Number: 02
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: SPILL PROC:COMPLETED. STOP SPILL AT SOURCE. PREVENT FROM ENTERING DRAINS, SEWERS, STREAMS/OTHER BODIES OF WATER. (ING 4)
Ingredient Sequence Number: 03
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 3:PREVENT FROM SPREADING. IF RUNOFF OCCURS, NOTIFY AUTHS AS REQD. PUMP/VACUUM TRANSFER SPILLED PROD TO CLEAN (ING 5)
Ingredient Sequence Number: 04
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 4:CNTNRS FOR RECOVERY; ABSORB UNRECOVERABLE PROD. TRANSFER CONTAM ABSORB, SOIL & OTHER MATLS TO CNTNRS FOR DISPOSAL.
Ingredient Sequence Number: 05
NIOSH (RTECS) Number: 999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: RESP PROT:ENGINEERING OR ADMINISTRATIVE CONTROLS SHOULD BE IMPLEMENTED TO REDUCE EXPOSURE.
Ingredient Sequence Number: 06
NIOSH (RTECS) Number: 999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: VENT:SUSPECTED OR APPARENT ADVERSE EFFECTS:.
Ingredient Sequence Number: 07
NIOSH (RTECS) Number: 999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Physical/Chemical Characteristics

Appearance And Odor: CLEAR, SAYBOLT COLOR +25 LIQUID, HOMOGENEOUS SOLUTION.
Boiling Point: 360F,182C
Vapor Pressure (MM Hg/70 F): <5 @ 77F
Vapor Density (Air=1): >1
Specific Gravity: 0.93-0.94
Evaporation Rate And Ref: SLOWER THAN ETHYL ETHER
Percent Volatiles By Volume: 100
pH: N/A

Fire and Explosion Hazard Data

Flash Point: 125F,52C
Extinguishing Media: REGULAR FOAM, CARBON DIOXIDE, DRY CHEMICAL.
Special Fire Fighting Proc: USE NIOSH APPRVD SCBA & FULL PROT EQUIP (FPN). WATER/FOAM MAY CAUSE FROTHING WHICH CAN BE VIOLENT & POSS ENDANGER LIFE OF FIREFIGHTER. REFER TO PPE SECTION.
Unusual Fire And Expl Hazrds: VAPS ARE HVR/AIR & MAY TRAVEL ALONG GROUND/ BE MOVED BY VENT & IGNITED BY HEAT, PILOT LIGHTS, OTHER FLAMES & IGNIT SOURCES AT LOCATIONS DIST FROM MATL (SUPDAT)

Reactivity Data

Stability: YES
Cond To Avoid (Stability): NONE SPECIFIED BY MANUFACTURER.
Materials To Avoid: AVOID CONTACT W/STRONG OXIDIZING AGENTS.
Hazardous Decomp Products: MAY FORM CARBON DIOXIDE & CARBON MONOXIDE, VARIOUS HYDROCARBONS.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT RELEVANT

Health Hazard Data

LD50-LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES

Health Haz Acute And Chronic: EYE:CAN CAUSE IRRITATION. SYMPTOMS INCLUDE STINGING, TEARING, REDNESS AND SWELLING. SKIN:MAY CAUSE MILD IRRITATION. PROLONGED OR REPEATED CONTACT MAY DRY SKIN. SYMPTOMS MAY INCLUDE REDNESS, BURNING, DRYING AND CRACKING, AND BURNS. INGESTION:SWALLOWING SMALL AMOUNTS OF THIS MATERIAL DURING NORMAL (EFTS OF OVEREXP)
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NOT RELEVANT
Signs/Symptoms Of Overexp: HLTH HAZ:HANDLING IS NOT LIKELY TO CAUSE HARMFUL EFTS. SWALLOWING LG AMTS MAY BE HARMFUL. INHAL:BREATHING OF VAPOR/ MIST IS POSSIBLE. SYMPTOMS OF EXPOSURE: STOMACH OR INTESTINAL UPSET (NAUSEA, VOMITING, DIARRHEA), IRRITATION (NOSE, THROAT, AIRWAYS).
Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.
Emergency/First Aid Proc: EYES:IMMED MOVE INDIVIDUAL AWAY FROM EXPOS & INTO FRESH AIR. FLUSH GENTLY W/WATER FOR AT LST 15 MINS WHILE HOLDING EYELIDS APART; SEEK IMMED MED ATTN. SKIN:REMOVE CONTAM CLTHG. WASH EXPOS AREA W/SOAP & WATER. IF SYMPS PERSIST, SEEK MED ATTN. LAUNDER CLTHG BEFORE REUSE. INGEST:DO NOT INDUCE VOMIT. THIS MATL IS ASPIR HAZ. IF INDIVIDUAL IS DROWSY/UNCON, PLACE ON LEFT SIDE W/HEAD DOWN. SEEK (SUPDAT)

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: SM SPILL:ABSORB LIQ ON VERMICULITE, FLOOR ABSORB/OTHER ABSORB MATL. LG SPILL:ELIM ALL IGNIT SOURCES (FLARES, FLAMES INCL PILOT LIGHTS, ELEC SPKS). PERS NOT WEARING PROT EQUIP SHOULD BE EXCLUDED FROM AREA OF SPILL UNTIL CLEAN-UP HAS BEEN (ING 3)
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Method: CONTAMINATED ABSORBENT MAY BE DEPOSITED IN A LANDFILL I/A/W LOCAL, STATE & FEDERAL REGULATIONS. DESTROY BY LIQUID INCINERATION I/A/W APPLICABLE REGULATIONS.
Precautions-Handling/Storing: ALL 5-GALLON PAILS & LARGER METAL CNTNRS, INCL TANK CARS & TANK TRUCKS, SHOULD BE GROUNDED &/OR BONDED WHEN MATERIAL IS TRANSFERRED.
Other Precautions: CONTAINERS OF THIS MATERIAL MAY BE HAZARDOUS WHEN EMPTIED. SINCE EMPTIED CONTAINERS RETAIN PRODUCT RESIDUES (VAPOR, LIQUID &/ OR SOLID), ALL HAZARD PRECAUTIONS GIVEN IN THIS MSDS MUST BE OBSERVED.

Control Measures

Respiratory Protection: IF OVEREXP HAS BEEN DETERMINED/DOCUMENTED, A NIOSH APPRVD AIR SUPPLIED RESP IS ADVISED IN ABSENCE OF PROPER ENVIRON CONTROL. OSHA REGS ALSO PERMIT OTHER NIOSH APPRVD RESPS UNDER SPECIFIED CNDTNS. (SEE YOUR SFTY EQUIP SUPPLIER). (ING 6)
Ventilation: PROVIDE SUFFICIENT MECH (GEN &/OR LOC EXHST) VENT TO MAINTAIN EXPOS BELOW LEVEL OF OVEREXP (FROM KNOWN, (ING 7)
Protective Gloves: RESIST GLOVES(NEOPRENE, NITRILE RUBBER).
Eye Protection: ANSI APPROVED CHEM WORKERS GOGGS (FP N).
Other Protective Equipment: EYE WASH FOUNTAIN & DELUGE SHOWER WHICH MEET ANSI DESIGN CRITERIA (FP N). WEAR IMPERVIOUS CLOTHING & BOOTS.
Work Hygienic Practices: NONE SPECIFIED BY MANUFACTURER.
Suppl. Safety & Health Data: EXPLO HAZ:HNDLG POINT. NEVER USE WELDING/ CUTTING TORCH ON/NEAR DRUM (EVEN EMPTY) BECAUSE PROD (EVEN JUST RESIDUE) CAN IGNITE EXPLOSIVELY. FIRST AID PROC:MED ATTN. IF POSS, DO NOT LEAVE INDIVIDUAL UNATTENDED. INHAL:MOVE INDIVIDUAL AWAY FROM EXPOS & INTO FRESH AIR. IF SYMPS PERSIST, SEEK MED ATTN. IF BRTHG IS (ING 2)

Transportation Data

Trans Data Review Date: 98013
DOT PSN Code: GJL

DOT Proper Shipping Name: FLAMMABLE LIQUIDS, N.O.S.
DOT Class: 3
DOT ID Number: UN1993
DOT Pack Group: III
DOT Label: FLAMMABLE LIQUID
IMO PSN Code: HIA
IMO Proper Shipping Name: FLAMMABLE LIQUID, N.O.S. c
IMO Regulations Page Number: 3345
IMO UN Number: 1993
IMO UN Class: 3.3
IMO Subsidiary Risk Label: -
IATA PSN Code: MCA
IATA UN ID Number: 1993
IATA Proper Shipping Name: FLAMMABLE LIQUID, N.O.S. *
IATA UN Class: 3
IATA Label: FLAMMABLE LIQUID
API PSN Code: MCA
API Symbols: *
API Prop. Shipping Name: FLAMMABLE LIQUIDS, N.O.S.
API Class: 3
API ID Number: UN1993
API Pack Group: III
API Special Prov: P5
API Basic Pac Ref: A7.3

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Disposal Data

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Label Data

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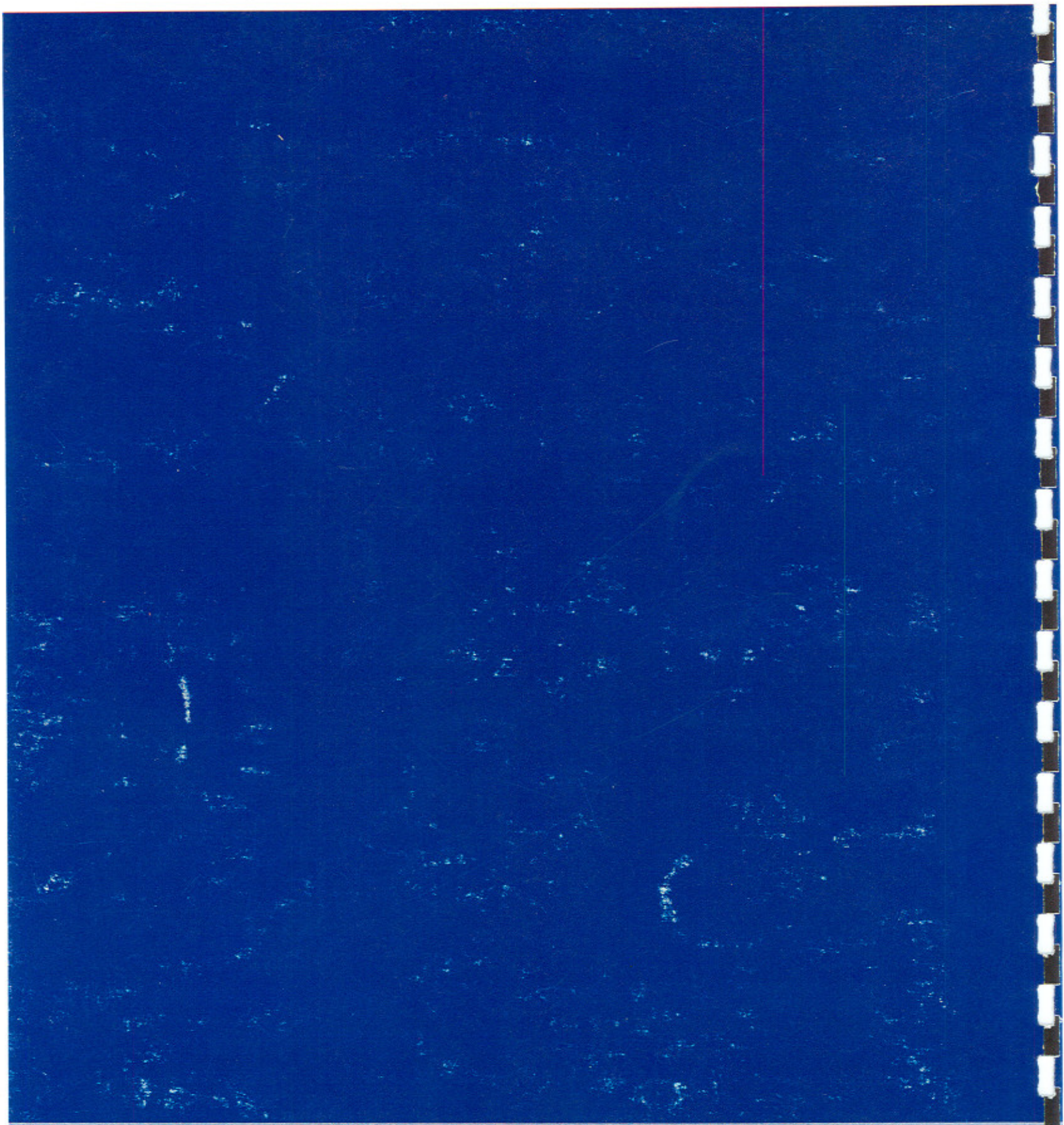
Label Required: YES
Technical Review Date: 03DEC97
Label Date: 01DEC97
Label Status: 0
Common Name: JP-10
Chronic Hazard: NO
Signal Word: WARNING!
Acute Health Hazard-Slight: X
Contact Hazard-Slight: X
Fire Hazard-Moderate: X
Reactivity Hazard-None: X
Special Hazard Precautions: COMBUSTIBLE. ACUTE:EYE:CAN CAUSE IRRITATION. SYMPTOMS INCLUDE STINGING, TEARING, REDNESS AND SWELLING. SKIN:MAY CAUSE MILD IRRITATION. PROLONGED OR REPEATED CONTACT MAY DRY SKIN. SYMPTOMS MAY SWALLOWING LARGE AMOUNTS MAY BE HARMFUL. INHALATION:STOMACH OR INTESTINAL UPSET (NAUSEA, VOMITING, DIARRHEA), IRRITATION (NOSE, THROAT, AIRWAYS). CHRONIC:NONE LISTED BY MANUFACTURER.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: ASHLAND CHEMICAL CO
Label P.O. Box: 2219
Label City: COLUMBUS
Label State: OH
Label Zip Code: 43216
Label Country: US
Label Emergency Number: 800-274-5263



Sverdrup

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