FINAL

RANGE MANAGEMENT PLAN AND ENVIRONMENTAL ASSESSMENT

For the

HILL AIR FORCE RANGE AND WENDOVER AIR FORCE RANGE

Of the

UTAH TEST AND TRAINING RANGE (UTTR)

Version 3.1

Prepared for:
EMX (Environmental Management Directorate, Plans and Programs Division)
Hill Air Force Base, Utah

Prepared by:

Dames & Moore
Foster Wheeler Environmental Corporation

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FINDING OF NO SIGNIFICANT IMPACT

1. **NAME OF ACTION:** Acceptance and implementation of the RANGE MANAGEMENT PLAN, Hill Air Force Range and Wendover Air Force Range of the UTAH TEST AND TRAINING RANGE (UTTR)

2. **DESCRIPTION OF THE PROPOSED ACTION:** The proposed action is the implementation of the RMP component of this Range Management Plan (RMP)/Environmental Assessment (EA). Because the last RMP for UTTR was prepared in 1975, a new RMP was needed to describe current and anticipated future activities on UTTR as well as their environmental setting. Because these activities might have environmental consequences, an EA that evaluates these potential consequences is also an integral component of this document.

UTTR is composed of both airspace and ground withdrawn from public use by the U.S. Department of Defense (DOD). The ground components managed by the U.S. Air Force lie beneath a portion of the airspace, with the Hill Air Force Range (HAFR) being beneath NUTTR (the airspace north of Interstate 80) and the Wendover Air Force Range (WAFR) being beneath SUTTR (the airspace south of Interstate 80). UTTR activities are also supported by ground facilities at Dugway Proving Ground. This document addresses primarily the land area of HAFR and WAFR and the portions of UTTR that are directly above that land area. Uses of the airspace often extend considerably beyond the space above the HAFR and WAFR land boundaries into an airspace complex composed of numerous subdivisions of restricted areas and military operating areas. Uses of the overall airspace are considered in sufficient detail to provide a context in which the overall function of UTTR can be understood.

The proposed action assumes ongoing customer requirements for activities that are not specifically predictable but are within the current mission and objectives of UTTR, which are to continue to provide unique training and testing facilities that enable DOD to maintain skilled personnel and state-of-the-art equipment ready to be used in testing, training, and support services associated with weapon systems. UTTR provides DOD a large testing facility that is unique in terms of the size of the ground safety footprint (the overall area in which an aircraft or other vehicle may safely operate, even if it goes off target) in the combined undeveloped land area of HAFR, WAFR, and the portion of Dugway west of Granite Mountain; the size of the associated airspace; and the distance of UTTR from potential missile launch sites.

Objectives for future use of the UTTR include the following: (1) continued provision of space and facilities for complex air-to-air, air-to-ground, and ground training exercises involving bombers, fighters, and ground troops having multiple roles and particularly emphasizing those training missions and testing operations that are most benefited by the remoteness, topography, size and undeveloped land area provided by UTTR; (2) increased communication and coordination among user groups to provide interactive and cost effective testing and training opportunities; (3) increased use of the sophisticated systems

systems at the Sand Island Target Complex; (4) increased use of the thermal treatment unit (TTU), which would be supported by upgrading the facility and its capability; (5) increased storage capacity in the missile storage area (MSA) to accommodate Delta II storage, for example; and (6) continued provision of test facilities for both manned and unmanned aircraft and munitions.

Because the components of the proposed action are not specifically predictable, three management options were developed within the proposed action. These management options serve to guide the NEPA compliance process for different activities, maximize the usability of this document, and maximize flexibility in use of UTTR. Option 1 is a restricted version of the status quo, with the intent of minimizing impacts to various resources (e.g., restrict the timing of some uses to minimize impacts to nesting raptors). Given that the ongoing operations at UTTR have already been approved under the NEPA process, reducing their effects would also be acceptable under NEPA and in compliance with the spirit of NEPA regarding the minimization of impacts. Option 2 is the status quo in terms of areas of use, types of use, and intensity of use. Therefore, under this option, no changes in range use are envisioned and no NEPA compliance activities are required beyond what has already been accomplished with prior activity-specific or site-specific NEPA documentation. Option 3 encompasses those activities that would involve a change in the areas of use, the types of use, or the intensity of use. Activities pursued under Option 3 would require additional activity-specific or site-specific NEPA evaluation. This process encourages groups planning new or changed activities on UTTR to incorporate NEPA evaluation when they are initiating their planning and selecting the location and way in which their plan might be implemented. These groups should then proactively involve the Plans and Programs Division of the Environmental Management Directorate in their more detailed planning. The action alternative, with these three management options, would implement this RMP, thereby incorporating information on the environmental resources and current uses of UTTR into the management of the range, and implementing a stepwise and focused process for early considerations of NEPA precepts by users of UTTR.

3. **SELECTION PROCESS:** Other alternatives, considered but eliminated, would involve the removal of specific types of training or testing activities or their transfer from UTTR to other DOD facilities. It was considered extremely unlikely that all current activities would be transferred from UTTR, given its unique characteristics, and beyond the scope of this EA to consider complete elimination of training or testing activities from the Air Force program. Because the action alternative is the continuation of current activities, which are not specifically predictable but rather are responsive to the needs of various customers, it was not possible to define other action alternatives based on specific alternative future use scenarios. Therefore, the proposed action alternative is the only viable alternative to be considered together with the no action alternative.

4. **ALTERNATIVES CONSIDERED OTHER THAN THE PROPOSED ACTION:** The no action alternative is to reject this plan and continue to operate under the 1975 RMP. So doing would forego the use of the RMP as an officially-adopted foundation for

range management and future planning. Thus, the no action alternative would officially bypass the up-to-date description of range uses, and the interface of these uses with the newly incorporated information on the affected environment and health/safety considerations. Finally, it would fail to benefit from the suggestions for minimizing impacts from range uses and maximizing the efficiency of NEPA compliance by the early incorporation of NEPA into the thought process of those planning new or changed range uses.

5. **SUMMARY OF ANTICIPATED ENVIRONMENTAL EFFECTS:** Impacts of range uses on environmental resources may be categorized into air impacts, ground-surface impacts, and below-ground impacts. Air impacts include degradation of ambient air quality, increased noise levels, or intrusion into visual resources. Ground-surface impacts may affect the largely transitory surface water (flow and quality), wetlands, soil, vegetation and wildlife (including threatened and endangered species), cultural resources (including paleontological, archeological, and historical resources), and visual resources In addition, they may result in the presence of hazardous waste or other spills or residues. The causes and more specific types of below-ground impacts are very similar to those of ground-surface impacts except that they may affect rock formations and mineral resources as well as deeper lying soils and groundwater rather than surface water. Consideration of these potential environmental effects has been incorporated into the three management options of the proposed action. The proposed action would have no significant adverse environmental effects. Options 1 and 2 are already in compliance with NEPA; Option 3, mandates evaluation under NEPA of activity-specific or site-specific changes in area, type, or intensity of use.

6. **FINDING OF NO SIGNIFICANT IMPACT:** Air Force Regulation (AFR) 19-9 and Air Force Instruction (AFI) 32-7060 that supersedes it address coordinated planning of test and training ranges and compliance with NEPA and imply that the planning process should be current so that it can provide guidance to ongoing and future actions. The proposed action meets these criteria by providing an updated plan that describes current and anticipated future range activities as well as environmental and health/safety considerations. Further, it outlines an orderly and efficient NEPA compliance process for future activity-specific and site-specific changes in area, type or intensity of use. Therefore, the proposed action would have no significant adverse environmental effects. Therefore, the proposed action is also the preferred action. Based on these considerations, a Finding of No Significant Impact is appropriate for this environmental assessment.

Authorized Signature — 4 Dec 96 — Date

TABLE OF CONTENTS

SUMMARY

MAIN TEXT

LIST OF FIGURES

Figure

LIST OF TABLES

LIST OF ACRONYMS

AAA	Used to Denote Triangulation Radar
ABW	Air Base Wing
ACC	Air Combat Command
ACHP	Federal Advisory Council on Historic Preservation
ACI	Air Combat Intercept
ACM	Advanced Cruise Missile
ACMI	Air Combat Maneuvering Instrumentation
ACT	Air Combat Training
AFB	Air Force Base
AFCEE	Air Force Center for Environmental Excellence
AFFTC	Air Force Flight Test Center
AFI	Air Force Instruction
AFLC	Air Force Logistics Command
AFMC	Air Force Materiel Command
AFOSH	Air Force Occupational Safety and Health
AFPD	Air Force Policy Directive
AFR	Air Force Regulation
AFRCE	Air Force Regional Civil Engineer
AFRES	Air Force Reserve System
A/G	Air to Ground
AG	Air Group
AGL	Above Ground Level
AGM	Air-to-ground munition
Air Force	U.S. Air Force
AIRFA	American Indian Religious Freedom Act
ALC	Air Logistics Command
ALCM	Air Launched Cruise Missile
ANG	Air National Guard
ANSI	American National Standards Institute
AQCR	Air Quality Control Region
AR	Air Refueling
Army	U. S. Army
ARPA	Archaeological Resource Protection Act
ARS	Air Refueling Squadron
ARW	Air Refueling Wing
AS	Air Squadrons
ASNAA	Aviation Safety and Noise Abatement Act
ATC	Air Traffic Control
ATVs	All-terrain vehicles
AU	Air Utility Helicoptor Group
AUM	Animal Unit Month
AW	Air Wing

AWACS	Airborne Warning and Control System
BACT	Best Available Control Technology
BCE	Base Civil Engineer
BFM	Basic Fighter Maneuvers
BLM	Bureau of Land Management
BOS	Base Operating Support
BRAC	Base Realignment and Closure
BS, BMS	Bomber Squadron
BW, BMW	Bomber Wings
CAA	Federal Clean Air Act
CAG	Carrier Air Groups
CALCM	Conventional Air-Launched Cruise Missiles
CAM	Consolidated Aviation Maintenance
CATEX	Categorical Exclusions
CBU	Cluster bomb unit
CEG	Civil Engineering Group
CENTAF	U.S. Central Air Force Command
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response and Compensation Liability Act
CFR	Code of Federal Regulations
CFT	Composite Force Training
Clover Control	299th Range Control Squadron
CM	Cruise Missile
CO	Carbon Monoxide
COMSQ	Communications Squadron
CONUS	Continental United States
CVW	Carrier Navy Weapons Group
CW	Composite Wing
CWA	Clean Water Act
dB	Decibel
dBA	Decibel, A-Weighted Scale
dBC	Decibel, C-Weighted Scale
DCA	Defensive Counter Air
DEQ	Department of Environmental Quality
DERA	Defense Environmental Restoration Account
DET	Detachment
DOD	U.S. Department of Defense
DOE	U.S. Department of Energy
DOT	Department of Transportation
DRMO	Defense Re-utilization and Marketing Office
Dugway	Dugway Proving Ground
DV	Dummy Vehicles
DWQ	Division of Water Quality
EA	Environmental Assessment

EC	Electronic Combat
ECM	Electronic Counter Measures
ECS	Electronic Communications Squadron
ECTC	Electronic Combat Test Capability
EED	Electro-Explosive Devices
EIAP	Environmental Impact Analysis Process
EIS	Environmental Impact Statement
EM	Environmental Management Directorate
EME	Environmental Management Directorate, Environmental Compliance Division
EMH	Environmental Management Directorate, Hazardous Waste Division
EMX	Environmental Management Directorate, Plans and Programs Division
EN	Engineering Division
EOD	Explosive Ordnance Disposal
EOI	Explosives Operations Instructions
EPA	U.S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-know Act
ER	Emergency Response
°F	Degrees Fahrenheit
FAA	Federal Aviation Administration
FG	Fighter Groups
FONSI	Finding of No Significant Impact
FRP	Facilities Response Plan
FS	Fighter Squadron
FTSQ	Flight Test Squadron
FW	Fighter Wing
FY	Fiscal Year
GAPA	Ground-to-Air Pilotless Aircraft
GAT	Ground Assault Target
GIS	Geographic Information System
GLCM	Ground Launched Cruise Missile
GLO	General Land Office
HAFR	Hill Air Force Range (Air Force ground)
HAG	Helicopter Aerial Gunnery Range
HAMOTS	High Accuracy Multiple Object Tracking System
HAP	Hazardous Air Pollutant
HAZMAT	Hazardous Materials
HCL	Hydrogen Chloride
HE	High Explosives
HQ USAF/LEE	Air Force Director of Engineering and Services
HQ AFESC/DEV	Air Force Environmental Directorate
HQ USAF/LEEV	Air Force Environmental Division
HTH	Trade Mark for a high-test calcium hypochlorite product
HUD	Heads Up Display

HUS	HAMOTS Upgrade System
Hz	Hertz
IADS	Integrated Air Defense System
ICBM	Intercontinental Ballistic Missile
ID	Identification
IFR/VFR	Instrument Flight Rules/Visual Flight Rules
INF	Intermediate Nuclear Force
IRP	Installation Restoration Program
JAAT	Joint Air Attack Tactics
km2	Square Kilometers
L_{cdn}	C-Weighted Sound-Pressure Level
L_{dn}	Day/Night Average-Sound Level Metric
L_{dnmr}	Route Map for Noise Along Military Training Routes
LA	Office Symbol for the Logistics Directorate
LGB	Laser-Guided Bomb
LI	Office Symbol for the Landing Gear Directorate
LM	Office Symbol for the Missile and Motor Dissection Directorate
LMSIP	Office Symbol for the Propellant Analysis Section
LMSMHR (LMSH)3	Office Symbol for the Missile Maintenance Branch
LWC	Local Wind Circulation
MAG	Marine Air Groups
MCC	Mission Control Center
MOA	Military Operating Area
MOU	Memorandum of Understanding
MSA	Missile Storage Area
MSL	Mean Sea Level
MTR	Military Training Route
MUTES	Multiple Threat Emitter Systems
MWR	Military Welfare Recycling
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NAVSEA-OP-5	Naval Sea Systems Command Operations
NCA	Noise Control Act
NEPA	National Environmental Policy Act
NESHAPS	National Emission Standards for Hazardous Air Pollutants
NFPA	National Fire Protection Association
NHPA	National Historic Preservation Act
NO2	Nitrogen Dioxide
NPDES	National Pollutant Discharge Elimination
NRD	National Register District
NRHP	National Register of Historic Places
NUTTR	Utah Test and Training Range-North (air space)
O3	Ozone
OB/OD	Open Burning/Open Detonation

Ogden ALC	Ogden Air Logistics Center (OO ALC)
OI	Operating Instructions
OO ALC	Ogden Air Logistics Center
OS	Operational Squadron
OSHA	Occupational Safety and Health Act
OSS/OSTA	Operational Support Squadron/Operational Support Training Airspace
PA/SI	Preliminary Assessment Site Investigation
PAE	Public Affairs Environmental Coordinator
PCBs	Polychlorinated Biphenyls
PDEIS	Preliminary Draft Environmental Impact Statement
PGM	Precision-Guided Munitions
PM-10	Particulate Matter less than 10 microns
PPE	Personal Protective Equipment
ppm	Parts Per Million
PSD	Prevention of Significant Deterioration
RANGES/PO	Range Operations Branch
RANS	Range Support Squadron
RC	Range Control
RCRA	Resource Conservation and Recovery Act
RCS	Range Control Squadron
RF	Radio Frequency
RMP	Range Management Plan
RS	Range Squadron
S/S	Surface to Surface
SAF/MIQ	Air Force Deputy for Environment and Safety
SAIC	Science Applications International Corporation
SAM	Surface-to-Air Missile
SARA	Superfund Amendments and Reauthorization Act
SE	Security and Safety Division
SEAD	Suppression of Enemy Air Defense
SEL	Sound Exposure Level
SFO	Simulated Flameout
SGB	Industrial Health Monitoring Directorate
SHPO	State Historic Preservation Offices
SO2	Sulfur Dioxide
SOA	Supersonic Operating Area
SOAG	Special Operating Air Group
SOCOM	Special Command
SOS	Special Operations Squads
SP	Special Protective Cluster
SPCC	Spill Prevention Control and Countermeasure
SPL	Sound Pressure Level
SQ	Squadrons
SS	Special Squadron

SUA	Military Support Flight of the 75th RANS
SUE	Civil Engineering Flight of the 75th RANS
SUF	Fire Department Flight of the 75th RANS
SUS	Security Police Flight of the 75th RANS
SUTTR	Utah Test and Training Range-South (air space)
SWMU	Solid Waste Management Units
TCLP	Toxicity Characteristic Leaching Procedure
TESTG	Test Group, also the 6545th or 545th Test Group
TESTG/EN	Test Group, Engineering Division
TESTG/SE	Test Group, Safety Office
TESTG/XRP	Test Group, Programs and Resources Division
TF	Test Forces Division
TMD	Theater Missile Defense
TOSS	Television Ordnance Scoring System
TP	Test Product
TRAINS	Threat Reaction Analysis and Indicator System
TSCA	Toxic Substance Control Act
TSP	Total Suspended Particulates
TSPI	Time-Space-Position Information
TTU	Thermal Treatment Unit
TW	Test Wing
U2	Uranium
UAV	Unmanned Air Vehicle
UDPR	Utah Division of Parks and Recreation
UDWR	Utah Division of Wildlife Resources
mg/L	milligrams per liter
UPDES	Utah Pollutant Discharge Elimination System
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
USNPS	U.S. National Park Service
USPCI	U.S. Pollution Control Inc.
USTs	Underground Storage Tanks
USU	Utah State University
UTTR	Utah Test and Training Range (ground and air space)
VFR	Visual Flight Rules
VRM	Visual Resource Management
WAFR	Wendover Air Force Range (Air Force ground)
WSA	Wilderness Study Areas
XR	Programs and Resources Division

SUMMARY

1.0 INTRODUCTION

This Range Management Plan and Environmental Assessment (RMP/EA) for the Utah Test and Training Range (UTTR) updates the Preliminary Range Management Plan for the Ogden Air Logistics Center (ALC) Test Range (Ogden ALC Directorate of Operations 1975) by providing more current information on range uses and including information on environmental resources and considerations regarding range uses. In fulfilling its obligations as an EA under the National Environmental Policy Act (NEPA), it also describes an action and a no action alternative and provides management options for implementing the action alternative.

The UTTR is in northwestern Utah, between the Great Salt Lake and eastern Nevada (Figure S-1). Formerly called the Ogden ALC Test Range, UTTR is composed of both airspace and ground withdrawn from public use by the U.S. Department of Defense (DOD). Strictly defined, NUTTR and SUTTR refer to the airspace north and south of Interstate Highway 80 between Salt Lake City and eastern Nevada and above the UTTR ground components managed by the U.S. Air Force (Air Force) as well as above Dugway Proving Ground (Dugway, managed by the U.S. Army [Army]) and other nearby public lands (primarily managed by the Bureau of Land Management [BLM]). This airspace includes both restricted area and military operating area airspace (Figure S-2). The ground components managed by the U.S. Air Force lie beneath a portion of the airspace, with the Hill Air Force Range (HAFR) being beneath NUTTR and the Wendover Air Force Range (WAFR) being beneath SUTTR. UTTR activities are also supported by ground facilities at Dugway. This document addresses primarily the land area of HAFR and WAFR and the portions of NUTTR and SUTTR airspace that are directly above that land area. Uses of the airspace often extend considerably beyond the space above the HAFR and WAFR land boundaries into an airspace complex composed of numerous subdivisions of the restricted areas and military operating areas (Figure S-2). Uses of the overall airspace are described in sufficient detail to provide a context in which the overall function of UTTR can be understood. Impacts from uses of the airspace extending horizontally beyond the boundaries of HAFR and WAFR are addressed only generally in this document when they differ from impacts from airspace uses above HAFR/WAFR.

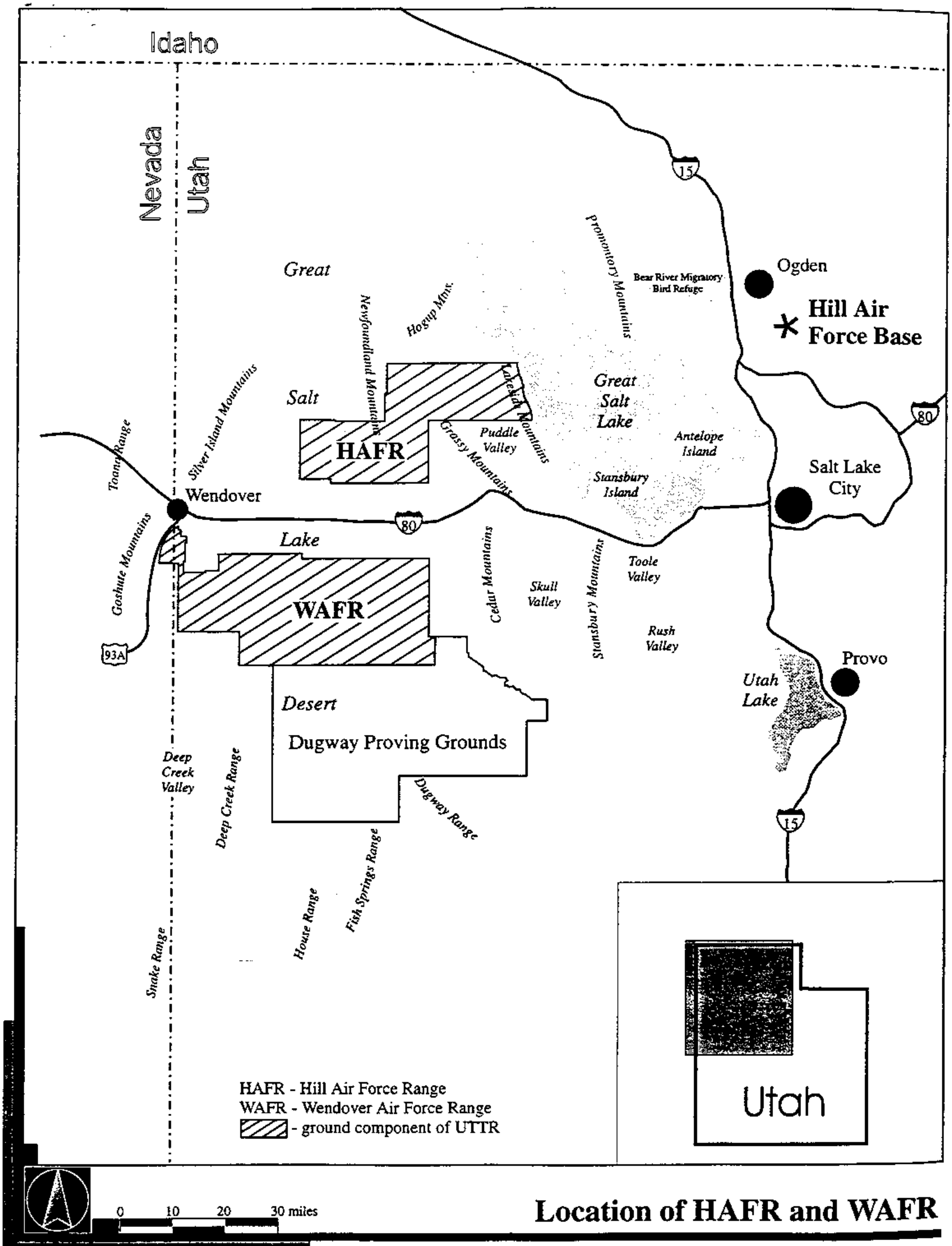
1.1 STATEMENT OF MISSION AND PLANNING OBJECTIVES

UTTR was established for and has been used in support of many DOD testing programs since it was withdrawn from the public domain in 1941. The goals for UTTR established by the 1975 RMP were largely accomplished by 1986 according to a statement in the Record of Decision on the Gandy Range Extension Environmental Impact Statement (EIS), although UTTR is still not entirely under one management.

The current mission and objectives of the UTTR are to continue to provide unique training and testing facilities that enable DOD to maintain skilled personnel and state-of the-art equipment ready to be used in testing, training, and support services associated with weapon systems. UTTR provides DOD a large and unique testing facility given the size of the ground safety footprint (the overall area in which an aircraft or other vehicle may safely operate, even if it goes off target) in the combined undeveloped land area of HAFR, WAFR, and the portion of Dugway west of Granite Mountain; the size of the associated airspace; and the distance of UTTR from potential missile launch sites.

Planning objectives associated with future uses of the UTTR include the following:

- Continued provision of space and facilities for complex air-to-air, air-to-ground, and ground training exercises involving bombers, fighters, and ground troops having multiple roles and particularly emphasizing those training missions and testing operations that are most benefited by the remoteness, topography, size and undeveloped land area provided by UTTR
- Increased communication and coordination among user groups to provide interactive and cost effective testing and training opportunities;
- Increased use of the sophisticated systems at the Sand Island Target Complex
- Increased use of the thermal treatment unit (TTU), which would be supported by upgrading the facility and its capability
- Increased storage capacity in the missile storage area (MSA) to accommodate Delta II storage, for example
- Continued provision of test facilities for both manned and unmanned aircraft and munitions



Location of HAFR and WAFR

Figure S-1

Increases in use may require increases in manpower for the 75th Range Support Squadron (RANS), the Base Operating Support (BOS) provider at the UTTR.

1.2 PURPOSE AND NEED FOR THE PROPOSED ACTION

Air Force Regulation (AFR) 19-9 and Air Force Instruction (AFI) 32-7060 that supersedes it address coordinated planning of test and training ranges and compliance with NEPA when decisions may have potential environmental consequences. Both AFR and AFI guidance imply that the planning process should be current so that it can provide guidance to ongoing and future actions. Because the last RMP for UTTR was prepared in 1975, a new RMP is needed to present current and currently proposed activities on UTTR. It is provided as an integral component of this document. Because these activities might have environmental consequences, an EA to evaluate these potential consequences is also an integral component of this document. The RMP component of this document bridges the gap since 1975 for the Air Force Center for Environmental Excellence (AFCEE), the group currently responsible for base comprehensive planning and coordination for environmental impact planning; the EA component provides a UTTR-specific framework for ongoing NEPA compliance as part of the action alternative.

2.0 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

The proposed action is the implementation of the RMP component of this document. The no action alternative is to reject this plan and continue to operate under the 1975 RMP. Because continuation of current activities, which are not specifically predictable but rather are responsive to the needs of various customers, is the primary mission and objective, it was not possible to define other action alternatives based on specific alternative future use scenarios. Rather, the proposed action assumes ongoing customer requirements for activities that are not specifically predictable. These types of activities are extensively characterized in Section 4. Other alternatives, considered but eliminated, would involve the removal of specific types of training or testing activities or their transfer from UTTR to other DOD facilities. It was considered extremely unlikely that all current activities would be transferred from UTTR, given its unique characteristics, and beyond the scope of this EA to consider complete elimination of training or testing activities from the Air Force program.

Therefore, the action alternative, to continue to support current Air Force activities that are not specifically predictable, was the only viable alternative to be considered together with the no action alternative.

Because the components of the proposed action are not specifically predictable, three management options were developed within the proposed action. These management options serve to guide NEPA compliance of different activities, maximize the usability of this document, and maximize flexibility in use of UTTR.

3.0 AFFECTED ENVIRONMENT

The UTTR is characterized by an arid climate, highly variable temperature, and low relative humidity. UTTR is further characterized by a basin and range physiography and by minimal, saline surface water flow (of water that has not transpired or evaporated) into an internal basin where it evaporates further. Both HAFR and WAFR are primarily covered by Playa and Playa-Saltair Complex soils. These soils are found primarily in the low-lying, flat portions of the ranges. Very few of the soils that cover HAFR and WAFR are suitable for livestock grazing, rangeland seeding, cropland, or development.

Surface water on both HAFR and WAFR does not support aquatic communities because it is transitory, except at Blue Lake and Mosquito Willy's springs. The vegetation cover types, which also approximate wildlife habitat types on HAFR and WAFR, are predominantly salt flats/playas/barrens, sparse salt-tolerant vegetation, desert brush mixes, sand barrens, and shadscale/kochia. Horned larks, northern harrier, prairie falcon, raven, golden eagle, shrike, and coyote are the most frequently encountered species. Few migrating raptors pass over HAFR. The most widespread mammals on HAFR and WAFR are the black-tailed jackrabbit, desert cottontail, antelope ground squirrel, Great Basin pocket mouse, Ord's kangaroo rat, western harvest mouse, deer mouse, desert woodrat, and porcupine. Pronghorn are common although not widespread. The peregrine falcon, bald eagle, long-billed curlew, white-faced ibis, and ferruginous hawk have been observed on HAFR and WAFR.

A wide range of prehistoric, historic, and paleontological resources occur on and near HAFR and WAFR. Cultural resource surveys have resulted in the identification of more than 130 archeological sites within 30 miles of the HAFR and WAFR boundaries. Only since 1991 have HAFR and WAFR themselves been subject to any large-scale, stratified surveys. To date, these intense, pedestrian surveys have covered 25 percent of the ranges.. Seven of these higher-density areas have been recommended for nomination as National Register Districts (NRDs) and proposed actions occurring within these districts will trigger evaluations even though they have already been surveyed. Most of the land within these districts contains no or very few resources and restricted development should be possible. Most of UTTR, which consists of mud and salt flats or relatively recent eolian deposits, has virtually no potential for paleontological resources.

The visual resources of the lands comprising and adjacent to HAFR and WAFR are typical of the Great Salt Lake Desert. They are characterized by isolation, remoteness, expansive open space, and dramatic basin and range landforms.

4.0 RANGE USES AND ASSOCIATED CONSIDERATIONS

The two large tracts of HAFR and WAFR land are owned, managed, and primarily used by the DOD for military personnel training, weapons system testing, and for disposal of ordnance and other materials. These direct uses may occur in the UTTR airspace or at specific developed facilities, such as targets, test pads, and pads used for training, testing, or disposal of munitions and missiles at HAFR, WAFR, or Dugway. Related to these direct uses are support infrastructure and support services. Infrastructure uses include instrumentation for measurement or scoring, communication networks (e.g., fiber optic or other cabling, telemetry, radar), storage areas, and transportation infrastructure. Support services include those activities that are required for the primary direct uses to be accomplished, but that cannot be allocated to a single direct use. Examples include scheduling, safety, facility maintenance, and construction.

4.1 LAND USE SETTING, GEOGRAPHIC AREAS, AND USERS OF UTTR

The lands surrounding HAFR and WAFR are owned by federal and state governments and private individuals. They are used to a limited extent for commercial and residential purposes and for recreation. They are supported by a limited infrastructure.

Federal lands surrounding HAFR and WAFR are managed primarily by DOD and BLM. One of the adjacent land uses most significant to UTTR is Dugway. BLM lands in the vicinity of HAFR and WAFR are managed for multiple use, as directed under the Federal Land Policy and Management Act of 1976. These uses include livestock grazing, wildlife, undeveloped and developed recreation, and mining. Some of the nearby federal lands are currently being considered for inclusion in the National Wilderness Preservation System. There are currently no school trust land inholdings within HAFR and WAFR. In the immediate vicinity of HAFR and WAFR there is little industrial, commercial, or residential development. Some adjacent industrial uses include minerals extraction and processing, mining, landfills/waste incineration, and brine shrimp collection. The only significant commercial development in the immediate vicinity of UTTR is at Wendover. Other uses of the area, such as grazing, recreation, and hunting are quite dispersed.

The combined land base of HAFR and WAFR is almost 1 million acres: 351,539 acres in HAFR and 576,157 acres in WAFR. The UTTR airspace covers about 3,000,000 acres and is subdivided into restricted and military operating sectors, each with a specific altitude structure. Approximately 98 percent of the total land base in HAFR and WAFR is unimproved. HAFR contains administrative and test facilities/structures to support testing, training, and munitions disposal missions. This range is generally divided into live and inert testing areas, with specific areas of the range designated for specific uses. Several sites on HAFR are permanently manned. WAFR is composed primarily of mud flats, that are almost completely devoid of rocks, well-developed soil, or plant life. WAFR has no permanently staffed facilities.

The groups associated with UTTR are currently being reorganized. To allow this new organization time to settle in and definitize, the organizational structure that was in place at the time data were being collected for this RMP/EA has been retained in this document, both here and in Section 4.0. Based on these January 1995 data, there are five primary groups associated with UTTR (Figure S-3):

- The Air Force Flight Test Center (AFFTC), based at Edwards Air Force Base (AFB), California, and represented by the 545th Test Group (TESTG) at Hill AFB, Utah
- The Air Combat Command (ACC), represented by the 388th Fighter Wing (FW), which is based at Hill AFB, and the 366th Composite Wing (CW), which is based at Mountain Home AFB, Idaho
- The Air Force Materiel Command (AFMC) is represented at the UTTR by the Explosive Ordnance Disposal (EOD) Division, the 75th RANS, and by directorates of the Ogden ALC [EM (environmental management), SE (safety), SGB (industrial health monitoring), LI (landing gear), and LM (missile and motor dissection)]
- The primary Air Force Reserve System (AFRES) user is the 419th FW based at Hill AFB. Other AFRES bomber and fighter units in the continental United States (CONUS) deploy to use UTTR
- The Air National Guard (ANG) is represented at UTTR by the 299th Range Control Squadron (RCS).

Of these groups, the 545th TESTG and the 299th RCS function as managers of UTTR. The 545th TESTG also maintains electronic equipment, schedules range use, provides safety support for airspace users, and collects and analyzes electronic data from testing and training missions. To some extent the support capabilities of the 545th TESTG and the 75th RANS overlap. The 75th RANS supports the range infrastructure and is responsible for facilities at Oasis and the TTU. The EOD Division is responsible for cleanup and maintenance of targets and is supported in this activity by components of the 545th TESTG. The Ogden ALC directorates are largely involved in environmental regulatory compliance, safety oversight, equipment testing, and equipment maintenance activities. The remaining groups use the range for various activities. The ACC and AFRES users are composed of bomber and fighter units that train on UTTR using targets on HAFR and WAFR and the airspace above and beyond them. In addition, UTTR provides facilities for a variety of customers such as the National Guard, Marines, bomber wings, fighter wings, and other military groups, especially those involved in cruise missile testing and large footprint bomb testing.

The interrelationships and functions of the various groups associated with UTTR are discussed in more detail in Section 4.0. The reporting affiliations of these groups may change depending on the task in which they are engaged. For example, to perform quick force exercises, a number of the groups mentioned above may temporarily report to the U.S. Central Air Force Command (CENTAF), which may coordinate large Composite Force Training (CFT) missions.

Under the current reorganization, the 545th TESTG and all its components have been dissolved. Personnel remaining from the 501st RANS and the SE, Programs and Resources (XR), Engineering (EN), and Test Forces (TF) Divisions are now collectively assigned to Detachment 1 (DET 1). DET 1, based at Hill AFB, reports to the 412th Test Wing (TW) based at Edwards AFB, as the 545th previously did (Webster 1996). By October 1997, DET 1 will report to the 388th FW to implement the recommendation of the 1995 Base Realignment and Closure (BRAC) Commission (Inguaggiato 1996). The 514th Flight Test Squadron (FTSQ), which also previously reported to the 545th TESTG, has been dissolved as well, and its remaining personnel who are associated with UTTR now report to LI, a component of Ogden ALC (Webster 1996). The current (August 1996) organizational structure is illustrated in Figure S-4. The changes between January 1995 and August 1996 can be seen by comparing Figures S-3 and S-4. They are also discussed in Section 4.1 and illustrated in Figures 4.1-4 and 4.1-5.

4.2 USES OF THE RANGE

4.2.1 Past and Present Uses

Uses on UTTR fall in three major classifications—training exercises, test functions, and support services. Targets and other resources on HAFR and WAFR are generally dedicated to either training or testing, and within these classifications, only certain uses are allowed or possible. The types of uses vary considerably in the support and infrastructure they require, and in their scheduling. Testing and training each account for roughly 30 percent of the scheduled hours on the range. Training, however, actually uses about twice as much total time (40 percent) on UTTR as testing (20 percent); testing tends to schedule more time than actually needed to ensure an available time slot with appropriate weather conditions. In addition, a testing mission may need to schedule the entire range, whereas multiple training missions may use the range at one time. The remaining 40 percent of the scheduled hours are used for all other activities.

4.2.1.1 Training

Training uses of the range may be generally classified based on the land and/or air resources they require. Training missions simulate actual combat missions where aircrews and ground troops are able to conduct operations against targets and simulated aggressors using the same ordnance and weapons systems that would be available to them in wartime.

For training, the overall UTTR airspace is the most important component. However, whenever daily training missions or CFT missions include air-to-ground weapons delivery, the target facilities on the ground at HAFR, WAFR, and Dugway become important mission components.

The airspace is subdivided into a number of restricted and military operating area sectors that are further subdivided into low- and high-altitude sectors. As a result of these various airspace subdivisions, NUTTR is divided into 12 sectors, 1 corridor, and air traffic control (ATC) airspace and SUTTR is divided into 12 sectors, 1 corridor, an ATC transition area and the Wendover Shelf. There is a current proposal to modify the airspace subdivisions in NUTTR (Parsons Engineering Science, Inc. 1995a). These horizontal and vertical subdivisions of airspace do not constrain aircraft, but permit scheduling and use of different parts of the range at the same time. For the use of this airspace, there are specific responsibilities, range scheduling procedures, range use procedures and restrictions, and range safety protocols.

The following training areas are used on HAFR: Eagle Range Complex, helicopter aerial gunnery range (HAG), Craner's Target Complex, ground assault target (GAT), drop/landing zones (associated with TS-22), Coffin Live Drop Area, and the Laser Tunnel. In addition to these defined target areas, the area west and southwest of Eagle Range Complex and the western half of HAFR are used for operational weapons training and air-to-air training.

On WAFR, the Kittycat and Wildcat Target Complexes contain a number of tactical targets. The Kittycat area allows deliveries of high explosive (HE) ordnance; the Wildcat area does not. Across the northern part of WAFR toward the west is the Air-to-Air Gunnery Range, used for practice against towed targets. The western half of the airspace over WAFR is used for air-to-air combat training for fighter aircrews and for dart training.

Across the WAFR boundary in Dugway, target complexes that are also an important component of UTTR include the Sand Island Target Complex, TS-3, Baker Strongpoint, and W-166, a mountain target area directly north of Michael Army Airfield. Much of this area is used for over land (versus over water) training of combat crews using operational weapons and electronic warfare devices. Several of these targets are also important for testing.

The following types of training missions are common at UTTR: air-to-ground (bombers and fighters), air-to-air, and ground troop training. These types of training missions may each be conducted independently or combined into complex missions.

Air-to-Ground Training

Air-to-ground training involves bombers and/or fighters releasing or simulating the release of weapons on land-based targets. The targets typically used for air-to-ground training are the HAG, the Eagle Range Complex, Craner's Target Complex, Wildcat Mountain, and Kittycat Mountain. A number of specified types of actions may be practiced at these targets. Air-to-ground training uses the restricted airspace and military operating areas for ingress to and egress from the target (Figure S-2). Direct use of the airspace is supplemented with ground-based tracking or data acquisition systems, various Electronic Combat (EC) threat simulators, and electronic and photographic or visual scoring systems. These data are sent to Mission Control Center for recording and perhaps also to the Air Combat Maneuvering Instrumentation Center for analysis and interpretation by the pilots. Live and simulated training exercises occur at about the same frequency. Live exercises include all situations where something comes off the plane, such as practice bombs, inert full weight bombs, or live bombs. Simulated exercises use video tape instead.

The weapon systems may be for either conventional or simulated nuclear bombs. UTTR also allows strafing, and the discharge of devices, such as chaff and flares, for defensive practice. Specific targets are authorized for certain types of ordnance.

Air-to-Air Training

Air-to-air training, in contrast to air-to-ground training, is a simulated battle of two or more aircraft against each other. Air-to-air training exercises utilize the airspace over HAFR and WAFR and additional controlled airspace as needed (Figure S-2). Specified types of maneuvers involving a single airplane or multiple airplanes are practiced. These operations take place in various levels of the airspace, and several missions can occur simultaneously at different altitudes.

Ground Troop Training

Ground troop training consists of various exercises (ground assault training, communications exercises, and mobile radar unit training) that use ground-based troops and equipment. The exercises include movement exercises, live-fire exercises, and joint air attack tactics. The primary ground troop users are the ANG, Marines, and Army.

Training Missions

The above-described training, targets, and airspace can be used for a number of training activities, which can be minimally combined in a typical daily training mission or complexly combined into a single CFT mission. The components of a typical daily training mission provide a small portion of a larger mission in which more than 20 aircraft can play diverse roles and in which the fighters and bombers may be hitting different targets simultaneously. The goal of a CFT mission is to include as many players as possible to increase its realism. The biggest difference between a CFT and a typical daily mission is complexity, not just in the number of aircraft and roles, but also in the multiplicity of roles for a single pilot.

4.2.1.2 Testing

Testing is an ongoing activity at UTTR; many of the target areas are dedicated exclusively to specific testing functions and use of ordnance and munitions specifically allowed for that target. Testing involves the launching, deployment, or ignition of weapons systems or components and the subsequent monitoring of their performance.

The location of the UTTR gives it distinct over land testing advantages when compared to other military munitions testing areas. A sparse population and an isolated location makes HAFR and WAFR attractive in terms of security and public safety. Additionally, HAFR and WAFR are located near Hill AFB and Dugway, allowing for coordinated uses. Instrumentation and communication systems link targets with mission control command offices at Oasis (HAFR), Dugway, and Hill AFB, or to control stations in the immediate vicinity of the target. Fiber optics and other land-based systems are used to transmit data directly and through microwave and telemetry links. This information is used to monitor test results.

The testing of cruise missiles (CMs) and unmanned air vehicles (UAVs) in UTTR relies on the large safety footprint available in the HAFR, WAFR, Dugway, and the airspace complex. Generally, these tests involve the release or launch of a weapons system that either tracks an air target or follows a predetermined course to a ground target. A variety of time-space-position information (TSPI), photo, and other tracking instruments are used; more than 60 ground stations in the HAFR/WAFR/Dugway complex supply TPSI data. This capability also provides the required area necessary to test warheads. Air Force conventional air launch cruise missile (CALCMs) are flown exclusively at UTTR to protect public safety. Air-to-ground precision-guided munitions (PGM) tests use air-launched guided weapons against ground targets. These tests are fully instrumented to provide TSPI across the entire range and beyond.

For ground testing, air-to-ground testing, and munitions testing, specific targets are used, as detailed in the text. For tests of accuracy or effect, the targets differ primarily in their electronic scoring capabilities and in the target objects they provide. For munitions testing, these targets differ in configuration and type of pad.

Tests may be broadly classified as to whether they are ground-based tests or use the airspace. Although the uses of UTTR have changed substantively since 1976 as new technology and systems have developed, both of these test categories remain strongly represented at UTTR.

Ground Testing

Ground testing includes rocket/missile motor testing, study, and analysis; tests of the A-10 aircraft's GAU-8 cannon and of other aircraft weapons systems; HE tests; and munitions (including rocket/missile motor) disposal. Each of these types of testing is conducted in a specific area and the diversity of testing activities is supported by a large number of diverse targets. Munitions disposal is included, even though it is not a direct test use and is under different regulations, because it shares some similarities with testing activities from an impact perspective.

Air Testing

Testing in the airspace may be manned or unmanned and may optionally include munitions testing. The testing of missiles and UAVs in the UTTR airspace relies on the large safety footprint available at the entire complex. Open-air testing and evaluation of CMs is the core testing mission of UTTR, which is the Air Force's primary overland range for testing CMs. Formerly, the testing of UAVs was also an important mission, but the role of UAVs has recently been much diminished. Air testing relies on a highly sophisticated network of electronic instrumentation that accurately records locational data and speed, enabling precise interpretation of aircraft performance. This electronic network extends beyond HAFR and WAFR to Dugway and beyond to UTTR to interconnect with other Air Force installations so that an unmanned aircraft can fly from one installation to another, finally ending up at a target on HAFR or WAFR. Several types of air testing such as tests of air-to-ground conventional munitions or of the shelf-life of munitions really bridge the gap between air and ground testing.

4.2.1.3 Services Supporting Range Uses

In order to keep UTTR functioning effectively and be able to meet the needs of users, support services are required on an ongoing basis. The primary support services provided to the range are communications, construction of targets and other facilities, and range cleanup, including explosive ordnance disposal and target maintenance and cleanup.

4.2.2 Future Uses

Future uses of UTTR are somewhat uncertain in this era of base closures and military cutbacks. Nonetheless, UTTR provides a unique area for over land training and testing. It would, therefore, be appropriate for future uses of UTTR to parallel past and present uses, particularly emphasizing those training missions and testing operations that are most benefited by the remoteness, topography, size, and undeveloped land area. A number of future uses of UTTR have been proposed and partially evaluated under NEPA. As noted previously, planning objectives associated with future uses of UTTR are continued provision of space for complex exercises, interactive and cost effective testing and training opportunities; increased use of the sophisticated systems at the Sand Island Target Complex; and increased use of the TTU.

Personnel currently working at or using UTTR anticipate that training and testing uses will be ongoing and that specific programs, such as Project Alpha Testing, will be completed as scheduled. Their predictions for the next 5 years are that UTTR will serve functions that are somewhat to very similar to current and past functions and that the demand for these UTTR functions will be a little less to much more than currently.

4.3 LEGAL, ENVIRONMENTAL, AND HEALTH/SAFETY CONSIDERATIONS

4.3.1 Legal Considerations

Legal considerations include memoranda of understanding, memoranda of agreement or cooperation, ingrants, and outgrants, of which there are a number on UTTR. These existing land use agreements establish procedures and requirements for use of UTTR and for managing the natural resources on UTTR. Of particular interest is the memorandum of understanding that makes the Utah Division of Wildlife Resources responsible for the management of the wetlands, wildlife, and wildlife-related activities around the Blue Lake Waterfowl Management Area, a 216-acre parcel that has been formally deeded to the State.

4.3.2 Environmental Considerations

Management of UTTR includes compliance with many federal, state, and local environmental laws and regulations to ensure that human health and the environment are protected. The Utah State Department of Environmental Quality is the state agency that implements and enforces most of the environmental laws and regulations promulgated in Utah. Utah has been delegated authority from the U.S. Environmental Protection Agency (EPA) to administer, implement, and enforce most of the federal environmental programs and laws. Past, present, and future activities at UTTR are governed by these laws and regulations, which address air quality, noise, natural resources, cultural resources, and the management of hazardous materials, solid wastes, hazardous wastes, recycling, underground storage tanks, spills and releases, transportation of materials and wastes, and emission reporting.

For each of these environmental considerations, a regulatory overview is provided followed by a discussion of how these regulations are being implemented on UTTR such as: the Part A operating permit for the TTU and the completed Draft Title V Operating Permit for all of UTTR regarding air quality; the mechanism by which complaints regarding noise are handled on the UTTR; the mechanism by which NEPA compliance is implemented both generally as to process and specifically for particular projects; the driving regulatory forces behind the HAFR and WAFR pedestrian surveys for cultural resources; the way in which hazardous materials are controlled through Central Receiving at Hill AFB and where they are found on HAFR and WAFR; how solid wastes are handled via landfills and recycling after any hazardous waste is separated out; where hazardous waste is generated and stored and how it is permitted and disposed on HAFR and WAFR; locations where other hazardous materials from the UTTR are disposed; the facilities at which water quality is managed on HAFR; the numbers of underground storage tanks on HAFR and WAFR; the guidance of the new draft Hill AFB Spill Prevention Control and Countermeasure (SPCC) Plan regarding spill response measures; and how emergency planning and community right-to-know as well as transportation of hazardous materials are handled on UTTR. Following the discussion of individual environmental considerations, a discussion of the interface of environmental considerations with range uses addresses training, testing and support services.

4.3.3 Health/Safety Considerations

Activities on UTTR have health/safety considerations associated with them. The hazardous material management program system places individuals in zones, defined as a person or a group of people that, as a result of their work, share a common set of potential or actual exposures to workplace hazards. The Bioenvironmental Group evaluates exposures and controls (engineering, administrative or personal protective equipment [PPE]) in these zones. While the Ogden ALC is ultimately responsible for full health/safety compliance at UTTR, the staff of the Safety Office, a part of the 545th TESTG, is responsible for the full range of safety issues for their customers at UTTR, including visitor briefing, test and training planning, mission assistance, post-mission follow-up, and post-incident investigations. They are thus responsible for safety in all parts of UTTR except at Oasis and the TTU, where the 75th RANS is responsible for safety. The 545th TESTG may further delegate safety responsibility to specific user groups for their particular mission. This section not only identifies responsibilities but provides a regulatory overview of health/safety regulations and their UTTR implementation.

4.4 RANGE BUDGET

The UTTR is in transition toward becoming an ACC-operated range with an approved up-front training budget of $5 million per year and an estimated additional $9 million per year for testing that will be paid for by the user. For the 75th RANS, the estimated budget has ranged between $2,800,130 and $2,905,261 between fiscal year (FY) 1991 and FY95, with a 10 percent increase per year anticipated into the future, where the work load is expected to continue to increase. It is expected that the sophisticated electronic systems associated with the UTTR will continue to be supported in the future, but it is not known how future budgets will compare with the $8 million FY93 and $11 million FY94 budgets.

4.5 RANGE USE ISSUES

For purposes of discussion, range use issues may be divided into two categories: issues arising from and affecting interactions among range users and issues arising from and affecting interactions between range users and the environment. There appear to be three primary types of issues between present range users: those affecting range uses, those affecting range responsibilities, and those affecting range management.

The range use issues focus primarily on scheduling and communication. When testing or priority training activities have been scheduled, subordinate training activities may be scheduled under backup status. Further, some uses, such as those at the Sand Island Complex, involve classified systems and activities about which information is distributed only on a "need to know" basis. If so, there is likely a minimum of communication between a priority user and a user that may have been bumped from the schedule, which may result in ill feeling.

The range responsibility issues result primarily because there are a number of groups providing support services whose areas of expertise overlap and because the situations or locations in which this expertise is to be applied are sometimes not clearly demarcated. These uncertainties, which could be largely resolved through improved and increased communication and resultant coordination or through consolidation of responsibility, are somewhat exacerbated by an owner/tenant mentality among some personnel that seems to result in a tension between controlling forces rather than a team approach.

The range management issues in part result from the owner/tenant mentality noted above, but also from the mix of civilian and military personnel that are responsible for activities on the UTTR. The civilian management style tends toward decentralized decision making, while the military management style tends toward centralized control.

Such issues are typical of any large-scale, complex operation having many players with diverse goals. Probably the most effective contribution toward resolution of the specific issues associated with each of these topics is improved communication, coordination, and an increased sense of teamwork and equal status among all players. In addition, consolidation of real property and of target maintenance personnel and requirements would reduce duplication of equipment, facilities, and skills; would be more cost effective; and would further facilitate communication, coordination, and teamwork.

Future range uses are anticipated to be similar to present range uses in the general sense. Thus, present UTTR uses are expected to merge into future uses without abrupt change or specific conflict. There may be conflict regarding allocation of diminishing funding, i.e., whether to allocate it toward long range improvement of electronic sophistication or toward short term training and testing missions. Thus, the restrictions on future uses are likely to revolve around funding.

Impacts of range uses on environmental resources may be categorized into air impacts, ground-surface impacts, and below-ground impacts. Air impacts include degradation of ambient air quality, increased noise levels, or intrusion into visual resources. Ground-surface impacts may affect the largely transitory surface water (flow and quality), wetlands, soil, vegetation and wildlife (including threatened and endangered species), cultural resources (including paleontological, archeological, and historical resources), and visual resources. In addition, they may result in the presence of hazardous waste or other spills or residues. The causes and more specific types of below-ground impacts are very similar to those of ground-surface impacts except that they may affect rock formations and mineral resources as well as deeper lying soils and groundwater rather than surface water.

Conversely, environmental resource laws and regulations may affect the locations of range uses and their scheduling. Changes in existing range uses (i.e., changes in the area, type, or intensity of use) as well as new uses must be evaluated through the NEPA process (and its incorporation of associated resource-specific regulations), which may delay implementation of a desired mission if

NEPA compliance has not been factored into the early planning phases of the mission. The results of the NEPA evaluation may constrain the location or season in which the mission may occur, may restrict the type or intensity of use, may require specific mitigation measures for impacts identified, or may disallow the mission altogether.

5.0 RANGE USE UNDER THE ACTION ALTERNATIVE

5.1 MANAGEMENT OPTIONS FOR THE ACTION ALTERNATIVE

Because the Statement of Mission and Planning Objectives (Section 1.1) indicates that continuation of current activities is intended and because current activities are largely responsive to the needs of various customers using the range, the definition of specific alternative future-use scenarios was not possible. Rather, the action alternative assumes ongoing support to customer activities that are not specifically predictable. Therefore, several management options were developed for the action alternative that serve to guide NEPA compliance of different activities. Option 1 is a restricted version of the status quo, Option 2 is the status quo, and Option 3 is an expansion of the status quo.

The Option 1 restrictions are based on information contained in Sections 3 and 4 with the intent of minimizing impacts to various resources (e.g., restrict the timing of some uses to minimize impacts to nesting raptors). Given that the ongoing operations at UTTR have been approved under the NEPA process, Option 1 is not mandated by NEPA. However, its implementation is in compliance with the spirit of NEPA regarding the minimization of impacts. A number of suggestions are given regarding the type of changes in range use that might minimize impacts.

Option 2 is the status quo in terms of areas of use, types of use, and intensity of use. Therefore, under this option, no changes in range use are envisioned and range use is as envisioned in Section 4. No NEPA compliance activities are required beyond what has already been done.

Option 3 encompasses those activities that would involve a change in the areas of use, the types of use, or the intensity of use. It thus requires further NEPA evaluation and implementation of a process developed in Section 5.2. Option 3 involves:

- Early integration of NEPA resource evaluations into the planning process by initiative of the group planning the new or changed activity, which should proactively involve EM Plans and Programs (EMX)
- Use of the geographic information system (GIS) on Hill AFB to determine whether the location potentially affected by the new or changed activity has been surveyed for natural or cultural resources
- A preliminary "walk through" of the decision-tree process by the group planning the new or changed activity and EMX to identify resources that may be affected, with particular attention given to those that may require field study
- A review of what site-specific data are available from the ongoing BLM/Utah State University (USU) study and the GIS database
- Planning of any needed field studies and their implementation during the appropriate season(s)
- Compilation and evaluation of additional information from the BLM/USU studies, the GIS database, and other pertinent resources
- A thorough application of the decision-tree process cooperatively by the group planning the new or changed activity and EMX
- Completion of the NEPA process by EMX

Thus, the primary purpose of defining Option 3 is the early integration of the NEPA process by groups planning new or changed activities on UTTR. While official authority for implementing NEPA rests with EMX, EMX should not be placed in a position of "catching" planned activities that should involve NEPA. Rather, every group planning a new or changed activity on the UTTR should proactively consider NEPA requirements when they are initiating their planning process and selecting the location and way in which their plan might be implemented. They should then proactively involve EMX in their more detailed planning.

5.2 A PROCESS TO EVALUATE NEW OR CHANGED RANGE USES

A process for evaluating new or changed range uses relative to their environmental impacts and NEPA requirements is presented in Table S-1 and charted in Figure S-5. More discipline-specific guidance is provided in the text. This process identifies the questions that need to be asked under Option 3, and how to proceed, given positive or negative responses. If a particular response is not clear, the more conservative response relative to environmental protection should always be assumed and followed. The sequencing and scheduling of this process are particularly important to its smooth implementation and to avoid impeding UTTR missions.

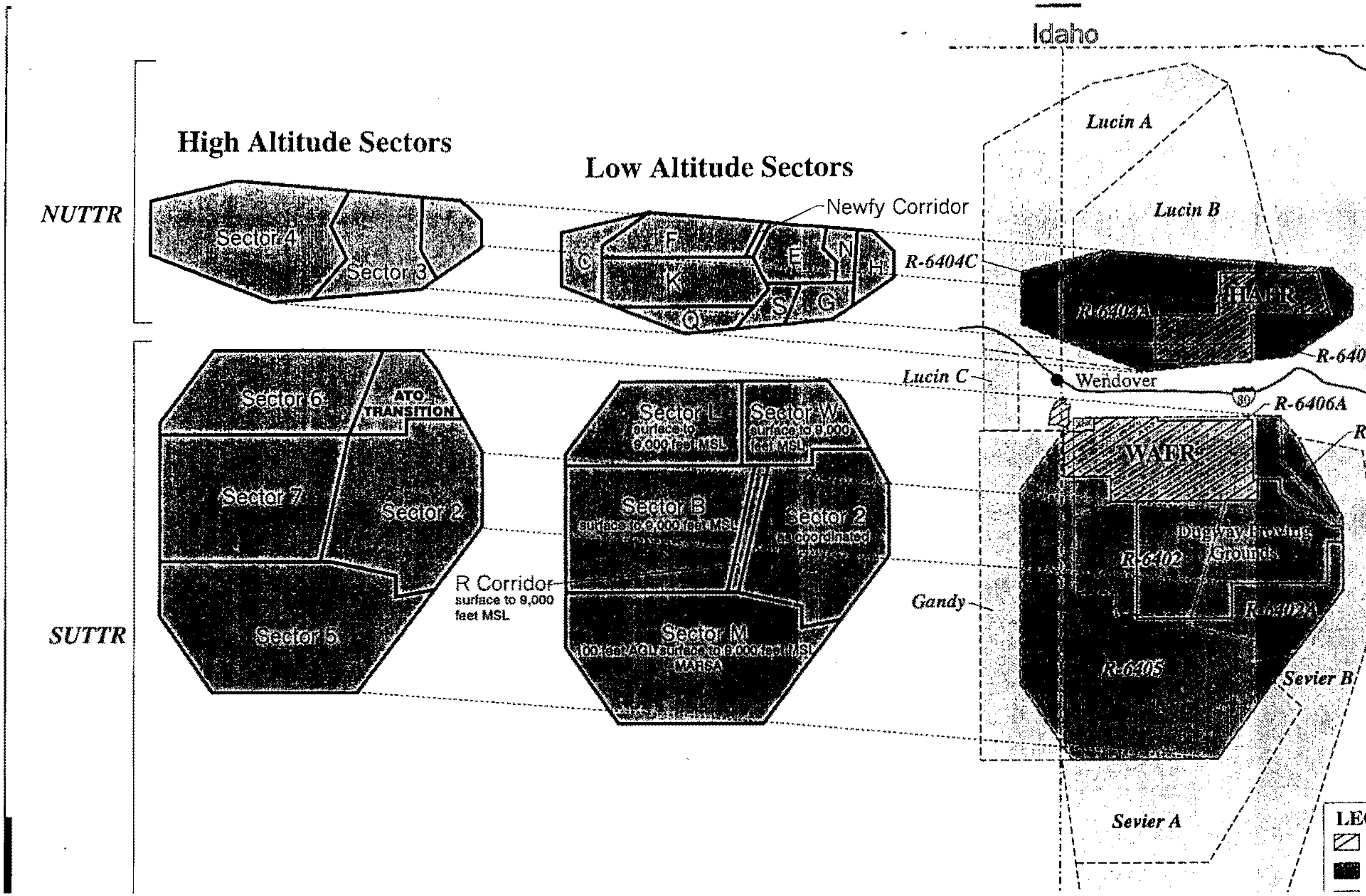
6.0 ENVIRONMENTAL CONSEQUENCES OF THE ALTERNATIVES

The two alternatives considered in this RMP\EA are no action and the proposed action. The no action alternative would reject this document and continue operating on the basis of the 1975 RMP. The action alternative would implement this RMP\EA, thereby incorporating current information on the environmental resources of the UTTR, providing information on current range uses, and implementing a stepwise and focused process for early considerations of NEPA precepts by users of UTTR.

Discussions of environmental consequences of activities on UTTR are an integral part of the Section 4 description of past, present, and future range uses. As such, they also provide a detailed consideration of the environmental consequences of the proposed action.

The no action alternative would bypass the new information on the affected environment and the up-to-date description of range uses. It would also forego the analysis of environmental and health/safety considerations and their interface with UTTR activities. Finally, it would fail to benefit from the suggestions for minimizing impacts from range uses and maximizing the efficiency of NEPA compliance, but its early incorporation into the thought process of those planning new or changed range uses.

Therefore, there are numerous benefits from acceptance of the proposed action and parallel detriments from its rejection in favor of the no action alternative. No benefits have been identified from rejection of the proposed action. Therefore, the proposed action is also the preferred action.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High Altitude Sectors
Low Altitude Sectors
NUTTR
SUTTR
Sector 4
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Q
Newfy Corridor
R-6404C
Lucin A
Lucin B
HAFR
R-6404A
Lucin C
Wendover
80
R-6406A
Sector 6
ATO TRANSITION
Sector 7
Sector 2
Sector 5
R Corridor
surface to 9,000 feet MSL
Sector L
surface to 9,000 feet MSL
Sector W
surface to 9,000 feet MSL
Sector B
surface to 9,000 feet MSL
Sector 2
as coordinated
Sector M
100 feet AGL surface to 9,000 feet MSL
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WAFR
Dugway Proving Grounds
R-6402
R-6402A
R-6405
Gandy
Sevier B
Sevier A
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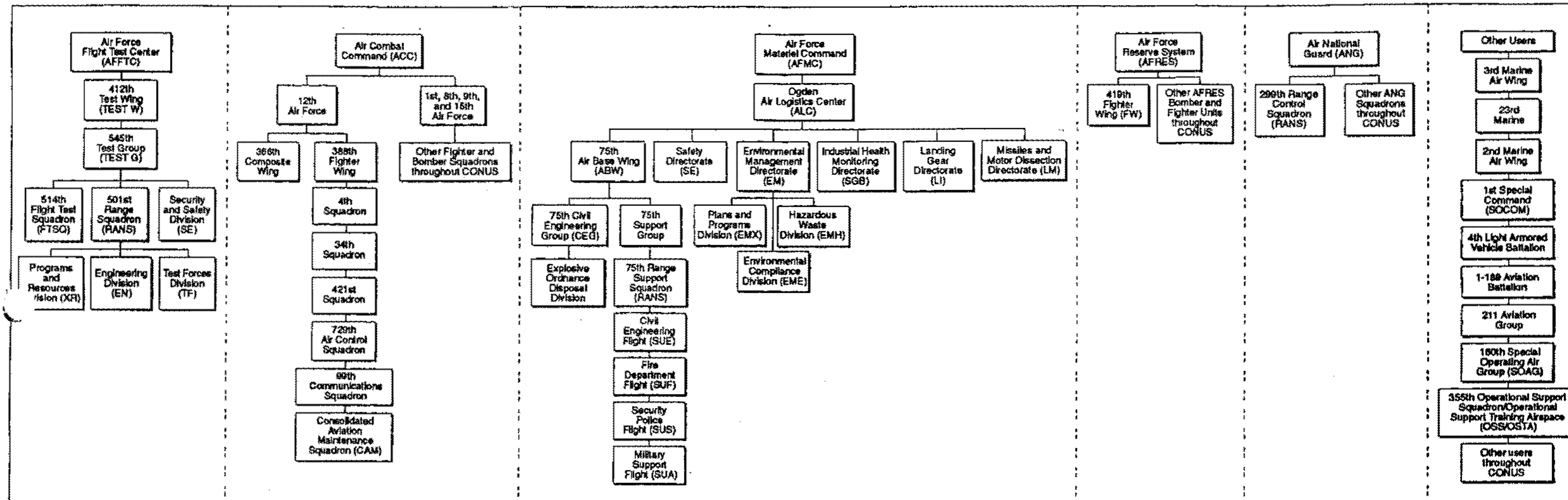
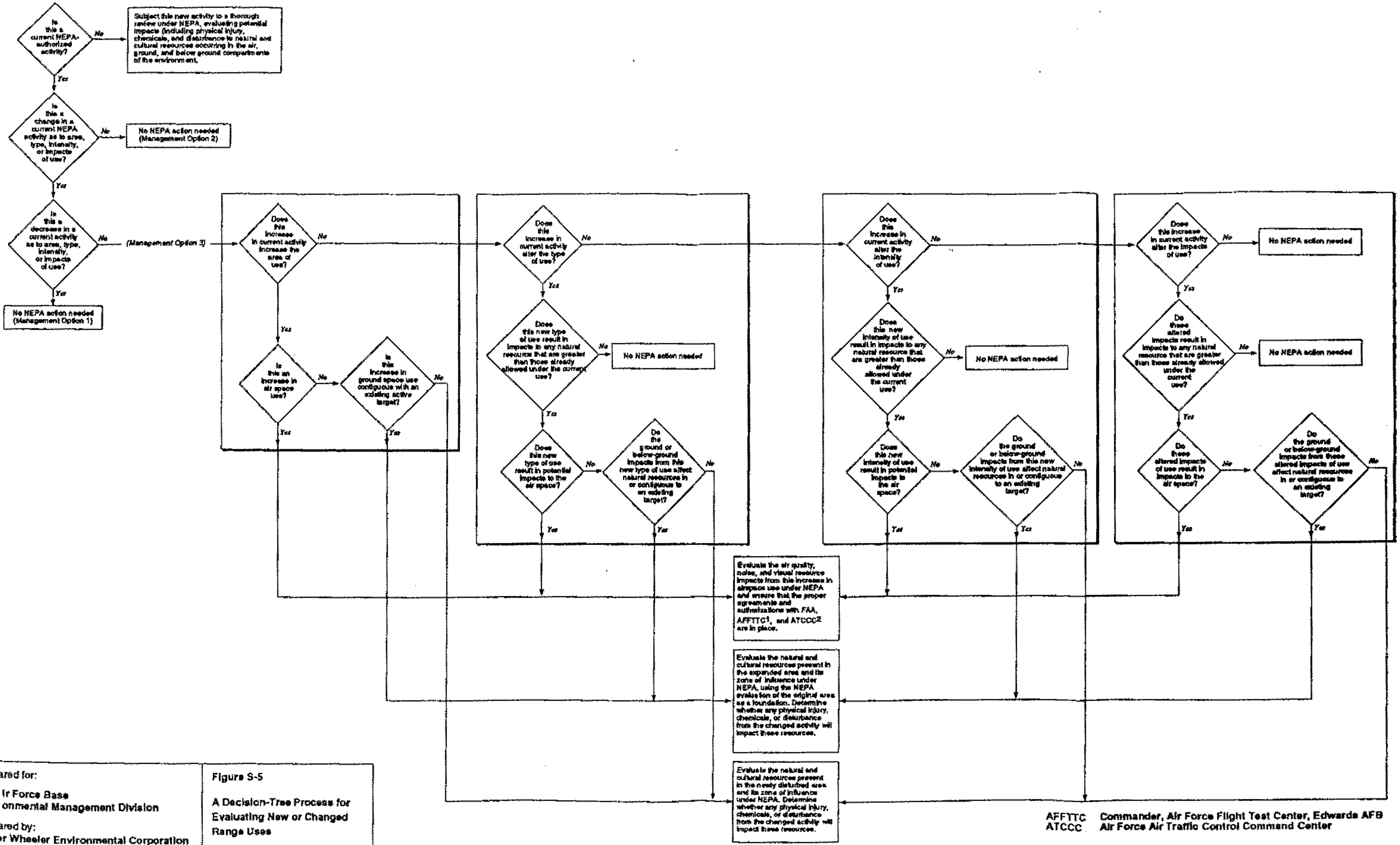


Prepared for:
Hill Air Force Base
Environmental Management Division

Prepared by:
Foster Wheeler Environmental Corporation

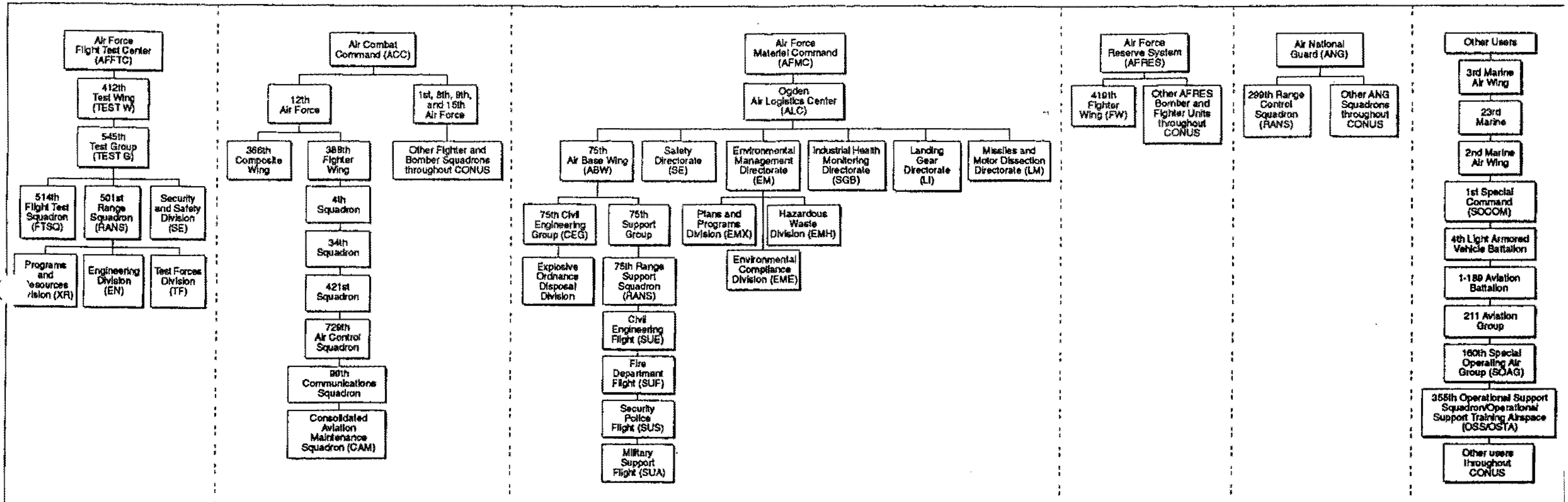
Figure S-3

Interrelationships of UTTR Range Users — January 1995



Prepared for: Ir Force Base onmental Management Division Prepared by: Foster Wheeler Environmental Corporation	Figure S-5 A Decision-Tree Process for Evaluating New or Changed Range Uses

AFFTC Commander, Air Force Flight Test Center, Edwards AFB
ATCCC Air Force Air Traffic Control Command Center



Prepared for:
Hill Air Force Base
Environmental Management Division

Prepared by:
Foster Wheeler Environmental Corporation

Figure S-4

Interrelationships of UTTR Range Users — August 1996

1.0 INTRODUCTION

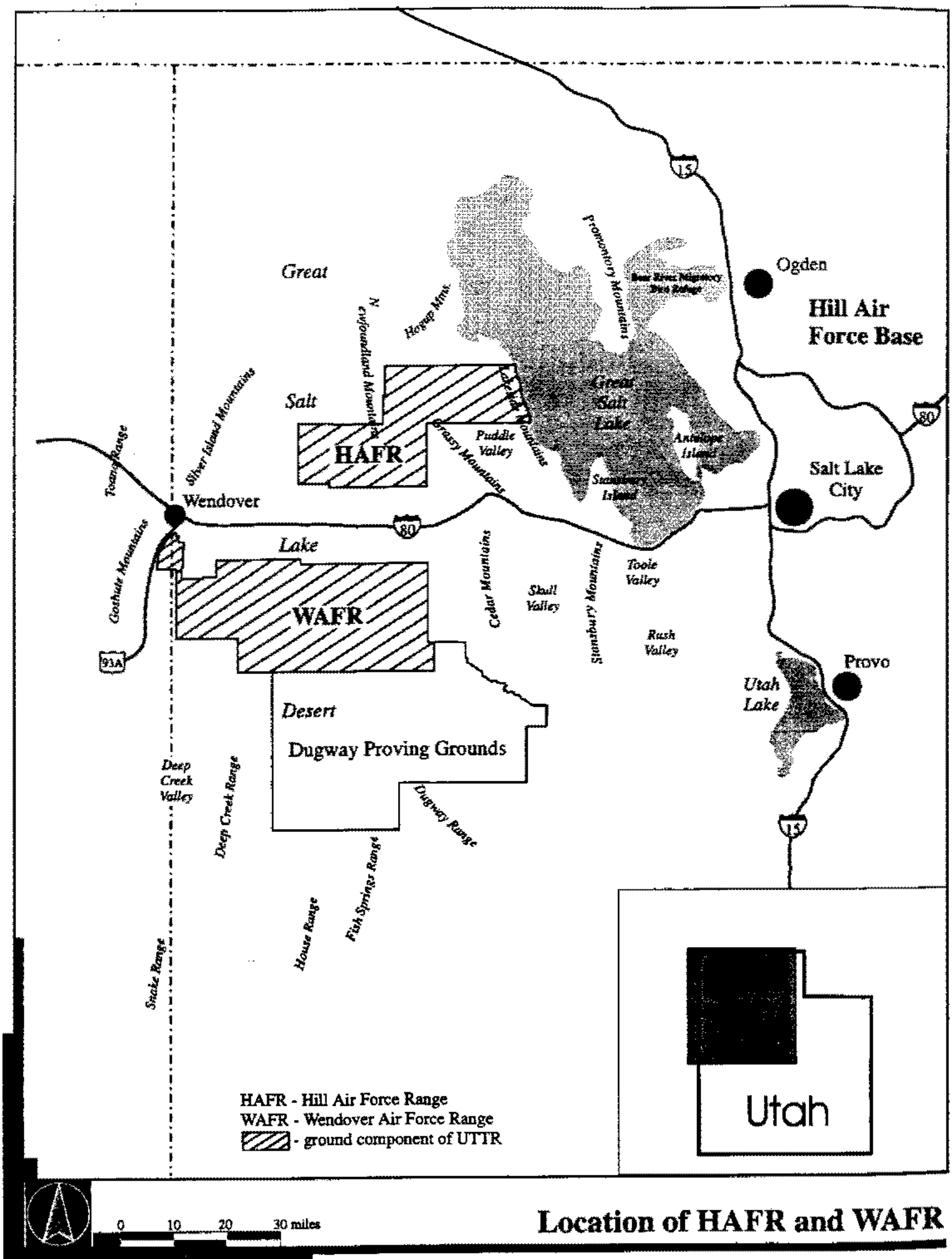
This Range Management Plan and Environmental Assessment (RMP/EA) for the Utah Test and Training Range (UTTR) updates the Preliminary Range Management Plan for the Ogden Air Logistics Center (ALC) Test Range (Ogden ALC Directorate of Operations 1975) by providing more current information on range use and by including information on environmental resources. The RMP components of this document are responsive to Air Force Regulation (AFR) 19-9 and Air Force Instruction (AFI) 32-7060 that supercedes it. Attachment 11 to AFR19-9 identifies the environmental issues that are to be addressed by an RMP. Table 1.0-1 shows the sections in this RMP/EA where each of these issues is addressed. The EA components of this document are responsive to AFR 19-2, which has been superceeded by AFI 32-7061 (24 January 1995); these guidance documents describe the Environmental Impact Analysis Process (EIAP) that implements the National Environmental Policy Act of 1969 (NEPA) for the U.S. Air Force (Air Force). Thus, this document will update information on UTTR uses, evaluate the environmental impacts of these uses, and provide a UTTR-specific framework for ongoing NEPA compliance as part of the action alternative.

UTTR is in northwestern Utah, between the Great Salt Lake and eastern Nevada (Figure 1.0-1). Formerly called the Ogden ALC Test Range, UTTR is composed of both airspace and ground withdrawn from public use by the U.S. Department of Defense (DOD). Strictly defined, NUTTR and SUTTR refer to the UTTR airspace north and south of Interstate Highway 80 between Salt Lake City and eastern Nevada and above the UTTR ground components managed by the U.S. Air Force as well as above Dugway Proving Ground (Dugway, managed by the U.S. Army [Army]) and other nearby public lands (primarily managed by the Bureau of Land Management [BLM]). This airspace includes both restricted area and military operating area (MOA) airspace (Figure 1.0-2). The ground components managed by the U.S. Air Force lie beneath a portion of the airspace, with the Hill Air Force Range (HAFR) being beneath NUTTR and the Wendover Air Force Range (WAFR) being beneath SUTTR. UTTR activities are also supported by ground facilities at Dugway. This document addresses primarily the land area of HAFR and WAFR and the portions of NUTTR and SUTTR that are directly above that land area. Uses of the airspace often extend considerably beyond the space above the HAFR and WAFR land boundaries into an airspace complex composed of numerous subdivisions of the restricted areas and military operating areas (Figure 1.0-2). Uses of the overall airspace are described in sufficient detail to provide a context in which the overall function of UTTR can be understood. Impacts from uses of the airspace extending horizontally beyond the boundaries of HAFR and WAFR are addressed only generally in this document when they differ from impacts of uses of the airspace above HAFR and WAFR.

The groups associated with UTTR are currently being reorganized. To allow this new organization time to settle in and definitize, the organizational structure that was in place at the time data were being collected for this RMP/EA has been retained in this document, both here and in Section 4.0. Based on these January 1995 data, there are five primary groups associated with UTTR (Figure S-3):

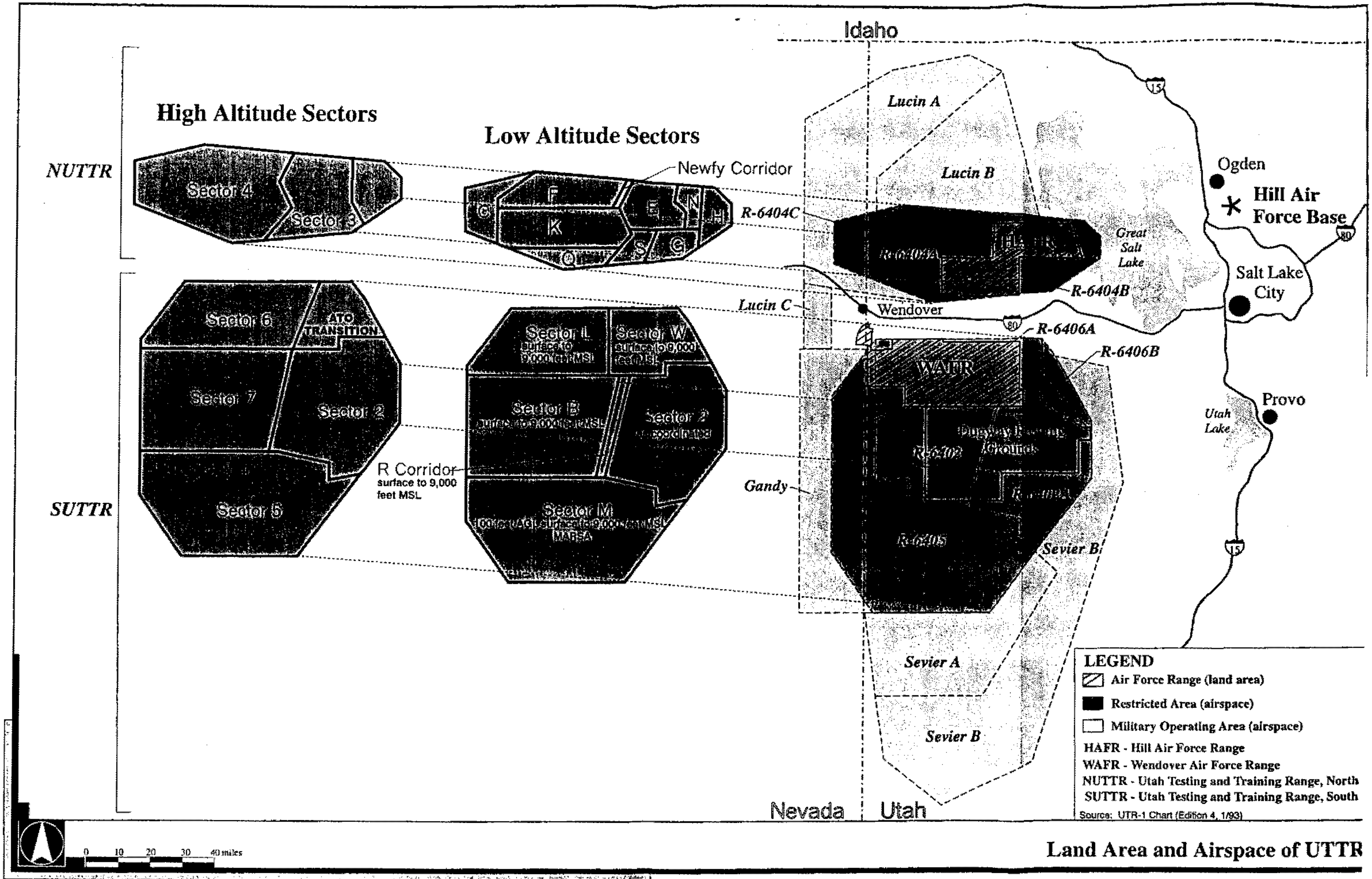
- Air Force Flight Test Center (AFFTC)
- Air Combat Command (ACC)
- Air Force Materiel Command (AFMC)
- Air Force Reserve System (AFRES)
- Air National Guard (ANG)

The AFFTC is represented at the UTTR by the 545th Test Group (TESTG), which is based at Edwards Air Force Base (AFB), California. (Note that these groups have recently been dissolved and their remaining personnel are now collectively Detachment (DET) 1, based at Hill AFB and reporting to the 412th TW as the 545th TESTG previously did.) The 545th TESTG is composed of the 501st Range Squadron, the 514th Flight Test Squadron (FTSQ), and various support divisions (i.e., programs and resources [XR]; engineering [EN]; test forces [TF]; and security and safety [SE]). Its mission is to test and evaluate aircraft, unmanned air vehicles (UAVs), air-launched cruise missiles (ALCMs), and munitions, in partnership with customers, and to provide customized test and training services and facilities to enhance combat readiness, superiority, and sustainability.



Location of HAFR and WAFR

Figure 1.0-1



Land Area and Airspace of UTTR

Figure 1.0-

The primary ACC user is the 388th Wing, which is based at Hill AFB, north of Salt Lake City. The 366th Composite Wing (CW), which is based at Mountain Home AFB, Idaho, also uses UTTR for training. The ACC fighter pilot groups train on HAFR and WAFR and in the airspace above and beyond these ground components of UTTR.

The Ogden ALC is represented at UTTR by the Explosive Ordnance Disposal (EOD) Division and the 75th Range Support Squadron (RANS), which are based at Oasis (the range support facility on the HAFR) and provide support to the variety of range users. To some extent, these support capabilities overlap with those of the 545th TESTG support divisions. The Ogden ALC is also supported by AFMC directorates that use portions of UTTR or support range activities (i.e., environmental management [EM], industrial health monitoring [SGB is the office symbol for this monitoring group], SE, landing gear [LI is the office symbol for this test group], and missile and motor dissection [LM is the office symbol for this test group]). These groups are largely involved in environmental regulatory compliance, safety and health monitoring, equipment testing, and equipment maintenance activities.

The primary AFRES user is the 419th Fighter Wing (FW) based at Hill AFB. Other AFRES bomber and fighter units throughout the continental United States (CONUS) deploy to use UTTR each year. These include both fighter and bomber aircraft that conduct training at UTTR.

Finally, the ANG is represented on a fulltime basis at UTTR by the 299th Range Control Squadron (RCS). Other ANG units may periodically train at UTTR.

The following sections of this RMP/EA address the mission and planning objectives of these groups (Section 1.1); indicate the purpose and need for the proposed action (Section 1.2); describe the proposed action and alternatives (Section 2); identify the environment potentially affected by UTTR activities (Section 3); and provide more detailed information on the setting and components of range land use, uses of the range, legal, environmental, and health/safety considerations, on-range budget, and on-range use issues (Section 4). Subsequent sections discuss range use under the action alternative (Section 5), and environmental consequences of the alternatives (Section 6). The two final sections document consultation and coordination that has occurred (Section 7) and list the references cited in the text (Section 8).

1.1 STATEMENT OF MISSION AND PLANNING OBJECTIVES

As noted in the original RMP (Ogden ALC Directorate of Operations 1975), UTTR was established for and has been used in support of many DOD testing programs since it was withdrawn from the public domain in 1941. Prior to 1975, test missions frequently crossed Air Force and Army range boundaries, requiring and using instrumentation systems in both areas, and resulting in operational constraints, excessive coordination needs, and duplication of effort. Therefore, the original RMP set the following goals:

- Integrate the Air Force and Army Flight Test Ranges into one consolidated airspace and range complex.
- Preserve, improve, and modernize these ranges.
- Ensure the recognition of this range complex as a major DOD test facility.
- Ensure the recognition of the Air Force as the management agency for the overall airspace and for the land area of HAFR and WAFR.

These goals were largely accomplished in 1986 according to a statement in the Record of Decision on the Gandy Range Extension Environmental Impact Statement (EIS) issued by the Deputy Secretary of the Air Force (Unknown nd), although UTTR is still not entirely under one management agency (Webster 1995). The airspace over HAFR, WAFR, and Dugway has been combined and is now managed by the 501st RANS, an Air Force Range Operations component stationed at Dugway.

The current mission of UTTR is to continue to provide DOD with unique training and testing facilities that maintain skilled personnel and ready-to-use, state-of-the-art equipment. The size of the ground safety footprint (the overall area on which aircraft or other vehicles may safely operate even if they go off target) in the combined undeveloped land area of HAFR, WAFR, and the portion of Dugway west of Granite Mountain; the size of the associated airspace; and the distance of UTTR from potential missile launch sites provide DOD with a large, unique test facility. Its uniqueness has become increasingly important given that ongoing testing of large munitions and aircraft requires a large ground safety footprint and given the increasing trend toward development of high-altitude munitions delivery and long-range missiles (Rydman 1994a). The development of sophisticated tracking and communications systems for both air and ground training and testing has been well supported. In Fiscal Year 1993 (FY93) and FY94, $8 million and $11 million were spent, respectively, to continue to improve range support facilities (Hebden 1994).

Specific planning objectives associated with future uses of the UTTR include the following:

- Continued provision of space and facilities for complex air-to-air, air-to-ground and ground training exercises involving bombers, fighters, ground troops, having multiple roles and particularly emphasizing those training missions and testing operations that are most benefited by the remoteness, topography, size and undeveloped land area provided by UTTR (Webster 1995)
- Increased coordination among user groups to provide interactive and cost effective testing and training opportunities (Gubler 1995)
- Increased use of the sophisticated systems at the Sand Island Target Complex (Gubler 1995)
- Increased use of the Thermal Treatment Unit (TTU), which would be supported by upgrading the facility and its capability (Hennessey et al. 1995)
- Increased storage capacity in the Missile Storage Area (MSA) to accommodate Delta II storage, for example (Hennessey et al. 1995)
- Continued provision of test facilities for both manned and unmanned aircraft and munitions

These objectives will be met with particular focus on the support of activities that make use of the area's varied terrain and excellent flying weather and visibility, the vast isolated areas that support the use of live ammunition, the low air traffic density, and the minimal restrictions on electronic emitting systems. Increases in the use of UTTR may require increases in manpower for the 75th RANS, the Base Operating Support (BOS) provider (Hennessey et al. 1995).

1.2 PURPOSE AND NEED FOR THE PROPOSED ACTION

The first sentence of Chapter 6 of AFR 19-9 states that "Planning for air operations and land use on air-to-ground test and training ranges and within their regions is essential for safety, prevention of encroachment, optimal use, and avoidance of conflicts." It then provides procedures for such planning. While Chapter 6 does not specify the frequency with which an RMP must be revised, it does state that the RMP should add current and proposed activities on the range and that activities on the range should be directed according to provisions of the RMP. Therefore, it follows that the most recent version of the UTTR RMP should be updated, as it was prepared in 1975. Chapter 6 notes that when an environmental impact analysis is required, it must be prepared according to AFR 19-2 (superceded by AFI 32-7061). AFI 32-7061 describes specific tasks and procedures for the EIAP that implements NEPA for the Air Force. As stated in Chapter 1, the EIAP "provides procedures for environmental impact analysis both within the United States and abroad...[and]...provides a framework on how to comply with NEPA and Executive Order 12114." While Air Force Instruction (AFI) 32-7060 supersedes AFR 19-9 and provides a more general framework for interagency and intergovernmental coordination for environmental planning, the goal of coordinated and current planning is the same. Under AFI 32-7060, the Air Force Center for Environmental Excellence (AFCEE) has the responsibility for base comprehensive planning and coordination for environmental impact planning. The RMP component of this document bridges the gap since 1975 by documenting and assessing for AFCEE the current and currently proposed activities on UTTR, as well as describing the environmental setting for these activities. To evaluate the potential environmental consequences of these activities and provide a UTTR-specific framework for ongoing NEPA compliance, an EA is also an integral component of this document.

Table 1.0-1 RMP/EA Sections Where Environmental Issues Identified in AFR 19-9 Are Addressed

Environmental Issues[1]	Report Section
Range Features	
Land Use	4.2
Land Requirements	4.1.2, 4.2.1
Airspace Requirements	4.2.1
Targets	4.1.2, 4.2.1
Other Structures	4.1.2, 4.2.1
Equipment	4.1.2, 4.2.1
Waivers	NI
Community/Governmental Context	
Off-Range Land Use	4.1.1
Zoning and other Development Controls	NI
Regional Development	4.1.1
Intergovernmental Agreements	4.3.1
Encroachment	4.1.1.2
Environmental Areas	
Fauna	3.4.1, 3.4.2.2, 3.4.3, 3.4.4, 4.3.2.3, 4.3.2.14, 5.2
Flora	3.4.1, 3.4.2.1, 4.3.2.3, 4.3.2.14, 5.2
Endangered Species	3.4.4, 4.3.2.3, 4.3.2.14, 5.2
Emission	4.3.2.1, 4.3.2.14
Ambient Air Quality	4.3.2.1, 4.3.2.14, 5.2
Mineral Resources	3.2.5, 4.3.2.14, 5.2
Soil Conservation	3.2.6, 4.3.2.14, 5.2
Forest Resources	NP
Grazing and Croplands	3.2.6, 3.4.2, 4.1.1.2
Hunting and Fishing	4.1.1.2
Outdoor Recreation	4.1.1.2
Hazardous Waste	4.3.2.7, 5.2
Historic Properties	3.5.2, 4.3.2.4, 4.3.2.14, 5.2
Archaeological Sites	3.5.1, 4.3.2.4, 4.3.2.14, 5.2
Wilderness	4.1.1.1, 4.3.2.14, 5.2

Legal Concerns	
Environmental Laws	4.3.2, 4.3.3
Outleases and Outgrants	4.3.1
Other Agreements	4.3.1
Liabilities	NI
Base Facilities	
Facilities Supporting Range Activities	4.1.1.4, 4.1.3, 4.2.1.3
Facilities Otherwise Affecting Range Operations	4.1.3, 4.1.1.4, 4.2.1
Noise	4.3.2.2, 4.3.2.14, 5.2
Water Resources	3.3, 4.3.2.3, 4.3.2.14, 5.2
Wetlands	3.4.1, 4.3.2.3, 4.3.2.14, 5.2
Floodplains	3.3.1
Coastal Zones	NP
Range Budget	
Past Funding Levels	4.4
Present Funding	4.4
Future Funding Needs	4.4

1 From AFR 19-9, Attachment 11: Checklist of Environmental Issues to be Considered. NOTE: AFR 19-9 has been superceded by AFI 32-7060

NP Not present on on HAFR or WAFR

NI Not identified for UTTR

2.0 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

In Section 1502.14, the Council on Environmental Quality (CEQ) regulations on implementing NEPA procedures describe how an EA or other NEPA document is to evaluate the alternative ways of implementing a proposed activity (established as required by NEPA Section 102(2)(C)(iii) and 102(2)(E)) and select the alternative of choice (i.e., the proposed action) from among them. These regulations require one of the alternatives considered to be a "no action" alternative. The proposed action in this EA is the implementation of the RMP provided as an integral component of this document. The no action alternative is to reject this plan and continue to operate under the 1975 RMP.

Because the UTTR planning objectives indicate that continuation of current activities is intended and because current activities are largely responsive to the needs of various customers using the range, the definition of other action alternatives based on specific alternative future use scenarios was not possible. Rather, the proposed action assumes ongoing customer requirements for activities that are not specifically predictable. These types of activities are extensively characterized in Section 4. Other alternatives, considered but eliminated, would involve the removal of specific types of training or testing activities or their transfer from UTTR to other DOD facilities. It was considered extremely unlikely that all current activities would be transferred from UTTR, given its unique characteristics, which include the following:

- Its large size and therefore large safety footprint
- Its abruptly variable topography and therefore effective testing of guidance systems and training of pilots in maneuvers
- Its isolation from population centers and therefore avoidance of public safety and annoyance concerns
- Its somewhat simplistic ecosystems and therefore relatively diminished environmental resources to sustain impacts from range activities
- Its strategic location and interconnections (spatial and communications) with other DOD facilities and therefore ability to participate in long range cooperative training and testing activities that can be fully evaluated over land

Since, for all these reasons, UTTR should continue to function as a training and test range, it seemed unreasonable and inefficient to restrict the specific types of activities that might occur there. It was beyond the scope of this EA to consider complete elimination of training or testing activities from the Air Force program. Therefore, the action alternative, to continue in support of current Air Force activities that are not specifically predictable, was the only viable alternative to be considered together with the no action alternative.

Because the components of the proposed action are not specifically predictable, three management options were developed within the proposed action. These management options serve to guide NEPA compliance of UTTR activities that differ in their environmental impacts, yet allow flexibility in managing these activities. Option 1 is a restricted version of the status quo, Option 2 is the status quo, and Option 3 is an expansion of the status quo. The Option 1 restrictions are based on information contained in Sections 3 and 4 with the intent of minimizing impacts to various resources (e.g., restricting the scheduling of some uses to minimize impacts to nesting raptors). Option 2 is the status quo in terms of areas of use, types of use, and intensity of use. Neither Option 1 nor Option 2 requires further NEPA compliance. Option 3 encompasses those activities that involve a change in the areas of use, the types of use, or the intensity of use. Option 3 requires further NEPA evaluation using the criteria established for UTTR. These options are described further in Section 5.

The incorporation of these three management options into the action alternative maximizes the usability of this document and flexibility in using UTTR by specifying the types of actions requiring further action under NEPA and by focusing that action with a site-specific evaluation process. This process takes into account specific information about UTTR such as areas that have been surveyed for archeological resources and soils that have been identified as unstable.

3.0 AFFECTED ENVIRONMENT

This section addresses the climatology, geology, hydrology, ecology, cultural resources, and visual resources of HAFR and WAFR, environmental components that are relevant to an examination of past, present, and future uses of the area. The Oasis complex and motor dissection and missile storage facilities, located in the southeast corner of HAFR, comprise the few permanent facilities on HAFR and WAFR. The uses of UTTR, described in Section 4, have largely been associated with training pilots and testing aircraft and munitions

3.1 CLIMATE

Climate of the UTTR is characteristic of the west desert region. The valleys of this region are considered arid. The climate on the east side of Great Salt Lake is considered semi-arid (Workman et al. 1992c). The climate is characterized by hot, dry summers, cool springs and autumns, moderately cold winters, and a general lack of year-round precipitation (U.S. Department of the Air Force 1989). During the winter, storm systems are separated by 2- to 3-week periods of stagnant high-pressure systems that tend to trap cold air in the valleys and create fog. Summer thunderstorms have the potential to cause extensive flash flooding and subsequent soil erosion (U.S. Department of the Air Force 1989).

Average annual precipitation, which varies significantly throughout the region due to various elevations and topography, ranges from 5 inches in the valleys and low-lying mud flats to more than 30 inches in the mountains (U.S. Department of the Air Force 1989). On the east side of the Great Salt Lake, the annual precipitation averages 18 inches per year (Workman et al. 1992c). Generally, precipitation in the Lakeside and Grassy Mountains averages 6 inches per year. Data from the Lakeside meteorological station, located just west of the Great Salt Lake and just north of these mountains, show an average precipitation of 6 inches between 1982 and 1990. However, heavy precipitation between 1982 and 1986 caused the Great Salt Lake to crest in 1986. Subsequently, an average decline in precipitation was recorded at the Lakeside station from 1986 to 1990. Snowfall at the Lakeside station and at the Wendover meteorological station on the

Nevada border averaged 8 inches from 1981 to 1991 between October and April of each year (Workman et al. 1992c).

Temperatures in the region are highly variable, although Great Salt Lake, located to the east of HAFR and to the northeast of WAFR at an elevation of 4,200 to 4,212 feet mean sea level (MSL), has a moderating effect on temperature in the area. The summers are a little cooler and the winters are a little warmer on the ranges because of the lake's presence. Average daily maximum temperatures range from 30 degrees Fahrenheit (°F) to 50°F in January and from 80°F to 100°F in July, while average minimum daily temperatures range from 10°F to 20°F in January and from 50°F to 70°F in July. Temperature graphs of the data collected at the TTU have been completed for quarterly periods from October 1, 1994 through September 30, 1995 (Table 3.1-1). At Dugway, immediately south of WAFR, the daily temperature can range from below 60°F to more than 100°F during July and August. Records from the National Weather Service at Dugway indicate that the highest recorded temperature was 105°F and the lowest recorded temperature was -22°F for a period of record from January 1951 to December 1975. For this same period of record, the average annual temperature ranged from 48°F to 52°F. The average annual temperature recorded in the town of Wendover between 1941 and 1970 is 52.2°F. The diurnal temperature at Wendover and Lakeside stations varies widely. The temperature difference between winter and summer may be as much as 130°F. During the summer, temperature ranges from 80 to 105°F. Winter temperatures range from -25 to 55°F (Workman et al. 1992c). The area averaged 151 frost-free days annually between 1951 and 1964. The relative humidity in the summer fluctuates between 13 and 50 percent. In winter, the fluctuation is from 65 to 95 percent (Workman et al. 1992c).

The north-south trending Wasatch Range strongly influences the wind patterns in northern Utah and forms a barrier just to the east of the Ogden area, while the Weber River Canyon northeast of Hill AFB and east of UTTR creates a predominant wind from the east-southeast throughout the year. Winds from that direction occur more than 35 percent of the time due to the strong flow of air that frequently comes down the mountain slopes and out of the canyon toward the Great Salt Lake.

During the day, the return wind flow from the lake and valley floor is less unidirectional and more representative of the valley wind flow (U.S. Department of the Air Force 1989).

In the vicinity of HAFR and WAFR, the general north-south orientation of the mountain ranges results in valley surface winds from the north or south. This pattern can be modified at night by downslope winds that are produced by cool, dense air flowing from higher elevations toward the valley floor. Light winds, originating locally, blow over the valley floors in a southeasterly direction by night and a northwesterly direction by day. Winds near the mountains usually have very different local effects and do not reflect the general nighttime southeast and daytime northwest patterns. The average wind speed as measured at Lakeside and Wendover Stations is 5 to 10 miles per hour (Workman et al. 1992c). Spring and fall winds up to 40 miles per hour and winter winds up to 50 miles per hour have been recorded. Winds are from the north-northeast and south-southwest. Wind roses of the data collected at the TTU have been completed for quarterly periods from October 1, 1994 through September 30, 1995. These data are summarized in Table 3.1-2. Just south of WAFR at Dugway, wind speeds range from 3 knots in December to 6 knots from March through June. High winds are common in the area from March to June and November to December, with gusts as high as 75 miles per hour (U.S. Department of the Air Force 1989).

Baseline meteorological data were gathered for HAFR between 1993 and 1995. These data were collected from one 10-meter tower at the TTU and from two 10-meter towers and one 30-meter tower at Oasis. Wind speed, wind direction, temperature, humidity, and solar radiation data were collected and correlated to existing data from stations 15 miles away. Quarterly summaries of these meteorological data for HAFR are on file with air quality personnel at Hill AFB (Graziano 1996).

3.2 GEOLOGY

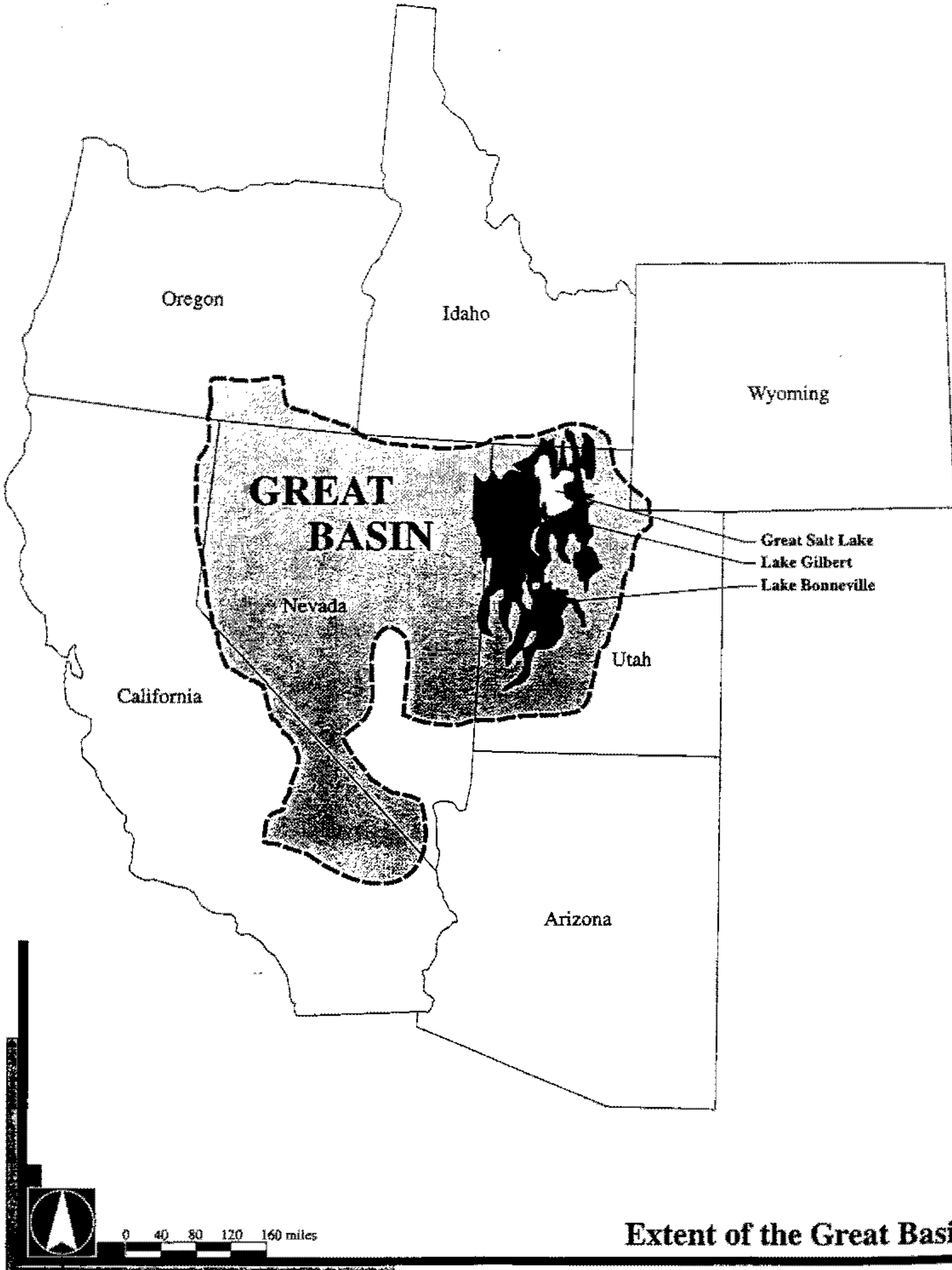
HAFR and WAFR lie in the Great Basin region of the Basin and Range Physiographic Province (Figure 3.2-1). The Basin and Range Physiographic Province is characterized by fault-block mountain ranges that generally trend north-south and that are separated by flat desert basins. During the late Pleistocene, the area including HAFR and WAFR was covered by a large freshwater lake called Lake Bonneville (Figure 3.2-1). At its maximum extent, Lake Bonneville covered an area of approximately 50,000 square kilometers (km^2) and had a depth of more than 330 meters (Flint 1971).

3.2.1 Geomorphology

The landforms on HAFR and WAFR can be classified into the following three categories: pre-Lake Bonneville, Lake Bonneville, and post-Lake Bonneville. Pre-Lake Bonneville landforms include landforms that were created by thrust faulting, domal uplift, volcanism, and block faulting. The landforms created by Lake Bonneville include wave-cut terraces, shorelines, sea caves, spits, and barrier bars. Lake Bonneville shorelines are visible along the flanks of the Lakeside Mountains on HAFR. Post-Lake Bonneville landforms include the present drainage patterns, outwash materials from occasional flash flooding, deposits of windblown sand and silt, and minor amounts of outwash materials from ravines and canyons (Workman et al. 1993b).

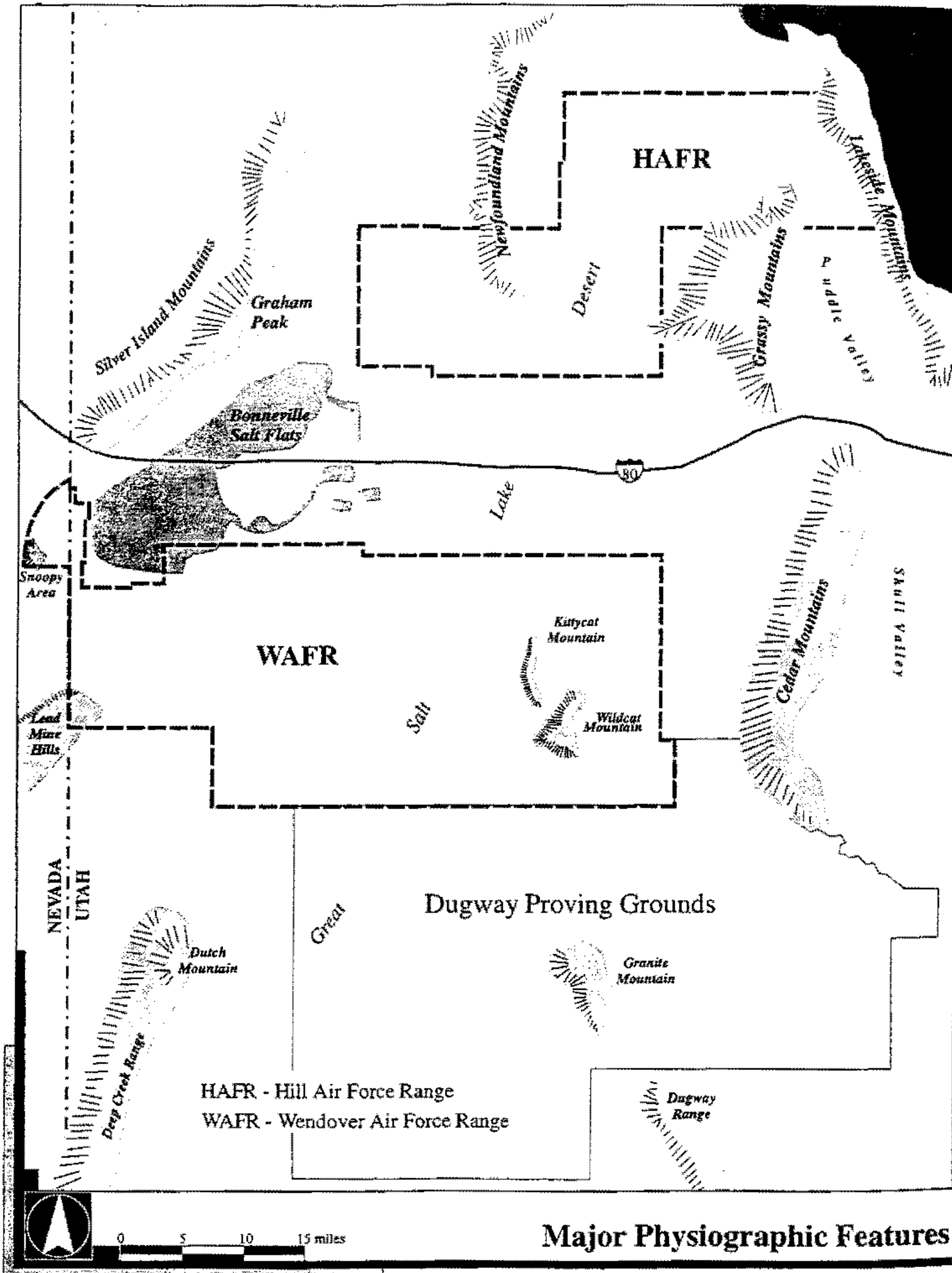
Land surface elevations across HAFR and WAFR generally vary from a high of more than 5,800 feet MSL in the Lakeside Mountains to a low of about 4,200 feet MSL along the Great Salt Lake. The nearby Deep Creek Mountains to the southwest and Stansbury Mountains to the east are 12,101 and 11,031 feet in elevation, respectively. Most of HAFR and WAFR is covered by often dry mud flats, with upland areas limited to the southern tip of the Newfoundland Mountains, northern tip of the Grassy Mountains and Lakeside Mountains on the HAFR, and Wildcat and Kittycat (Little Wildcat) Mountains on WAFR. An upland area, called Sink Valley, occurs between the Grassy Mountains and Lakeside Mountains on HAFR. Surface drainage is primarily away from the mountain areas into the mud flats. The mud flats are extremely flat with limited drainage towards the north-northeast to the Great Salt Lake (Figure 3.2-2).

Caves can be found in the Paleozoic carbonate rocks in the Lakeside Mountains on and east of HAFR and possibly in the northern tip of the Grassy Mountains. Caves form when dissolution of carbonate rocks by groundwater is followed by collapse. Caves are also present in the area surrounding HAFR and WAFR, including the northern House Range and the Snake Range (BLM



Extent of the Great Basin

Figure 3.2-1



Major Physiographic Features

Figure 3.2-2

1986). The caves on HAFR and WAFR could contain unique crystal formations or archeological sites.

3.2.2 Stratigraphy

Rock formations exposed across HAFR and WAFR range in age from Cambrian to Quaternary (Figures 3.2-3, 3.2-4, and 3.2-5). On HAFR, the rocks exposed in the Lakeside Mountains are primarily dolomites and limestones with some minor quartzites, siltstones, and sandstones that range in age from Cambrian to Pennsylvanian. Rocks of Tertiary age are not found here, although Quaternary deposits of lake clays and gravel are present. Rocks exposed in the Newfoundland Mountains on HAFR are primarily dolomites, quartzites, and limestones ranging in age from Ordovician to Devonian. Rocks of Tertiary age are not present, nor are rocks of Mississippian and Pennsylvanian age. Quaternary deposits consisting of lake clays, gravels, and sands are found in the Newfoundland Mountains. The remainder of HAFR is covered by Quaternary mud flats with some eolian deposits.

The only rocks exposed on WAFR are the Pennsylvanian dolomite and limestone that comprise Wildcat and Kittycat Mountains. These rocks appear to be intruded by igneous rocks that are younger than Pennsylvanian. Exposed rocks are also present just west of WAFR and across the Nevada line in the Snoopy Area and in the Lead Mine Hills. The remainder of WAFR is covered by Quaternary mud flats and some eolian deposits.

3.2.3 Structure

Near the close of the Mesozoic Era as part of the Laramide Orogeny, the major period of mountain building, the rock formations in the area of UTTR were compressed to form large folds that trend north-south. The Lakeside-Grassy Mountain area is typical of Basin and Range physiography. Structurally, the Lakeside Mountains and the Grassy Mountains are different. The Lakeside Mountains show structural patterns relating to the Paleocene uplift of the Northern Utah Highland Dome, of which they form the west flank (Doelling 1964). These patterns consist mainly of normal faults and open folds. An uplift in the Newfoundland Mountain area rising concurrently with the

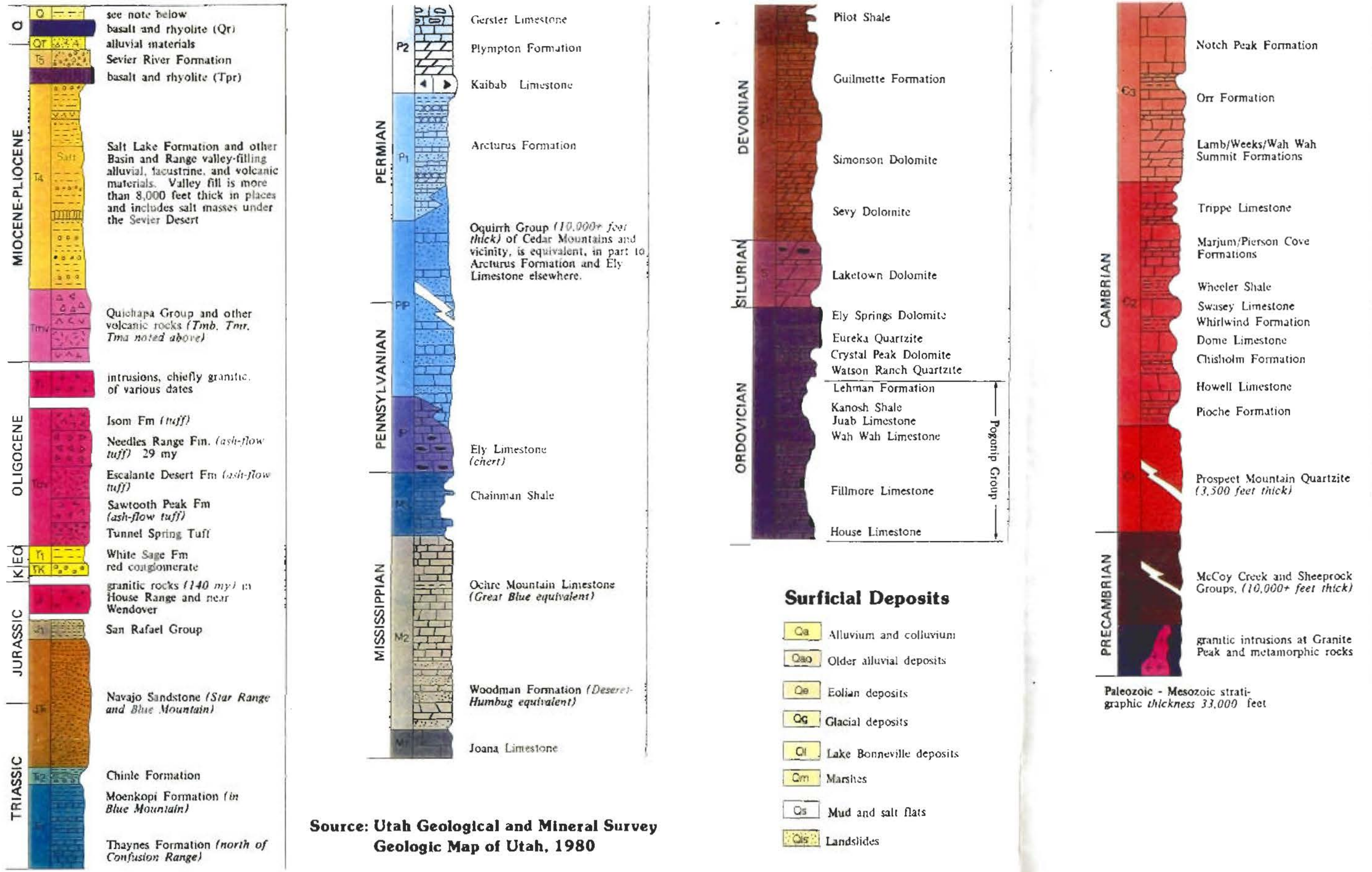
Northern Utah Highland uplift compressed the intervening Grassy Mountain area, overturning, tightly folding, and thrusting the strata. Both the Lakeside Mountains and the Grassy Mountains were later affected by block faulting (Workman et al. 1993b).

Wildcat and Kittycat Mountains were folded during the Laramide Orogeny. On the east side of Wildcat Mountain the formation dips about 11 to 14 degrees to the east, and on the west side the formation dips 17 to 22 degrees to the west. Kittycat Mountain is narrower and dips more steeply—27 to 32 degrees to the east and up to 40 to 45 degrees to the west (Workman et al. 1993b).

3.2.4 Seismicity

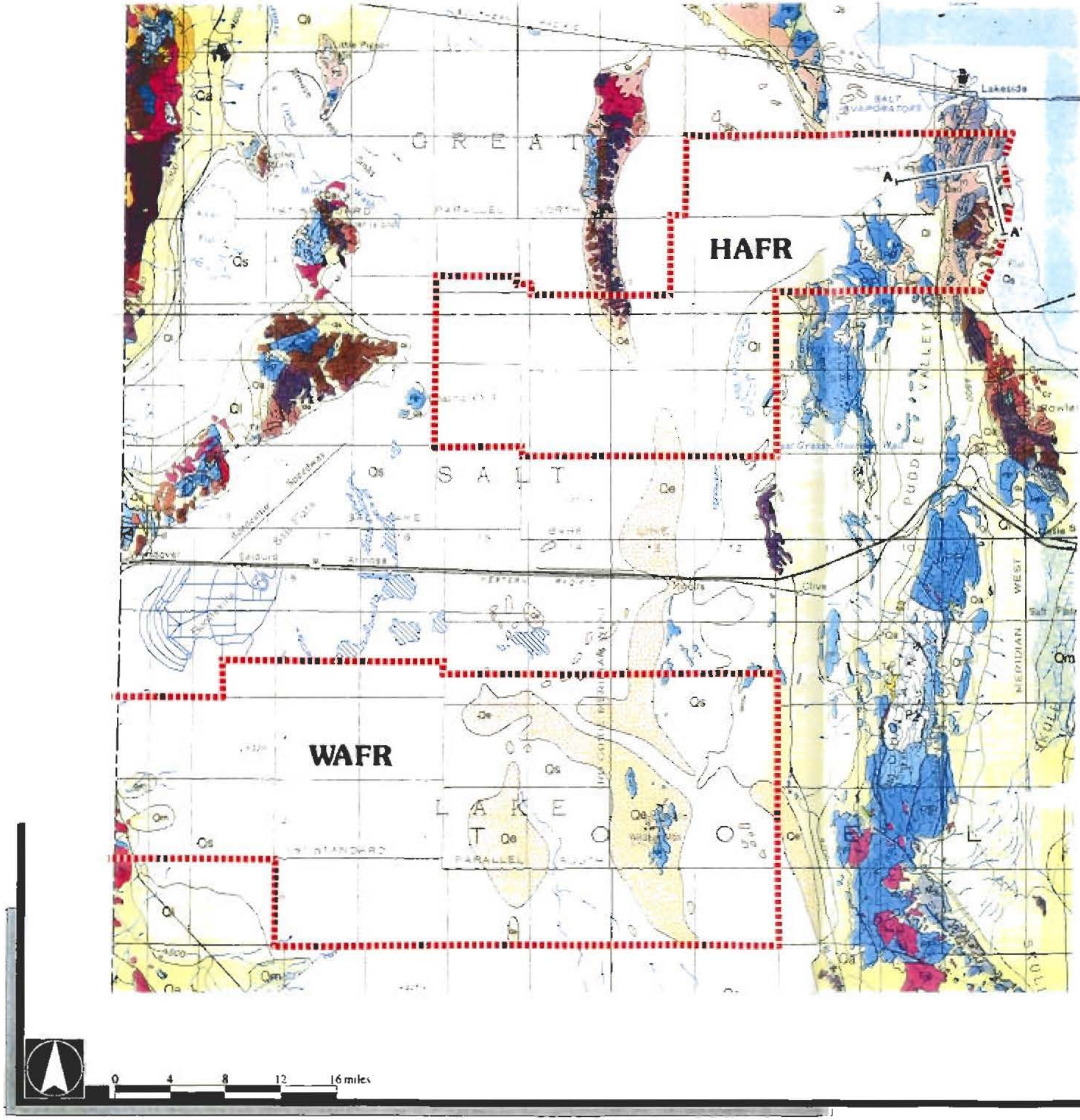
The area around the UTTR is seismically active. Historically, there have been 15 earthquakes recorded in Utah that were of Richter magnitude 5.5 or greater (Peterson 1986). Of these, four have been in the vicinity of the Great Salt Lake: two in Hansel Valley just north of the Great Salt Lake, one in Salt Lake City, and one on the Nevada-Utah border. Of earthquakes that measured a magnitude of 4.0 or greater on the Richter scale between 1850 and June 1978 in Utah, the west desert region had about one-third the number that occurred east of the Great Salt Lake near Hill AFB (Figure 3.2-6). A cluster of lower magnitude earthquakes occurred between July 1962 and June 1978 west and northwest of HAFR and near the Newfoundland Evaporation Basin. During the last week of September 1987, a series of six earthquakes, ranging in magnitude from 3.9 to 4.8 (Richter), occurred in the west desert midway between the Lakeside Mountains and the Newfoundland Mountains near the south end of the Hogup Mountains (Figure 3.2-6). A magnitude 4.0 (Richter) earthquake also occurred in this general area in 1967 (Workman 1988a).

Analysis of the northern Utah earthquakes suggests that these earthquakes are shallow seated and affect a small area. In northern Utah, no earthquake of sufficient intensity to cause extensive damage to well-constructed buildings has been recorded. The area in the vicinity of the UTTR is classified as U-1, U-2, and U-3 by the Utah Seismic Safety Advisory Council (Workman 1988a).



General Stratigraphic Column for the UTTR

Figure 3.2-3



LEGEND

A ——— A' Location of Cross-Section

Air Force Range Land Boundary

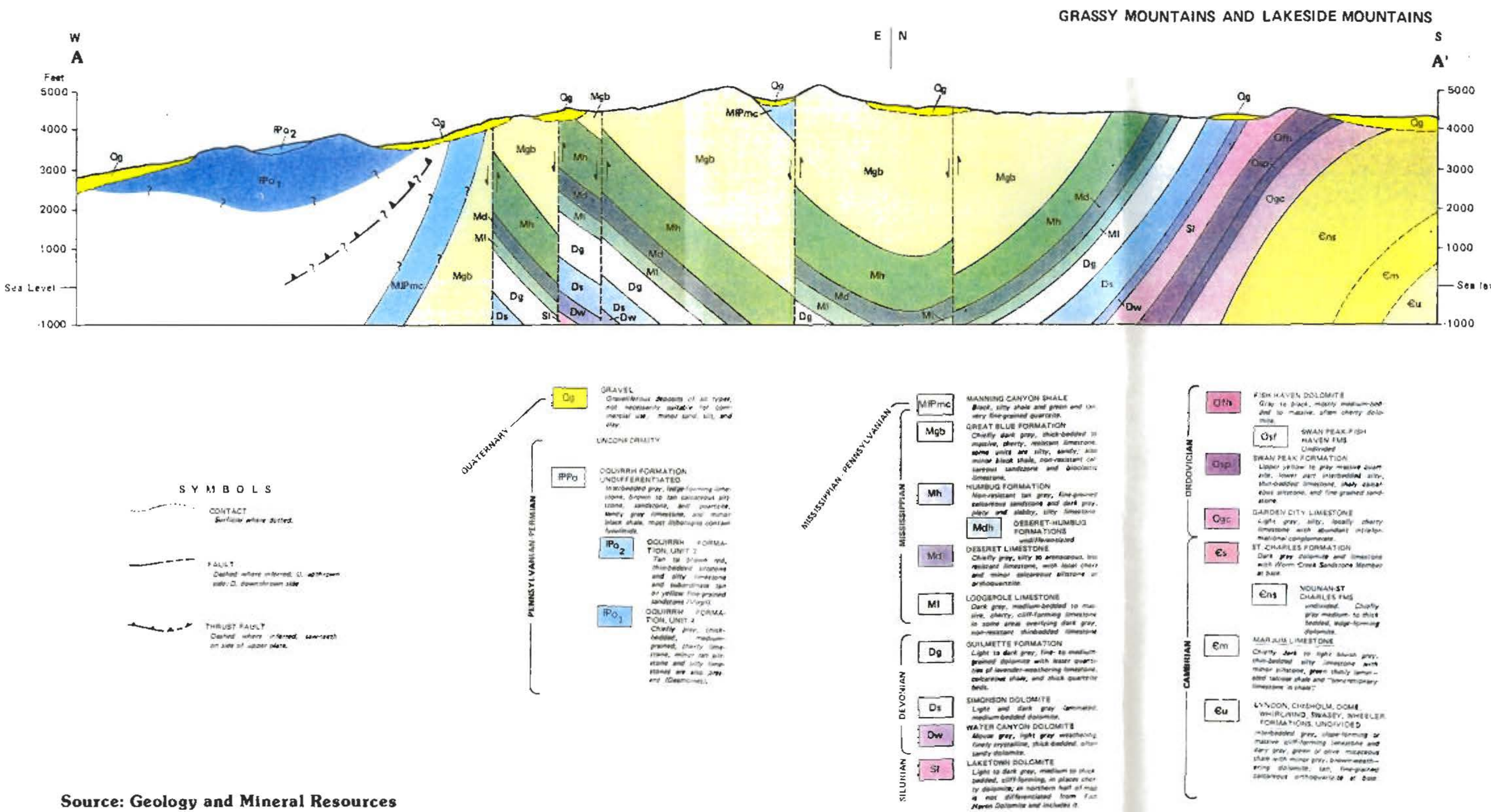
Source: Utah Geological and Mineral Survey
Geologic Map of Utah
1980

Scale 1:500,000
Contour Interval: 500 Feet

Note: See Figure 3.2-3 for Surficial Deposit Explanation.

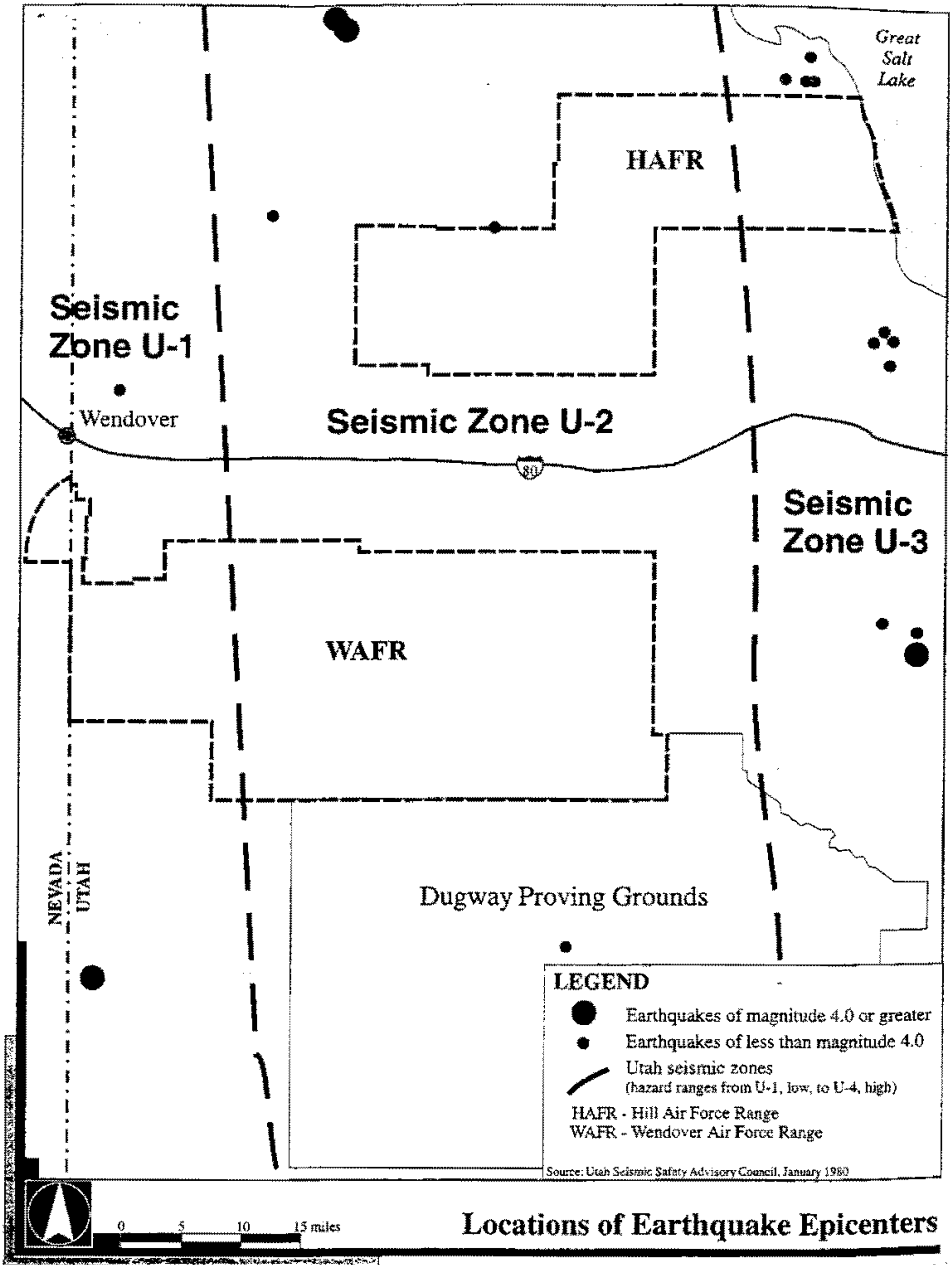
Geologic Map of the UTTR

Figure 3.2-



Source: Geology and Mineral Resources of Box Elder County, Utah, 1980 by Hellmut H. Doelling, et al., Bulletin 115.

Geologic Cross-Section of Grassy and Lakeside Mountains



Locations of Earthquake Epicenters

Figure 3.2-6

The zone of high risk, designated U-4, lies primarily on the east side of the Great Salt Lake. Risk decreases toward the east and the west (Mabey 1985) as shown in Figure 3.2-6.

3.2.5 Mineral Resources

Mineral exploration and development activities are prohibited on HAFR and WAFR. However, mineral resources do occur in and around these ranges and have historically been developed. Gold, silver, copper, lead, zinc, beryllium, mercury, iron, tungsten, molybdenum, fluorite, barite, and antimony deposits are known to occur southwest of the WAFR at Gold Hill. Gold, silver, copper, lead, zinc, tungsten, and barite are known to occur west of the HAFR in the vicinity of the Silver Island Mountains. Tungsten is known to occur in the Newfoundland Mountains north of HAFR. Limestone and dolomite are actively mined in the Lakeside Mountains south of HAFR (Doelling and Bon 1990).

Barite is known to occur on WAFR at Wildcat Mountain (Doelling and Bon 1990; Workman et al. 1993b). Fluorite, malachite, and chalcanthite have also been identified there, as well as a potentially valuable clay deposit. A mine was active on Wildcat Mountain in the past but was closed down when UTTR was established in 1941 (Workman et al. 1993b). Six small adits associated with this mine can still be located (Weder 1995).

Most of HAFR and WAFR is covered or underlain by saline materials that could be mined for sodium, chloride, potassium, and magnesium (Figure 3.2-7). Two active magnesium mines are located immediately south of HAFR, the Knolls Solar Ponds and Rowley Mine (Doelling and Bon 1990; Doelling 1983). Brines are currently being evaporated near the town of Wendover.

Additional nonmetallic mineral resources available on HAFR and WAFR include gypsum, anhydrite, limestone, dolomite, and silica sand (Doelling 1983). Economical gravel deposits may also be present in the vicinity of the Lakeside Mountains.

Oil and gas resources are not expected to be present beneath UTTR. The nearest known oil and gas field is Rozel Point, located on the eastern shore of the north arm of the Great Salt Lake. Many shallow wells were drilled in and around oil seeps in this area in the early 1900s. Currently, Rozel Point is not producing and all wells are shut-in or abandoned (Hill and Bereskin 1993).

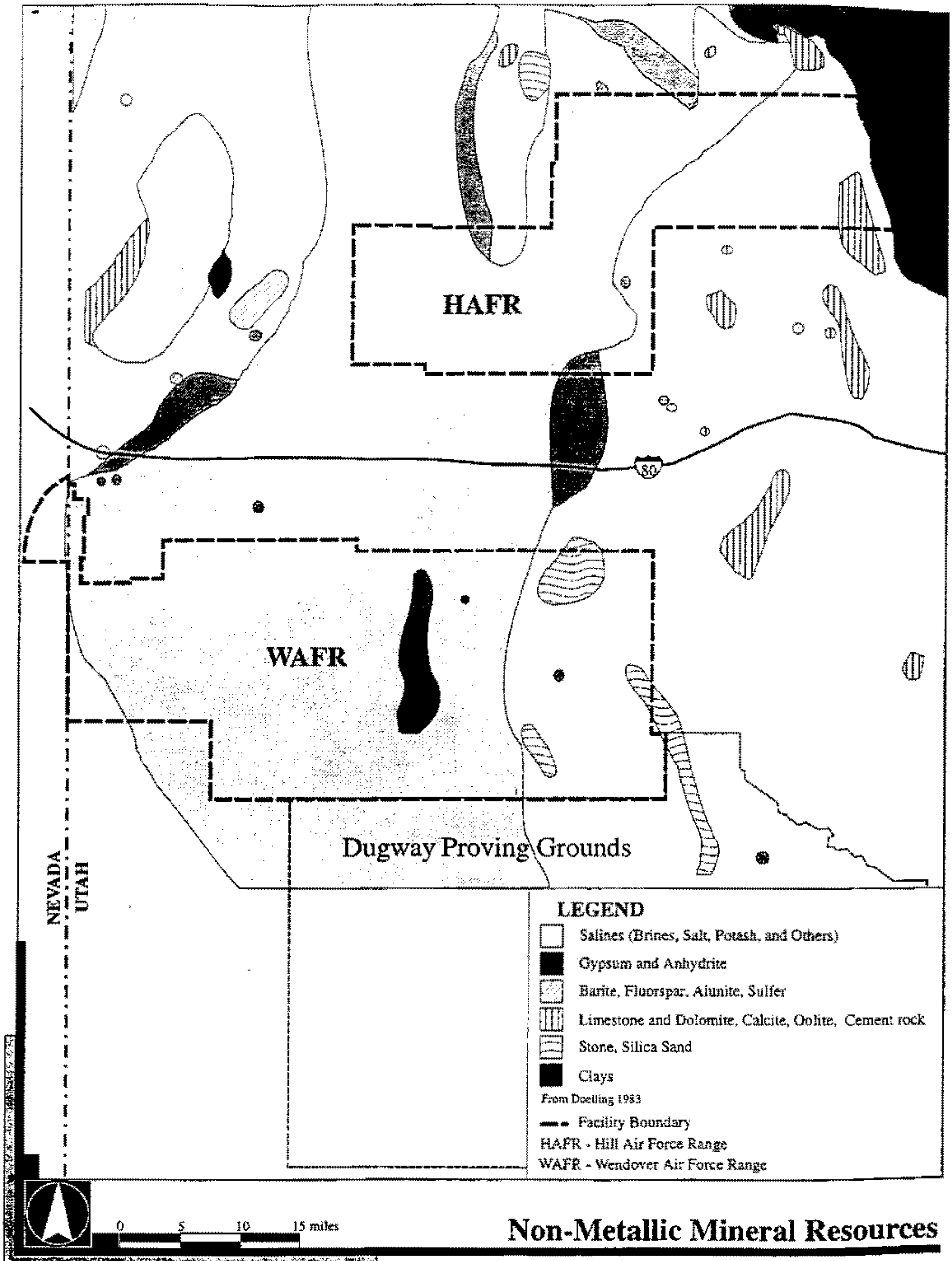
3.2.6 Soils

Both HAFR and WAFR are primarily covered by Playa and Playa-Saltair Complex soils (Figures 3.2-8 and 3.2-9). These soils are found primarily in the low-lying, flat portions of the ranges. The playas consist of barren undrained basins that are subject to repeated inundation by salt water and salinization by evaporation of the accumulated water. The surfaces of playas are often thinly covered by salt crystals and patterned by cracks when dry. The soil materials are strongly calcareous, stratified lacustrine sediments of silt, clay, and sand containing sufficient amounts of salt to prohibit the growth of vegetation. The Playa soils have low permeability and drain slowly. Their available water capacity is very low.

The Saltair soil is formed in alluvium and lacustrine sediments derived from mixed rock sources. The surface layer is typically very pale brown, strongly saline silt loam 8 inches thick. The underlying material to a depth of 60 inches or more is white, strongly saline silt loam and silty clay loam. The Saltair soils have low permeability and drain slowly. Their available water capacity is very low to low.

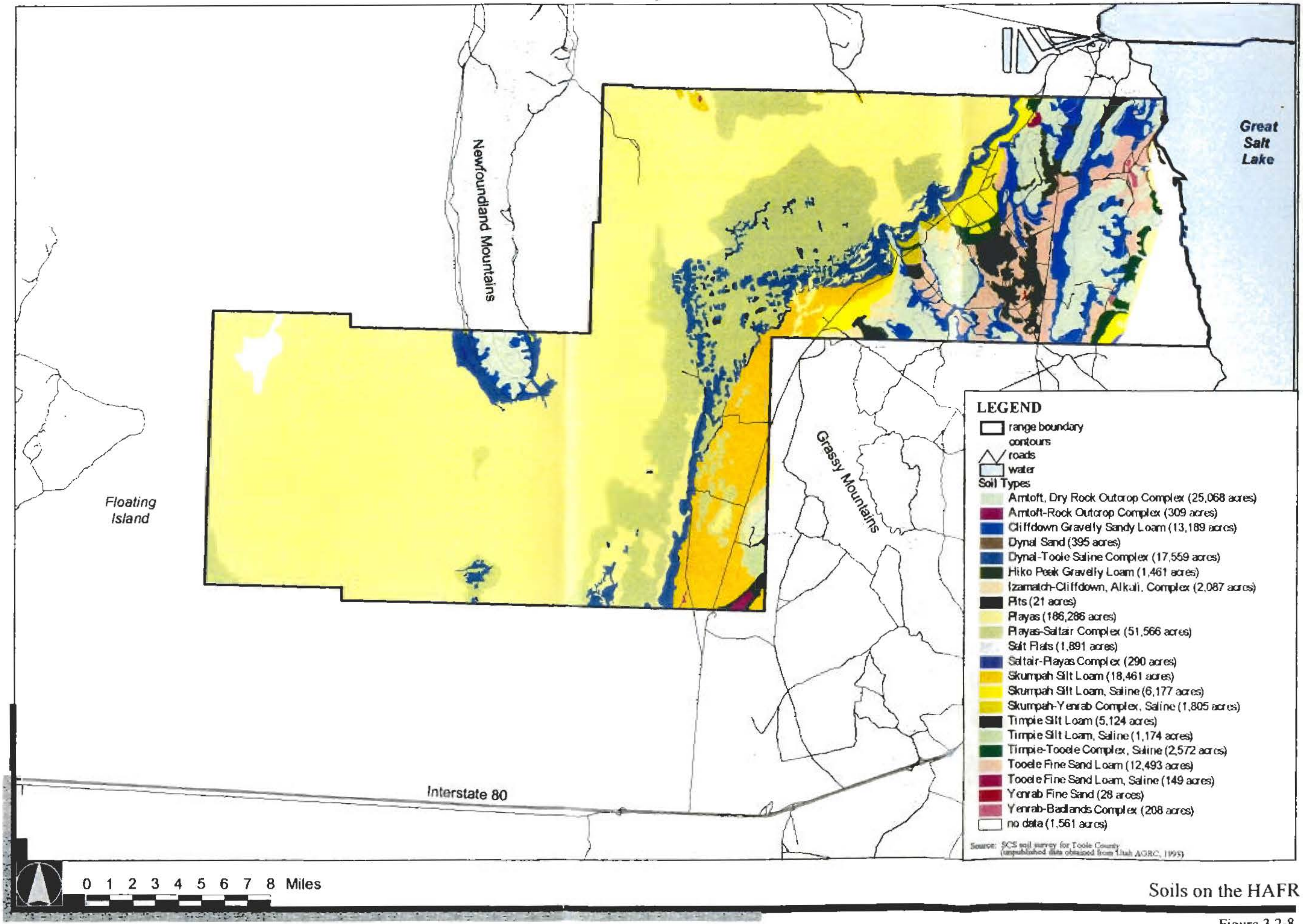
Most of the remaining soils are found covering the slopes and upland areas of HAFR and WAFR. These consist primarily of silt loam, sand, gravelly-sandy loam, thin cobbly loams, and rock outcrops. Most of these soils are alkaline and covered with sparse vegetation.

Very few of the soils that cover HAFR and WAFR are suitable for livestock grazing, rangeland seeding, cropland, or roads and building site development (Table 3.2-1). Both the Playa and Saltair soils are poorly suited to livestock grazing, rangeland seeding, recreational uses, or homesite development due to low forage quality, alkalinity, and frequent flooding. Less than 6 percent of the



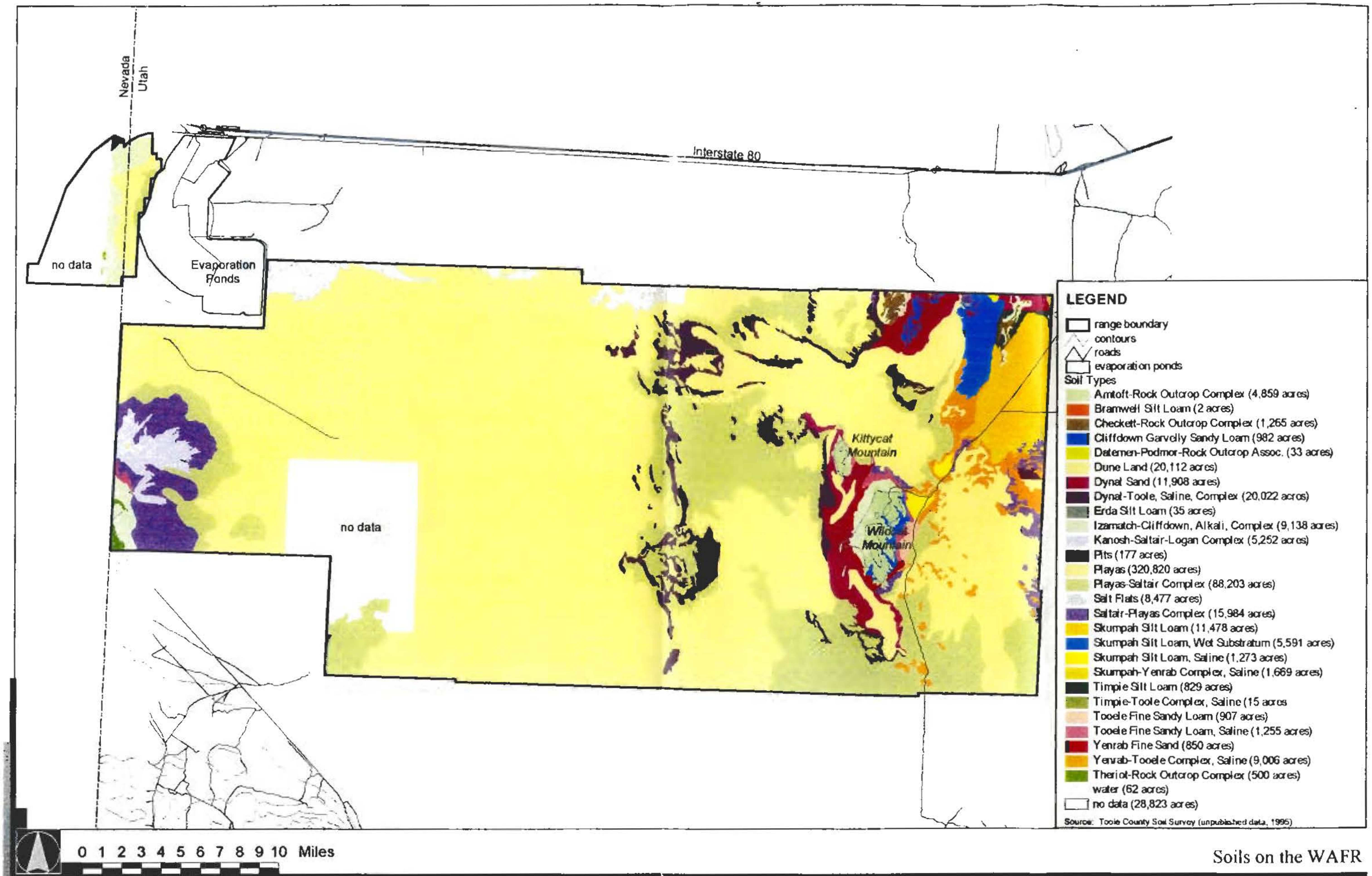
Non-Metallic Mineral Resources

Figure 3.2-7



Soils on the HAFR

Figure 3.2-8



Soils on the WAFR

Figure 3.2-9

soils on HAFR (Hiko Peak Gravelly Loam, Izamatch-Cliffdown Alkali Complex, Timpie Silt Loam, Tooele Fine Sandy Loam, Yenrab Fine Sand, Yenrab Badlands Complex) are considered fair or good for livestock grazing. Less than 0.5 percent (Hiko Peak Gravelly Loam) are considered fair for range seeding. Nine percent (Cliffdown Gravelly Sandy Loam, Hiko Peak Gravelly Loam, Timpie Silt Loam, Timpie Silt Loam - Saline, Tooele Fine Sandy Loam, Tooele Fine Sandy Loam - Saline) are considered suitable for irrigated crops. Less than 0.5 percent of the soils (Hiko Peak Gravelly Loam) are considered suitable for road or building sites. All of these soils are concentrated along the slopes of the northeastern corner of HAFR.

Of the soils on WAFR, less than 6 percent (Checkett-Rock Outcrop Complex, Cliffdown Gravelly Sandy Loam, Edra Silt Loam, Izamatch-Cliffdown Alkali Complex, Kanosh-Saltair-Logan Complex, Skumpah Silt Loam, Tooele Fine Sandy Loam, Yenrab Fine Sand, Yenrab-Tooele Complex-Saline) are considered fair or better for livestock grazing. Less than 1 percent (Edra Silt Loam, Kanosh-Saltair-Logan Complex) are considered fair or better for range seeding. Less than 1 percent (Cliffdown Gravelly Sandy Loam, Edra Silt Loam, Timpie Silt Loam, Tooele Fine Sandy Loam, Tooele Fine Sandy Loam-Saline) are considered suitable for irrigated crops. Only 0.01 percent (Edra Silt Loam) are suitable for road or building sites. All of these soils are concentrated along the slopes and upland areas on the east and west sides of WAFR. Approximately 3.5 percent of WAFR is covered with dune sand, which occurs only in its northeast corner.

3.3 HYDROLOGY

3.3.1 Surface Water

No perennial streams originate on HAFR and WAFR, although there are perennial streams in the Deep Creek Mountains to the southwest. The only flows in the stream channels on HAFR and WAFR are found just below perennial springs and generally infiltrate within a short distance. Most of the precipitation that falls on the area is quickly discharged by evapotranspiration or is stored temporarily as soil moisture and then discharged by evapotranspiration (Gates and Kruer 1981; Stephens 1974).

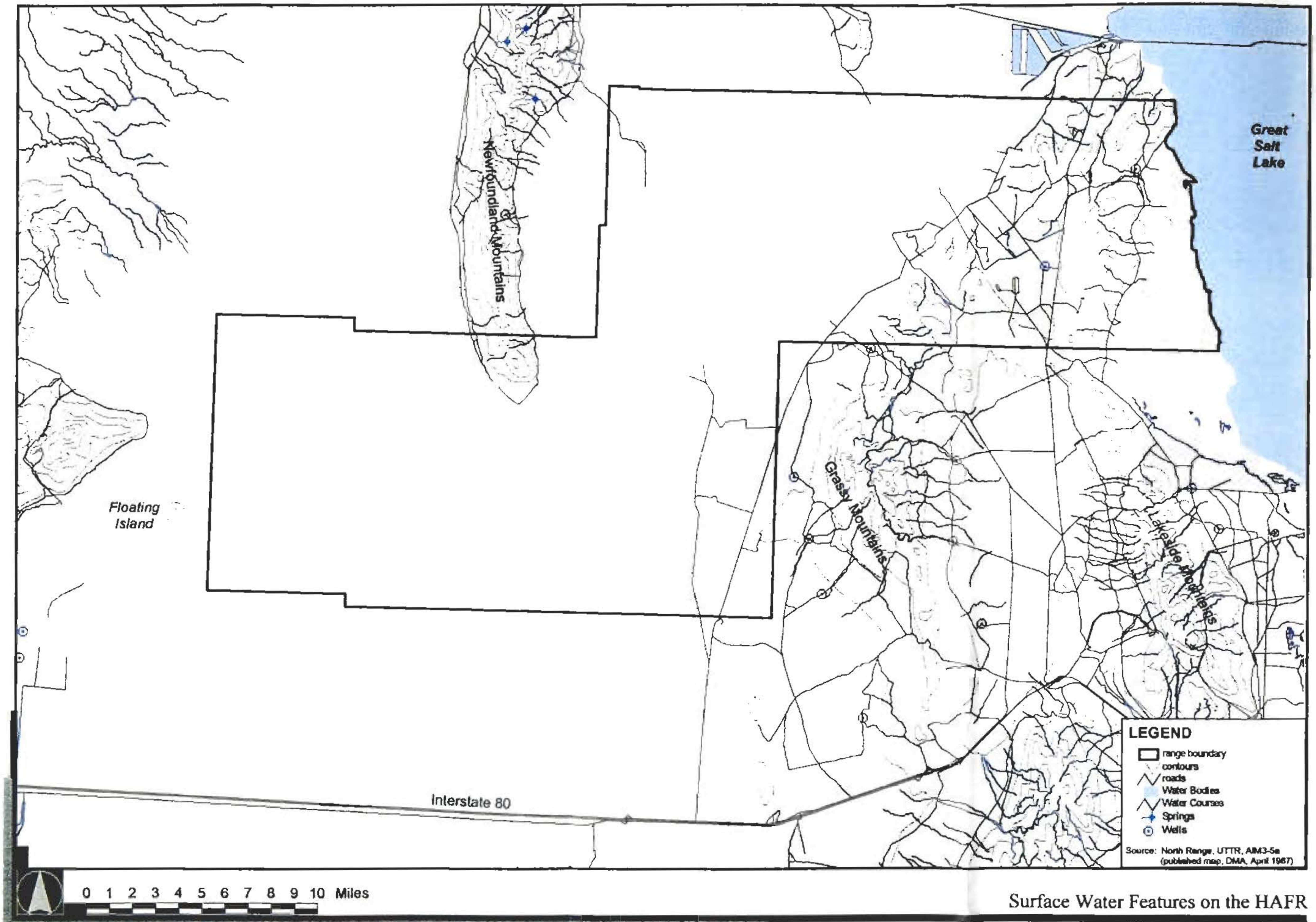
Some water runs off the steep consolidated-rock slopes of the mountains during and immediately after intense summer thunderstorms and during periods of rapid snow melt. Very little of this runoff reaches the basin lowland below the consolidated areas (Gates and Kruer 1981; Stephens 1974).

The Great Salt Lake borders on the northeast side of HAFR. It is a shallow saline remnant of Lake Bonneville that is confined in a low depression within the Great Basin. The waters that flow into the lake are trapped within the closed basin and can leave only by evaporation. The water level of the lake has fluctuated greatly over recorded time (Workman and Flannery 1989). Most recently, the water level rose significantly in the years 1983 to 1986, causing considerable property damage (PRC 1986). The fluctuating water level can cause flooding along the east flank of Lakeside Mountains on HAFR and flooding of the low-lying mud flats that extend into HAFR between the north end of the Lakeside Mountains and the south end of the Hogup Ridge. Flooding of the mud flats on HAFR is impeded by the embankment of the Southern Pacific Railroad's Lucin Cutoff and the Threshold, a slight rise between Hogup Ridge and the Lakeside Mountains.

Within the HAFR boundaries, there are two springs in the Lakeside Mountains and a number of springs east of HAFR in the Grassy Mountains and in the southern extension of the Lakeside Mountains (Figure 3.3-1). On the west side of WAFR are two large springs surrounded by extensive wetlands, the only known perennial springs on WAFR (Figure 3.3-2). The water in Blue Lake is relatively high in dissolved solids (Table 3.3-1); concentrations in the water at Mosquito Willy's are expected to be similar.

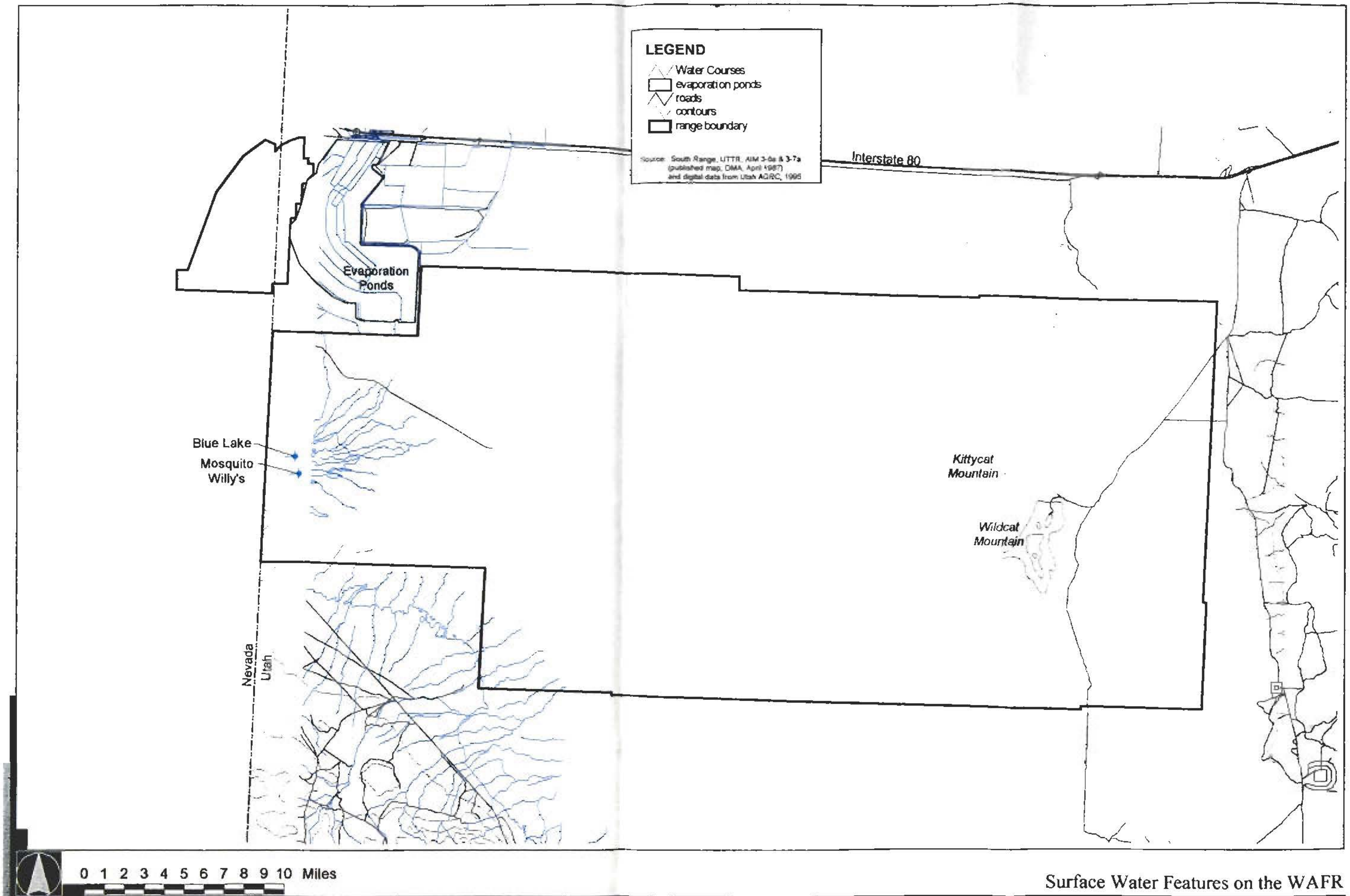
3.3.2 Groundwater

Groundwater occurs in both the unconsolidated and consolidated rocks beneath HAFR and WAFR. The major groundwater reservoir is the unconsolidated to partially consolidated basin fill. This material is more than 1,000 feet thick, possibly ranging up to 2,000 feet thick beneath some areas of HAFR and WAFR. This reservoir has been divided into three major aquifers in the region—shallow brine, alluvial fan, and basin fill (Gates and Kruer 1981; Stephens 1974). It is best known



Surface Water Features on the HAFR

Figure 3 3-1



Surface Water Features on the WAFR

Figure 3.3-2

in the vicinity of Wendover and the three aquifers defined there may be discontinuous throughout the Great Salt Lake Desert.

The shallow-brine aquifer consists of lake bed clay and silt and crystalline salt, and underlies the mud flat area of playa soils. The extent of the mud flat area is shown on Figures 3.2-8 and 3.2-9 for HAFR and WAFR, respectively. Although these sediments extend to a considerable depth, only the upper 25 feet act as an aquifer (Figure 3.3-3). Brine moves through the crystalline salt and the fractures in the underlying clay. Recharge to the aquifer is primarily from infiltration of precipitation and lateral inflow from adjacent basins. Discharge from the aquifer occurs by evaporation and by flow into brine-collection ditches. Groundwater flows from the highlands into the mud flats where it evaporates. Known properties of the shallow-brine aquifer are listed in Table 3.3-2. The total dissolved solids in the water of this aquifer are generally greater than 35,000 milligrams per liter (mg/L) (Gates and Kruer 1981; Stephens 1974).

The alluvial-fan aquifer consists primarily of sand and gravel. Recharge to the aquifer is primarily from infiltration of precipitation and subsurface inflow. Discharge occurs by evapotranspiration where the aquifer is shallow, by pumping and flow from wells, and by subsurface outflow. Known properties of the alluvial-fan aquifer are listed in Table 3.3-2 (Gates and Kruer 1981; Stephens 1974). It is not known whether this aquifer is present beneath HAFR or WAFR. If present, it would be found along the flanks of the Newfoundland and Lakeside Mountains.

The basin-fill aquifer consists of older alluvial sediments that underlie most of HAFR and WAFR. These deposits consist of conglomeratic deposits of clay, sand, and gravel that are unconsolidated to well cemented. Recharge to this aquifer is probably entirely by subsurface inflow from adjacent aquifers in the alluvial fans and bedrock. Discharge is primarily from pumping wells. Known properties of the basin-fill aquifer are listed in Table 3.3-2 (Gates and Kruer 1981; Stephens 1974).

Information on groundwater is provided by data from two wells completed in the basin-fill aquifer for the HAFR Oasis Complex in the northern subarea of Sink Valley. These wells were completed in the early 1960s and reach a depth of between 300 feet and 723 feet below ground surface, with a depth to water at the time of drilling of 180 feet to 190 feet below ground surface. When completed, the wells yielded 300 gallons per minute. Water quality analysis results from samples collected during drilling are summarized in Table 3.3-3. As of August 1990, the depths to water were 200 feet to 204 feet below ground surface and the total dissolved solids in the water ranged from 5,300 to 9,300 mg/L. The water from these potable wells is treated in reverse osmosis units prior to discharge to the water distribution system (Price and Bolke 1970; SAIC 1990; Engineering-Science, Inc. 1992). Improvements to the water treatment system eliminating excessive sodium from drinking water as well as providing an additional water tank and new water supply lines to improve fire suppression capabilities will be part of a major facility improvement scheduled to begin at Oasis in late 1996 or early 1997 (U.S. Department of the Air Force 1996a).

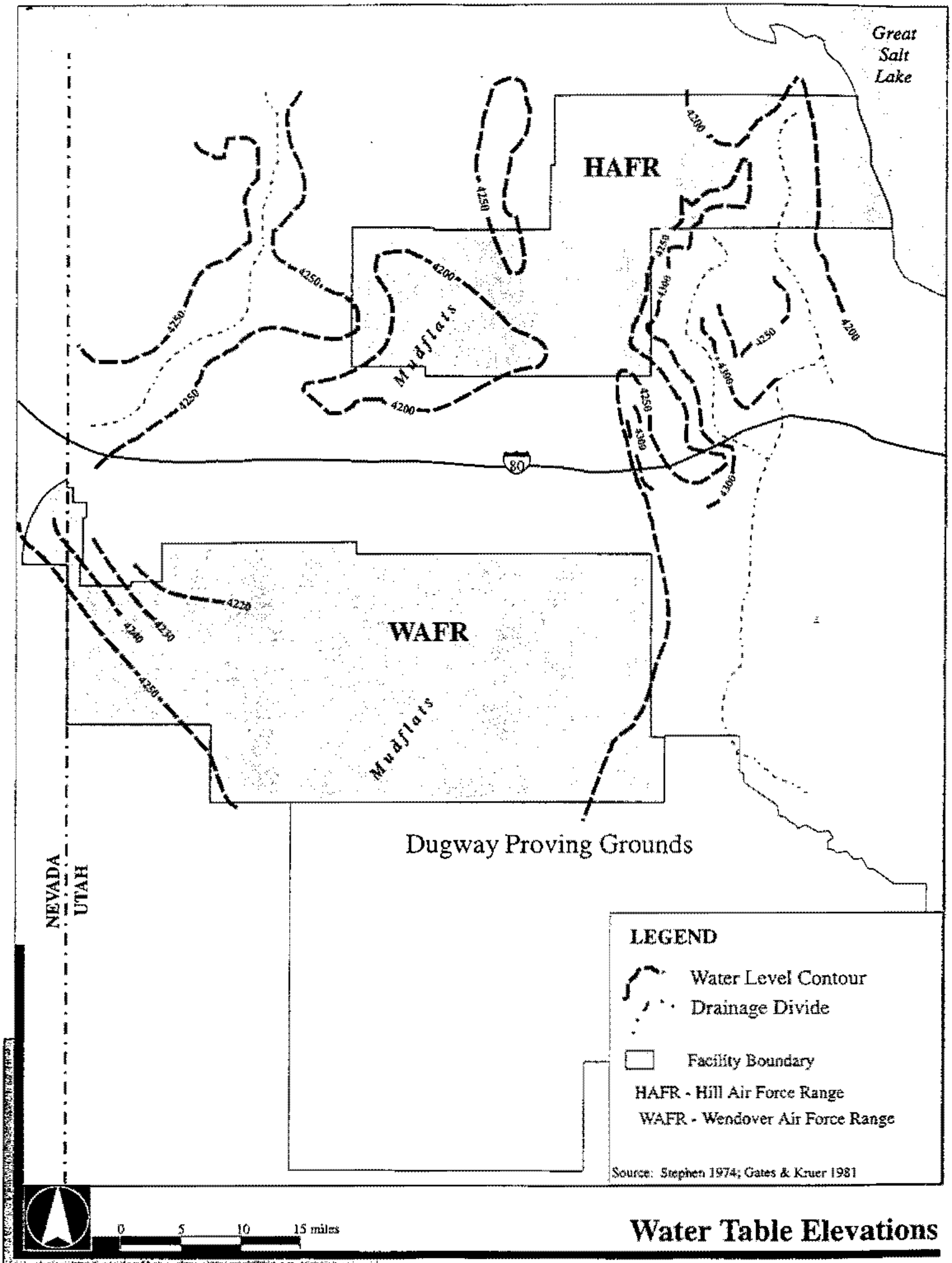
The groundwater at Oasis is also monitored upgradient and downgradient of Hazardous Waste Landfill No. 5 as required by the landfill's Resource Conservation and Recovery Act (RCRA) closure permit. Monitoring wells at this location indicate that the depth to water is approximately 400 feet. Water quality data for this monitoring well are presented in Table 3.3-3 (USGS 1992).

3.4 ECOLOGY

As is apparent from the above discussions of the climate, geology, and hydrology, HAFR and WAFR are characterized by an arid climate, with meager precipitation, highly variable temperature, and low relative humidity, and a basin and range physiographic structure that has minimal relief except for the mountain outcrops. Surface water that has not transpired or evaporated flows into an internal basin where groundwater recharge occurs. This combination of abiotic environmental factors has strongly influenced the aquatic and terrestrial ecosystems on the ranges.

3.4.1 Aquatic Ecology

For the most part, surface water on HAFR and WAFR does not support aquatic communities because it is transitory. This is true of the many acres of mud flats in the western portions of both ranges. A recently completed management plan for the wetlands and mudflats on HAFR and



Water Table Elevations

Figure 3.3-3

WAFR identified three wetland types: a pickleweed-saltgrass-glasswort community, a saltgrass (or rabbitfoot beardgrass) community, and a bulrush-phragmites community. The saltgrass and bulrush-phragmites communities were categorized as jurisdictional wetlands, the pickleweed-saltgrass-glasswort community was tentatively categorized as jurisdictional. The boundary between wetlands and mudflats was based on plant distribution, with wetlands having greater than 10 percent plant cover and mudflats having plants spaced at least 10 meters apart (Parsons Engineering Science, Inc. 1995b).

At HAFR, 99 percent of the 22,576 acres categorized as jurisdictional wetland was vegetated by the pickleweed-saltgrass-glasswort community. A total of 238,551 acres of mudflats were calculated by remote sensing data; this acreage equals 65 percent of HAFR (Parsons Engineering Science, Inc. 1995b). At the eastern edge of HAFR, the range extends out into the Great Salt Lake. There are no wetlands associated with this portion of the lake's shoreline, and no Air Force use of the highly saline water of the lake, which is very shallow in this area. Extension of the HAFR boundary into the lake serves primarily to provide a spatial buffer for the testing and training uses of the land on the east side of the Lakeside Mountains. Due to the high salinity of the Great Salt Lake and the absence of any substantive freshwater inflow from the east side of the HAFR, there are no well-developed aquatic ecosystems along the eastern shore of the lake.

At WAFR, 90 percent of the 22,425 acres categorized as jurisdictional wetland was vegetated by the pickleweed-saltgrass-glasswort community. A total of 428,185 acres of mudflats were calculated by remote sensing data; this acreage equals 75 percent of WAFR (Parsons Engineering Science, Inc. 1995b). On the western edge of WAFR, there are two spring complexes (Figure 3.3-2), Blue Lake and Mosquito Willy's, that have extensive wetlands surrounding the springs. The wetlands in the vicinity of Blue Lake and Mosquito Willy's are characterized by saltgrass, rushes, and sedges (Workman et al. 1992c). This is primarily where the saltgrass and bulrush-phragmites communities identified in the recent management plan were found (Parsons Engineering Science, Inc. 1995b). These springs are fed by water from the Goshute Mountains and Lead Mine Hills to the west. The largest spring in the Blue Lake complex is about 60 feet deep, 550 feet wide, and

1,000 feet long (Huntchings 1988). The Blue Lake area has historically been used by hunters, fishermen, trappers, bird watchers, and scuba divers. Recently, bird watching and scuba diving have increased, contributing up to 3,000 user days per year (Huntchings 1988). The overall wetlands associated with these springs have been reported to total between 4,436 and 15,000 acres (Workman et al. 1992c; page 57 and 60, respectively). A more recent study of these wetlands documented 15,800 acres of wetlands in and around Blue Lake (Blood 1996). In 1974, 216 acres of the Blue Lake area were deeded to the State of Utah (Huntchings 1988), which manages this plot through the Utah Division of Wildlife Resources (UDWR). In addition, the UDWR manages the wildlife resources on 15,800 surrounding acres still owned by the Air Force under a memorandum of understanding (UDWR nd) that is currently being modified (Blood 1996). At one time, fishing was only allowed with prior clearance from the Air Force, but today the site and its associated parking lot is open to public access. The objectives of UDWR management are the following:

- Preserve and enhance the wetland habitat for its unique and wildlife values as a desert spring and to provide resting, feeding and nesting for the limited populations of waterfowl that traditionally use the area
- Provide and enhance controlled public hunting, fishing and recreational opportunities
- Identify boundaries that will encompass the UDWR approved activities and control public access (UDWR nd)

The current modification of the memorandum of understanding is expected to place the management of the wetlands surrounding Blue Lake under the Plans and Programs Division of the EM Directorate. The objectives listed above would remain the same (Blood 1996).

The mud flats in the western portions of both HAFR and WAFR may be categorized as palustrine systems with unconsolidated bottoms of mineral rich soils (silts and clays with sandy patches) that are semipermanently flooded and range from mixosaline to hypersaline (Cowardin et al. 1979). Cowardin's ecological definition of wetlands i.e., the presence of water, hydrophilic vegetation, or hydric soils; therefore, his definition is somewhat broader than the definition typically used for legally defining jurisdictional wetlands, i.e., the presence of all three of these components. The flooded western mud flats, even though they may be classified as wetlands based on ecological considerations, appear virtually sterile, and neither support developed plant communities nor are frequented by vertebrate animals. It is also unlikely that invertebrate communities are well developed in the mud flats.

Thousands of waterfowl use the area around the springs, and because of this peregrine falcons and bald eagles also use Blue Lake as a foraging area. Blue Lake is a historical nesting site for peregrine falcons (Workman et al. 1992c). Thorough surveys of the plants and animals inhabiting these wetlands have not been done. Surveys of the fish and amphibians are intended as part of a 5-year plan for the UTTR (Workman et al. 1992c). This 5-year-survey has been initiated and the initial data on the variety of species frequenting the springs and other portions of HAFR and WAFR will soon be available (Blood 1996).

3.4.2 Terrestrial Ecology

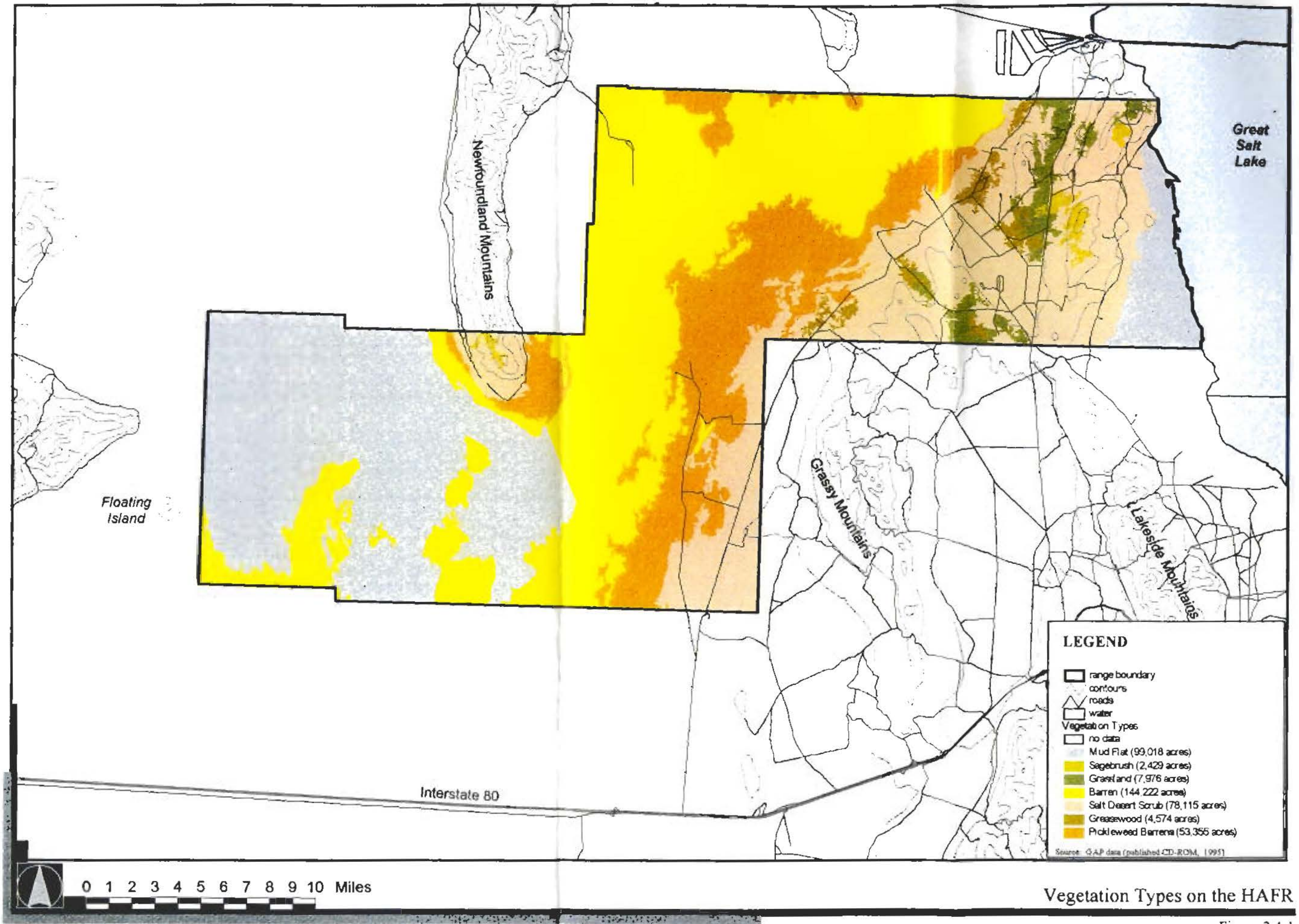
3.4.2.1 Vegetation

UTTR is within the Great Basin Floristic Province (Gleason and Cronquist 1964) and the Bonneville Basin Section (Cronquist et al. 1973). This area is characterized by "broad, low basins, numerous small mountain ranges, alkaline soils, and predominately shadscale-vegetated valleys. A relatively large area, the Great Salt Lake Desert, is comprised of barren salt and clay flats and is almost completly [sic] devoid of vegetation. Interspersed between valleys are several small and irregular [sic] shaped mountain ranges that rise abruptly from the valley floor at approximately 4200 feet elevation to elevations above 10,000 feet." (Workman 1986b, page 123).

The vegetation present on HAFR and WAFR can be characterized by general cover types or by more specific vegetation types. Figures 3.4-1 and 3.4-2 show the cover types identified in data currently available in electronic format from the Automated Geographic Reference Center in Salt Lake City and originally from data compiled to evaluate gaps in administrative protection compiled by Utah State University (Vaughn 1994). Table 3.4-1 lists the acreages of each of these cover types in HAFR and WAFR, both separately and collectively. From the table and Figures 3.4-1 and 3.4-2 it can be seen that the predominant cover type on both HAFR and WAFR is mud flat that is either barren or covered by water. This cover type covers over 59 percent of HAFR, 34 percent of WAFR, and 44 percent of the ranges collectively. Next in overall abundance is the pickleweed barrens cover type, which occupies 15 percent of HAFR, 41 percent of WAFR, and 31 percent of the ranges collectively. Salt desert scrub is the final cover type that might be called abundant on the ranges, occupying 22 percent of HAFR, 23 percent of WAFR, and 23 percent of the ranges collectively.

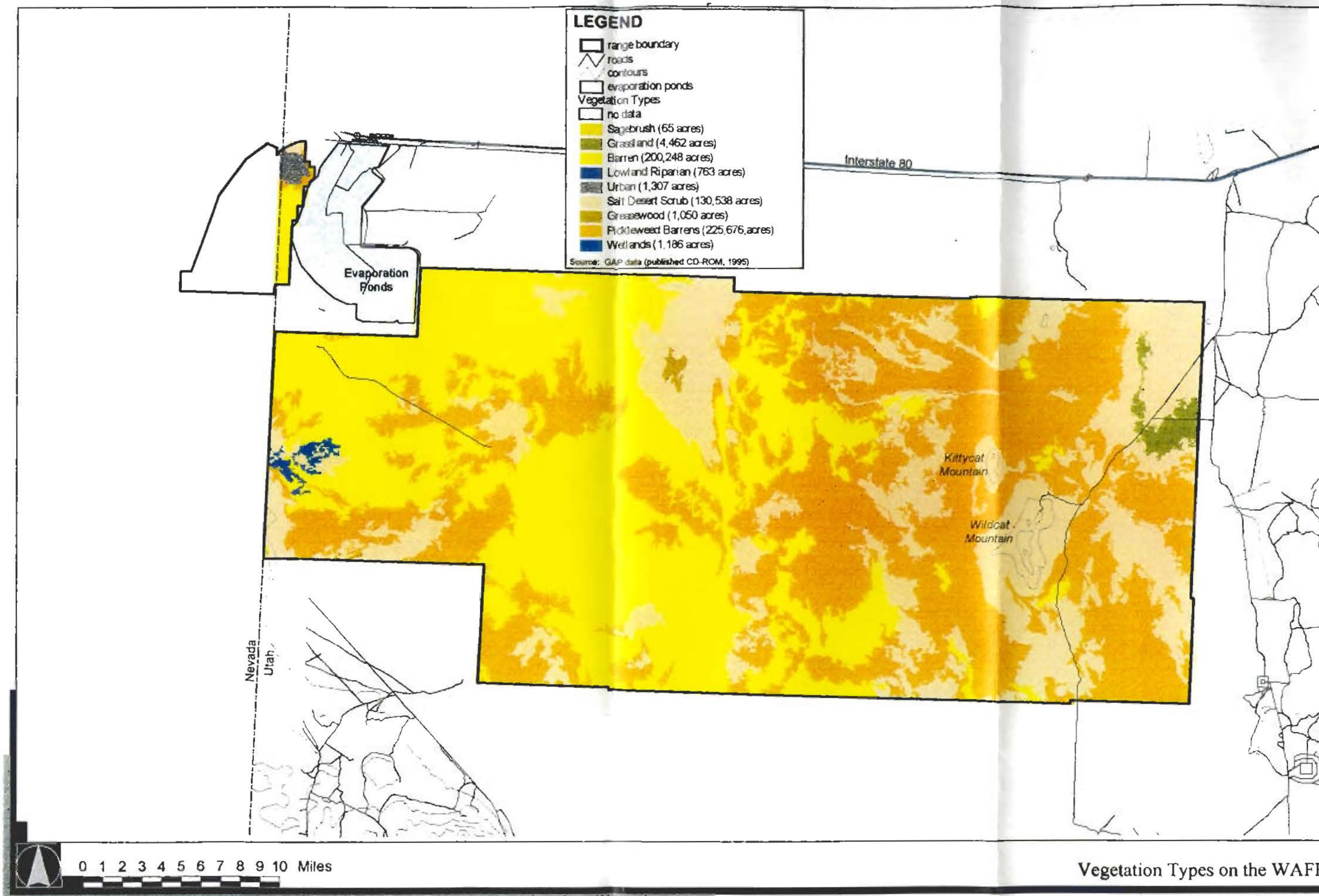
The patterns of cover-type distribution are readily apparent from Figures 3.4-1 and 3.4-2. The mud flats occur primarily in the western and northwestern portions of both ranges in low lying areas with low relief, while pickleweed grows primarily on the interface between the mud flats and more upland, less saline soils. The mounds of pickleweed adjacent to the barrens accumulate soil to form slightly higher areas that are gradually invaded by greasewood and Nuttall's saltbush. On the more upland soils, salt desert scrub is the predominant cover type, but it is interspersed with other shrub types (sagebrush, greasewood) or with grassland depending on the soil type, aspect, topography and elevation, and previous disturbances at various locations in the uplands of both ranges. The diversity of the cover types on HAFR is much greater due to the greater topographic diversity provided by the Lakeside Mountains. On WAFR, only Kittycat and Wildcat provide topographic relief and they are too rocky and abrupt to support much other than salt desert scrub. Habitats that are much less abundant, but especially important, are the scattered pinion-juniper/mountain shrub cover type, represented primarily by juniper in highly dispersed locations in the Lakeside Mountains on HAFR, and wetlands present only on WAFR.

Workman et al. (1992c) identifies slightly different cover types and provides vegetation types as well. The vegetation types listed by Workman et al. (1992c) are generally related to the cover types as shown in Table 3.4-2. In their tabulation (Table 3.4-3), the vegetation types on the 366,539 acres of HAFR are predominantly salt flats/playas/barrens (53 percent), sparse salt-tolerant vegetation (11 percent), desert brush mixes (11 percent), and sand barrens (8 percent) (Workman et al. 1992c). On the 576,157 acres of WAFR, the vegetation types are predominantly mud flats barrens (34 percent), sand barrens (28 percent), sparse salt-tolerant vegetation (26 percent), and



Vegetation Types on the HAFR

Figure 3.4-1



Vegetation Types on the WAFR

Figure 3.4-2

shadscale/kochia (4 percent) (Workman et al. 1992c). Table 3.4-3 lists the acres and percentages for each of the 15 vegetation types on HAFR and 14 vegetation types on WAFR. Further information on the process of identifying vegetation types and details on the types can be found in Workman et al. (1992c). The cheatgrass vegetation type, prevalent at least in part as a result of overgrazing, seems to be maintained as climax vegetation in some areas due to annual fires (Workman and Peterson 1989).

Study plots established for most of the vegetation types (Table 3.4-2) were sampled for species' relative percent frequency, revealing the most dominant grasses, forbs, and shrubs in each type. A synopsis of the elevation and prominent species in each study plot is provided in Table 3.4-4, and serves to characterize the types. A list of the plant species identified on HAFR and WAFR is provided in Table 3.4-5. Two of the genera listed (Delphinium sp and Astragalus sp) are identified as primary poisonous plants in the intermountain region (USDA Forest Service 1986).

Since a number of land uses at HAFR disturb the ground surface, naturally vegetated areas often become barren, undergo natural revegetation over a long period of time, or are revegetated by land managers. In support of this latter activity, a revegetation test program has been ongoing on the ranges since 1981. In this program, three 2.5-acre sites were planted in both spring and fall 1981 and in spring 1982. Of the 22 species (or subspecies) that were planted in these sites, 9 had done well when evaluated in 1991—3 varieties of crested wheatgrass, 2 additional species of wheatgrass, 2 varieties of Russian wildrye, four-wing saltbush, and prostrate kochia. Further details on this revegetation program are provided by Workman et al. (1992c, 1993b). Recommendations on continued and expanded revegetation studies are provided in the more recent of these data summaries, and further studies will be implemented (Blood 1994). Numerous agencies have participated in these studies, including the Utah State University Extension Service, BLM, Dugway Environmental Program and Engineering Offices, U.S. Forest Service, Utah State University, Weber State University, U.S. Department of Agriculture Agricultural Research, and Hill AFB Natural Resources Group (Sant and Neilson 1991). These studies will continue to provide information to facilitate effective revegetation of temporarily disturbed areas.

Because the cover types found on HAFR and WAFR generally represent groups of vegetation types that are combined on the basis of their physiognomic type (i.e., on the basis of general vegetation structure), they provide an approximation of wildlife habitat types as well. The general quality of the range wildlife habitat is indicated, at least for grazing animals, by the animal unit month (AUM) values for BLM grazing lands surrounding the ranges (Table 3.4-3). An AUM is the amount of range needed to support one cow and calf or five sheep grazing for 1 month. For the HAFR, these values range from 1.15 acres per AUM in the Lakeside Mountain grazing allotment in the southeast to 35.3 acres per AUM in the Basin Land and Livestock allotment in the north. Grazing allotments on the west and east flanks of the Grassy Mountains, in North Puddle Valley, and in the Newfoundland Mountains range between 10.7 and 17.1 acres per AUM. For the WAFR, five of the six grazing allotments in the vicinity are to the west and southwest; the sixth is due east. These allotments have values that range between 14.2 and 17.1 acres per AUM, except that values for the Deep Creek and Dutch Mountain allotments are 24.7 and 36.4 acres per AUM, respectively. Further detail is available in Workman et al. (1992c). Although neither range is grazed by domestic livestock as part of a grazing allotment, these AUM values provide a measure of the forage available to native species of grazing animals that are present on both ranges. In addition, sheep move along the west side of the Lakeside Mountains, crossing HAFR between grazing allotments (Weder 1994). They often dally enroute, resulting in some use of the forage on HAFR by domestic livestock (Winn 1994).

3.4.2.2 Animals

Wildlife surveys of birds and mammals, including specific surveys of the bald eagle, other raptors, and antelope, have been conducted on HAFR and WAFR. Wildlife and habitat inventory studies were a component of a series of quarterly and annual reports that also provide data on the avoidance of birds by aircraft (Workman 1985a, 1985b, 1985c, 1986a, 1986b, 1986c, 1986d, 1987a, 1987b, 1987c, 1987d, 1988a, 1988b, 1988c, 1988d, 1989a, 1989b). These reports are from a 5-year investigation that began in July 1984 and emphasized observations of gulls, pelicans, and raptors, as well as of insects, mammals, and vegetation on Hill AFB, HAFR, and WAFR.

The wildlife and habitat inventory portions of these studies focused on better characterizing the ecological resources of HAFR and WAFR so that the ranges could be managed from a more knowledgeable perspective. This study also noted areas of activity and taxonomic groups that were present and their general numbers. Also part of this study were more detailed reproductive studies of selected raptor species.

Insects

Seven inspect sampling locations were established within or near HAFR and WAFR (Newfoundland Mountains, Lakeside Mountains, Grassy Mountains-ridge, Grassy Mountains-foothill, Twin Springs below Wendover, Fish Springs, and the Residence Center on HAFR). The taxonomic identification of the collected insects was reported to family; more specific taxonomic information, relative abundance, and habitat affinity data were not provided. Workman et al. (1992c) also provide a list of insects identified on the ranges.

Birds

The bird species that occur on HAFR and WAFR are listed in Table 3.4-6. A number of bird species are categorized as common in Table 3.4-6: four ducks; a hawk; eight rails, shorebirds, phalaropes, or gulls; a dove; two owls; a nighthawk; a woodpecker; and numerous perching birds (Workman et al. 1992c). These species are common only in appropriate habitat. For many, their habitat is not common on the ranges, so they are not frequently encountered, but they contribute importantly to the species diversity on HAFR and WAFR. Other species of note because they are top trophic-level carnivores are the peregrine falcon, prairie falcon, golden eagle, bald eagle, red-tailed hawk, ferruginous hawk, Swainson's hawk, and osprey. In a 2-day reconnaissance of HAFR and WAFR conducted during October 1994, the species seen were horned lark, prairie falcon, northern harrier, raven, golden eagle, and shrike.

Several types of raptor studies have been completed by Workman et al. including investigations of migration and reproduction; data collections on feeding, hunting, and spring migration; and data collection for input to a "Threat of the Season Bird-Strike" model (Workman 1985a, 1985b, 1986a, 1986b, 1986c, 1986d, 1987a, 1987b, 1987c, 1987d, 1988a, 1988b, 1988c, 1988d, 1989b; Workman and Peterson 1989). Although particular attention was given to bald eagles and peregrine falcons, the two federally-listed endangered raptors that have been documented as present in the UTTR area, these studies focused on golden eagles, ferruginous hawks, red-tailed hawks, and prairie falcons, the four most common raptors in Utah (Workman 1987c).

Raptor migration observation sites were established at the north end of the Newfoundland Mountains, at the north end of the Grassy Mountains, and at the south end of the Lakeside Mountains, as well as at locations more distant from HAFR and WAFR. The closest observation site to the WAFR was on the south end of the Toana Range in Nevada. Raptors migrating southward down the Promontory Mountains tend to turn east when they reach the Great Salt Lake. However, some continue south along the ridges of Fremont and Antelope Islands or turn along the Lakeside Mountains, passing just east of HAFR, though few pass directly over HAFR. For example, between September 19 and 28, 1985, 145 raptors were observed along the Lakeside Mountains and 34 raptors were observed along the Grassy Mountains (Workman 1986c).

The reports from the Workman et al. study indicate that raptors tend to hunt from perches during the winter and by soaring during the summer, when they pose a greater hazard to aircraft and are at greater risk themselves. Raptor populations are supported by Townsend ground squirrels, horned larks, and meadowlarks, the most consistently abundant prey items found on the ranges, and also by rabbits. The cyclical fluctuation of rabbit numbers tends to influence the numbers and nesting success of raptors, including golden eagles, red-tailed hawks, and especially ferruginous hawks, for which jackrabbits may provide 79 to 80 percent of their forage biomass (Workman 1986b, 1987c, Workman and Peterson 1989). Prairie falcons tend to take smaller prey, such as horned larks, meadowlarks, and mourning doves. Fledglings of these species provide important prey for young inexperienced falcons, which fledge at about the same time (Workman 1987c).Raptor nest sites were surveyed during 1984, 1985, and 1986 in the Newfoundland Range, on Wildcat Mountain, and elsewhere within a 956-square-mile study area extending from the Nevada state line to the Great Salt Lake and north of the Great Salt Lake latitudinal baseline, but not including the mud flats, which are generally not used by raptors. Within this area, 400 raptor nests were mapped. From these, 70 nests in a smaller area, including the southeastern half of HAFR and the mountains south and east of HAFR, were chosen for productivity studies of the 4 major raptor species (i.e., golden eagle, ferruginous hawk, red-tailed hawk, and prairie falcon) (Workman 1986b). All the nests were found in a cheatgrass/shrub habitat type, which sometimes has a juniper component. More of the nests with predator access failed, presumably from predation by coyotes, kit foxes, bobcats, and badgers, whose tracks were seen in the vicinity. Prairie falcon reproduction levels were normal in 1985 and 1986, while golden eagle, ferruginous hawk, and red-tailed hawk reproduction was lower than in previous years in this area and lower than observed in other areas with similar habitat; rabbit populations were also very low during 1985 and 1986 (Workman and Peterson 1989).

Mammals

The mammal species that occur on HAFR and WAFR are listed in Table 3.4-7. The most widespread mammals on the ranges are the black-tailed jackrabbit, desert cottontail, antelope ground squirrel, great basin pocket mouse, Ord kangaroo rat, western harvest mouse, deer mouse, desert woodrat, and porcupine. Other mammals, which are significant as game species or top carnivores, are the badger, kit fox, coyote, bobcat, mule deer, and pronghorn. Pronghorn, in particular, are common, even though they are not as widespread as some of the species mentioned above (Workman et al. 1992c). In a 2-day reconnaissance of the ranges during October 1994, the mammal species observed were black-tailed jackrabbit, pronghorn, and feral horse.

Workman (1986b) provides an excellent summary of past surveys of mammals identified on or near HAFR and WAFR and provides good documentation of the locations where mammals have been sighted (Table 3.4-7). Workman also presents the results of small mammal trapping and larger mammal observations performed by his group on Stansbury Island and Floating Island and in the Lakeside Mountains, Hogup Mountains, Grassy Mountains, and Newfoundland Mountains, all of which are near HAFR. The only trapping and observations near WAFR were at Twin and Fish Springs, both of which have habitats that are not characteristic of WAFR, except perhaps at Blue

Lake and Mosquito Willy's. Trapping in the west desert for 2,100 to 4,500 trap nights at northern sites and 900 to 1,200 trap nights at southern sites had an overall success rate of 9.6 percent, which varied considerably among sites and seasons.

Generally, all the sites studied, except Floating Island, had similar populations. Of the total captures, deer mice were by far the most common (averaging 82.4 percent of the captures). They were trapped during all episodes and comprised from 13 to 100 percent of the captures at each site. Pocket mice and harvest mice were next most common; they were trapped during 72 and 40 percent of the trapping episodes and ranged from less than 5 percent to 87 and 16 percent of the captures at each site, respectively. Other species sporadically trapped were woodrats, the canyon mouse, kangaroo rats, the sagebrush vole, shrews, and the antelope ground squirrel. The atypical populations at Floating Island, a rather isolated rocky outcrop at the west end of HAFR, were primarily of pocket mice, including the little pocket mouse, which was captured at only one other study site (in the Newfoundland Mountains).

Observations of larger mammals or their sign revealed the presence of the kit fox at Floating Island, the Lakeside Mountains, Hogup Mountains, and Grassy Mountains; coyote in the Lakeside Mountains, Hogup Mountains, Grassy Mountains, and Newfoundland Mountains; bobcat in the Newfoundland Mountains; badger in the Hogup Mountains and Grassy Mountains; black-tailed jackrabbit in the Lakeside Mountains, Grassy Mountains, and Newfoundland Mountains; and cottontails in the Lakeside Mountains, Grassy Mountains, and Newfoundland Mountains. As part of these observations, Townsend ground squirrels were noted to be common in areas of softer soils in the Grassy Mountains.

Special Studies

Because many activities in modern society produce loud noise, considerable study has been done on the effects of this noise on wildlife. Survey documents on the effects of noise on various animals were prepared for the U.S. Environmental Protection Agency (EPA) (Memphis State University 1971) and BLM (Bondello and Brattstron 1978). The goal of these documents was to assess the knowledge regarding the impacts of noise on wildlife. The document prepared for BLM went on to establish guidelines regarding the use of the literature data in evaluating the effects on fish and wildlife of opening lands under BLM jurisdiction to certain types of uses. The Air Force's Noise and Sonic Boom Impact Technology Program also commissioned a document to evaluate the effects of aircraft noise and sonic booms on animals (Manci et al. 1987), and subsequently supported a workshop (Engineering and Services Center and USFWS 1988) to identify needed research to evaluate such effects. All of these studies concluded that because the effects of noise are generally species specific and tied to the physical structure, physiology, and behavior of individual species, considerable research is needed before effects on wildlife can be assessed. Effects include the following:

- Physical damage to nerve endings or blood vessels in the auditory receptors and physical changes in the adrenal gland
- Physiological changes in blood levels of eosinophils, adrenocorticoid hormones, cholesterol, and triglycerides and in urine levels of sodium and potassium by affecting the hypothalamus output of oxytocin and vasopressin
- Behavioral responses such as startles from nests or panic milling of groups

Not all responses are readily apparent to the casual observer, even though they may affect such parameters as an animal's reproduction, longevity, susceptibility to predation, or predatory efficiency. These responses are species specific because species vary in their sensitivity to noise and in the way they are adapted to using noise. For example, many bird species use sound in their courtship and breeding activities; kangaroo rats are anatomically adapted to amplify low-frequency sounds that facilitate their effectiveness as predators. The season of the year and associated gestation or incubation activities as well as the behavior of individual species may also influence the effects noise has on an organism. For example, prairie falcons incubate with their feet underneath their eggs so that if they are suddenly startled from their nest by a loud noise, their eggs are in danger of being knocked from the nest. In further support of the species-specific nature of wildlife responses to noise, it should be noted that all of the five studies recommended by the noise workshop (Engineering and Services Center and USFWS 1988) involve single species or species groups and specific locations: bears in the Arctic, bighorn sheep in the southwest, waterfowl in the mid-Atlantic and Gulf coasts, geese in Alaska, and caribou in the northwest.

The noise workshop, convened by the Air Force and USFWS in response to public concerns regarding the impacts of noise on wildlife, noted that the burden of proof regarding the absence of adverse impacts from noise associated with airspace use rests with the Air Force. Since January 1988, the Air Force has studied the effects of noise on the heart rate and body temperature of bighorn sheep, elk, and pronghorn (Workman 1988c, 1989a). The results of these studies (Workman et al. 1992b, 1992d) show that the body temperature of these species is not particularly influenced by responses to noise. Heart rate did increase (up to 2 times normal for pronghorn, more than 4 times normal for elk, and 2 times normal for bighorn sheep), particularly in response to a hovering helicopter and less so in response to the other noise sources tested (sonic booms by F-16 aircraft, subsonic flyovers by F-16 aircraft and a single-engine propeller-driven Cessna 182, and Huey helicopter flyovers at an altitude of about 100 feet). Accommodation to repeated exposures was shown by most of the individuals, although they varied in their overall responses. Continuation of these studies (3 weeks per species, three species per year, for several years) has been proposed (Engineering-Science 1994) in the Gold Hill area just southwest of WAFR. Therefore, information on the effects of noise on wildlife may continue to increase from this and, hopefully, other studies.

Bird Strike Studies

In addition to the effects of noise on animals, the avoidance of bird strike by aircraft has also been extensively studied in association with the UTTR, as mentioned above (Workman 1985a, 1985b, 1986a, 1986b, 1986c, 1986d, 1987a, 1987b, 1987c, 1987d, 1988a, 1988b, 1988c, 1988d, 1989b). However, the bird strike studies focused on gulls and pelicans and are not particularly pertinent to use of the airspace directly above UTTR. The gull studies extend west only as far as Timpie Springs and do not include the west side of the Great Salt Lake, although it was noted that gulls feed on grasshoppers using dry pastures east of the Lakeside Mountains. Gulls breed as close to HAFR as Antelope Island and, from there, forage particularly at the landfill north of Tooele and other landfills toward Salt Lake City. Pelicans breed as close to HAFR as Gunnison Island, which is in the Great Salt Lake to the north of HAFR. Pelicans tend to feed toward the east, ranging from Rozel Point over the Promontory Mountains to the Bear River Migratory Bird Refuge and other portions of Bear River Bay. Therefore, both the gull and pelican studies are also more associated with aircraft use at Hill AFB than at HAFR and are not discussed further.

3.4.3 Wildlife Management

Management of the wildlife on HAFR and WAFR is conducted under the trusteeship for wildlife and fisheries resources vested in the Commander of Hill AFB and in consultation and cooperation with UDWR and U.S. Fish and Wildlife Service (USFWS) (Workman et al. 1992c). This activity has included installation of guzzlers to provide available water for longer periods after precipitation and to disperse wildlife by increasing the number of areas with water. Hunting to control pronghorn populations on HAFR and WAFR has been discussed with UDWR, but has not yet been implemented (Workman et al. 1992c). As stated above, the aquatic and wetlands resources at Blue Lake and Mosquito Willy's at the western edge of WAFR are managed by UDWR.

3.4.4 Species of Special Concern

The species of special concern identified by the U.S. Department of the Air Force (nd-a) as occurring in the vicinity of Hill AFB are listed in Table 3.4-8. The table identifies species noted by Workman et al. (1992c) as of special concern in the vicinity of HAFR and WAFR. Of the 13 federally listed threatened, endangered, or candidate species listed by Workman et al. (1992c) as being likely to occur in the vicinity of HAFR and WAFR, the peregrine falcon and bald eagle have been observed in the vicinity of Blue Lake and the long-billed curlew, white-faced ibis, and ferruginous hawk on both HAFR and WAFR. Both the western snowy plover and the Skull Valley pocket gopher have been documented in the vicinity of WAFR and are likely to be present on the range. The Utah physa snail, least chub, Bonneville pocket gopher, and Swasey Spring pocket gopher are all known to occur south of WAFR, but have not been documented on WAFR (Workman et al. 1992c).

The Air Force and the State of Utah were cooperative participants in the National Eagle Survey beginning in 1979 and continuing until at least 1988. Data available for 1982 through 1987 indicate that the routes surveyed include a loop through the northern portion of HAFR, including both the helicopter aerial gunnery range (HAG) in the east Lakeside Mountains and the Hogup Mountains as well as extending west to cover both sides of the Newfoundland Mountains and a loop down the Cedar Mountains and around Granite Mountain on Dugway, but remaining east of WAFR. In 1987, two adult golden eagles were observed in both the Hogup Mountains and the HAG. In 1985, 11 golden eagles were observed just west of HAFR in both the west Newfoundland Mountains and east Newfoundland Mountains, as were 2 bald eagles in the west Newfoundland Mountains, and 3 golden eagles in the west Hogup-Big Pass area north of HAFR. In 1983, 2 red-tailed hawks were observed in the Hogup Mountains and 5 adult golden eagles, 1 unknown eagle, and 2 prairie falcons were observed in the Lakeside Mountains. The 1983 observations also included 5 adult golden eagles, 1 unknown eagle, and 1 Cooper's Hawk in the Newfoundland Mountains; 11 adult golden eagles and 3 prairie falcons in the west Hogup Mountains; and 1 bald eagle, 5 golden eagles, and 1 unidentified eagle in the west Lakeside area north of Interstate 80. Data from the other years are not broken down by area. These surveys were all conducted during January and show wintering raptors to be an important component of the fauna near HAFR (Hill AFB Files 1994).

The recently initiated 5-year survey of plants and animals present on HAFR and WAFR will provide considerably more site-specific data on the presence of species of special concern, especially threatened or endangered species. The initial data from this long-term survey will soon be available (Blood 1996).

3.5 CULTURAL RESOURCES

A wide range of prehistoric and historic resources occur on and near HAFR and WAFR. Approximately 25 cultural resource surveys have been conducted in the vicinity of the ranges.[3] These surveys, along with less formalized efforts (e.g., general local knowledge), have resulted in the identification of more than 130 archeological sites within 30 miles of the HAFR and WAFR boundaries.

In addition, several large-scale archeological excavations of dry cave sites have been carried out in the vicinity of the ranges, which have added greatly to the understanding of the paleoenvironment and subsistence choices made by the early residents of the west desert region. These excavations include excavations at Danger and Jukebox caves on the western boundary of the HAFR (Rudy 1953; Smith 1942; Jennings 1953, 1957; Aikens and Madsen 1986; Rhode 1988; Livingston 1988; Holmer 1988; Madsen 1988; and Madsen and Rhode 1990); Hogup Cave to the north (Aikins 1970); the nearby Floating Island Cave (Jones 1988; Hall 1988; and Holmer 1988); and Lakeside Cave in the Lakeside Mountains (Madsen and Kirkman 1988; Manion 1988; Andrews and Adovasio 1988; and Holmer 1988). Analyses of regional wetland adaptations or general analyses of site distributions in the Great Basin also aid in the understanding of the cultural resources on HAFR and WAFR (Thomas 1971, 1982, 1983; Madsen 1982; Janetski 1986, 1990; Raven and Elston 1988a, 1988b; Raven 1990a, 1990b; and Simms 1990).

Only since 1991 have HAFR and WAFR themselves been subject to any extensive, stratified surveys of cultural resources (Workman et al. 1992a, 1993a, 1993c, 1995). To date, these intense, pedestrian surveys have covered 25 percent of the ranges (Figures 3.5-1 and 3.5-2). The nature and the distribution of cultural resources on HAFR and WAFR are becoming better understood as a

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[3] Weder 1981; Jacklin 1981; Heath and Janetski 1982; Tipps 1984; Zier 1984; Schroedl 1985; Berry 1985; Nielson 1985a, 1985b, 1991; Hauck 1986; Billat et al. 1986; Russell 1986, 1987a, 1987b, 1987c; Senulis 1987; Lindsay 1987; Richens 1987; Lupo and Metcalfe 1987; Dodge 1988a, 1988b, 1988c; Billat 1989; Christensen 1989; and Baker 1990a, 1990b.

result of these surveys, of the ongoing research on the paleoenvironment sponsored by the DOD Legacy program, and of less systematic research (Hawkins and Madsen 1990, Arkush 1991). On HAFR and WAFR, archeological sites tend to be highly clustered, with almost none being present on the salt and mud flats that make up the largest portion of the range. However, moderate numbers of sites have been identified on the uplands and mountains, on sand dunes and around the shoreline of ancient Lake Gilbert, which was a reduced drawdown of Lake Bonneville from 9,000 to 8,000 B.C. (Figure 3.2-1). To date, seven of these higher-density areas have been recommended for nomination as National Register Districts (NRDs), and proposed actions occurring within these districts will trigger evaluations even though they have already been surveyed. Most of the land within these districts contains no or very few resources and restricted development should be possible.

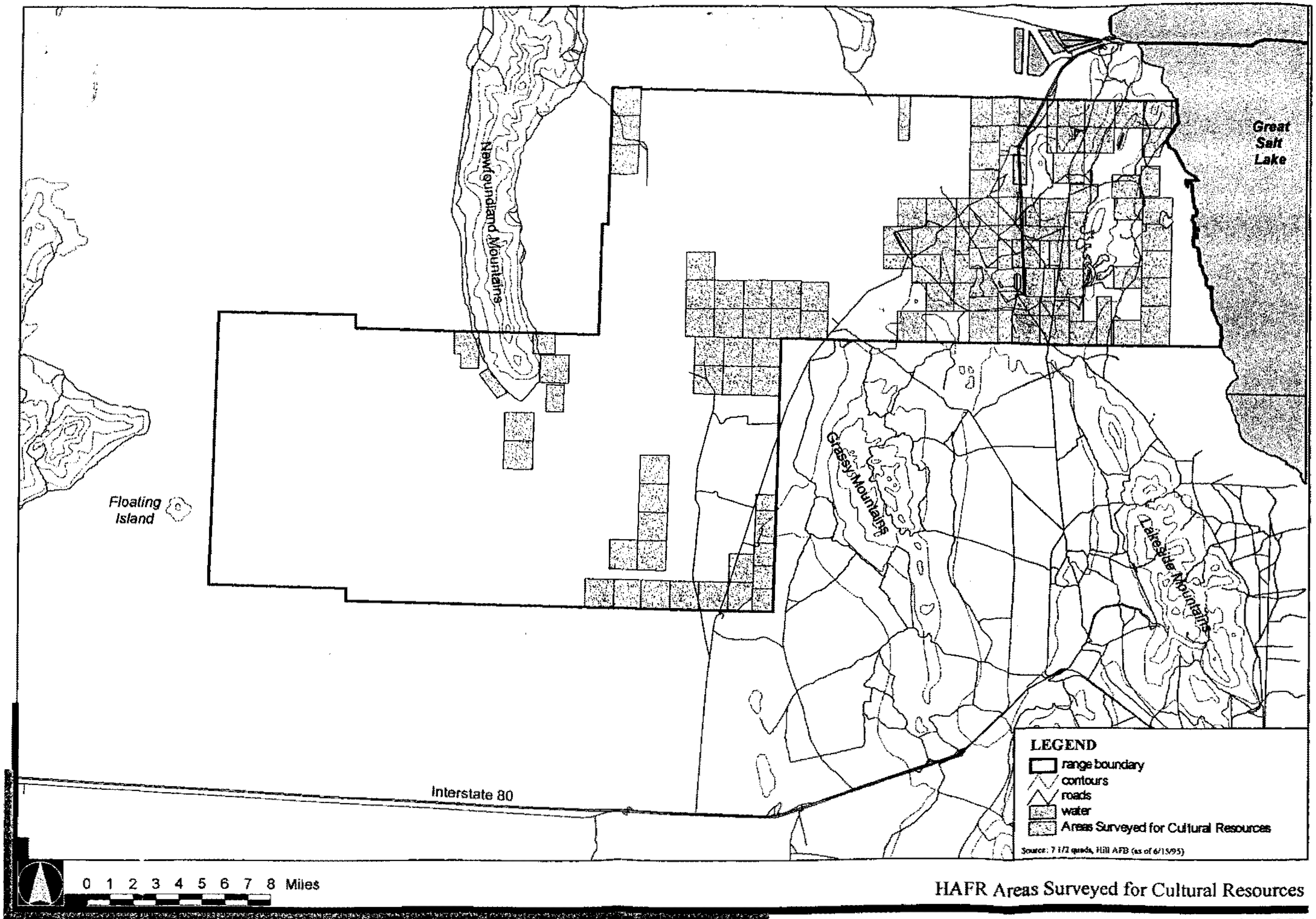
3.5.1 Archeology and Ethnography

The prehistory of the region encompassing HAFR and WAFR can be divided into the following five major periods:

- The Bonneville Period (9000 to 7500 B.C.)
- The Wendover Period (7500 to 4000 B.C.)
- The Black Rock Period (4000 B.C. to A.D. 500)
- The Fremont Period (A.D. 500 to 1300)
- The Late Prehistoric Period (A.D. 1300 to 1850) (Workman et al. 1993c)

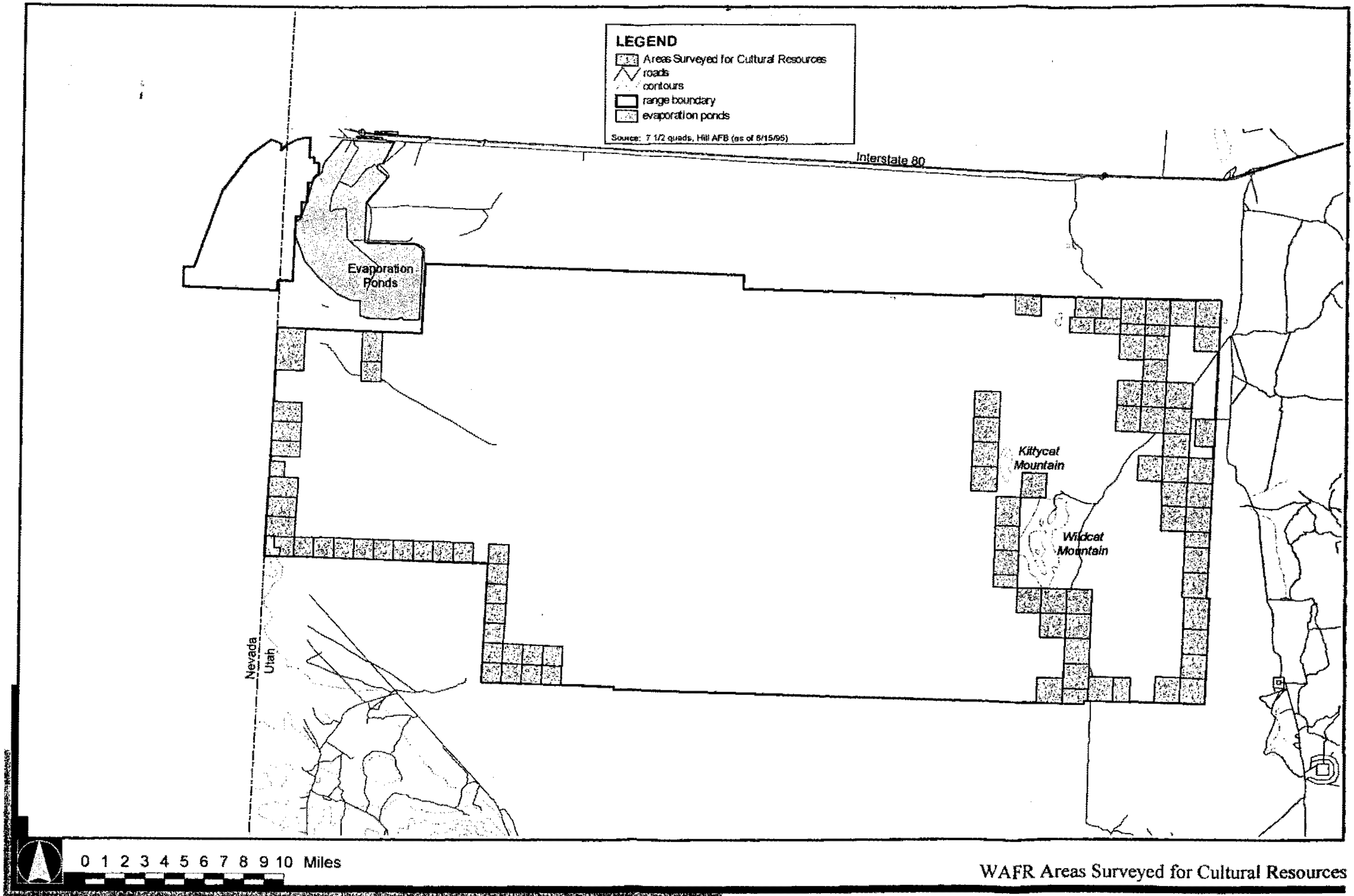
Toward the end of the Late Prehistoric Period, the Protohistoric Period bridges the time gap between European contact and the Historic Period.

Occupations dating to the Bonneville Period have not been found on HAFR and WAFR, but would probably be identified by fluted and stemmed points, found in association with the shorelines of Pleistocene lakes. If found, these sites would be considered highly significant.



HAFR Areas Surveyed for Cultural Resources

Figure 3.5-1



WAFR Areas Surveyed for Cultural Resources

Figure 3.5-2

Several sites associated with the Wendover Period have been identified, mostly in association with dry caves or with the Lake Gilbert shoreline. These sites are characterized by Elko, Gypsum, Humboldt, and Pinto series projectile points, most of which were associated with atlatls (spear throwers), and by milling stones.

Only one identified site clearly extends into the Black Rock Period, when a hotter and drier climatic regime resulted in a more diverse settlement pattern. These last two periods are commonly considered part of the Desert Archaic Tradition.

The Fremont Period (A.D. 500 to 1300) culture, a Formative group, is an anomaly in the Great Basin because it was semisedentary, used pottery, and included opportunistic maize horticulture. This culture probably developed in Utah from existing Archaic groups influenced by the diffusion of ideas from the American Southwest. Sixteen Fremont-affiliated sites have been identified on HAFR and WAFR. It is unlikely that any horticulture occurred in these areas; more likely, the range was used seasonally by Fremont groups from further east or by Desert Archaic or Late Prehistoric populations who traded with these groups. The closest known Fremont villages are in the vicinity of Grantsville, 60 kilometers to the east.

The Late Prehistoric Period (A.D. 1300 to 1850) is marked by a return to an Archaic-like lifestyle and the disappearance of semisedentary horticultural traits. This period is probably associated with an expansion of Numic (Shoshonean) speaking peoples from southeastern California and is characterized by small, side-notched and triangular Desert Series arrow points and by unpainted brown and gray ware ceramics. Late Prehistoric sites have been identified on HAFR or WAFR.

During and after the Protohistoric Period, the region around the study area was occupied by the Gosiute, a nomadic Numic group that utilized the Tooele, Skull, Rush, Cedar, Trout Creek, and Deep Creek Valleys. The lack of dependable water on HAFR and WAFR meant that their use of the area was probably sporadic. Only one archeological site dating to this period has been identified, although the present-day Gosiute may recognize Traditional Cultural Properties, a federal government term for native sacred grounds, within the boundaries of HAFR and WAFR.

To date, 115 prehistoric archeological sites that cannot be assigned to any cultural period have been identified on HAFR and WAFR. It is probable that many additional sites exist, especially within the proposed NRDs. All archeological sites located within an established NRD are considered contributing to that district and are therefore eligible for listing on the NRHP. Of the open sites located outside the boundaries of a NRD, it is likely that only those with recognizable features, diagnostic artifacts, or buried deposits will be considered eligible for inclusion on the NRHP.

3.5.2 Historic Period

The Historic Period in the region encompassing HAFR and WAFR can be divided into the following three periods:

- Exploration and transportation (1820s to 1870s)
- Development (1880s to 1930s)
- Military (1940s to present)

3.5.2.1 Exploration and Transportation Period

The period of exploration and transportation (1820s to 1840s) was probably initiated in the mid 1820s when fur trappers, including Jedediah Smith and Joseph Walker, skirted the Great Salt Lake Desert while traveling between the Rocky Mountains and California. Later, explorers commissioned by the federal government (e.g., John C. Fremont, Captain Howard Stansbury, Captain James Simpson) explored the region around the Great Salt Lake and the western desert.

For the most part, the UTTR region was shunned as dangerous and inhospitable. Instead, transportation corridors were established to the north and to the south (Stansbury 1852; Simpson 1876; Fremont 1887; Irving 1961; Malouf and Findlay 1986). One exception to this was the Hastings Cutoff. Other historic routes that passed in the vicinity of HAFR were the City of Rocks

Cutoff of the Oregon Trail and later, the route of the transcontinental railroad. Historic routes that passed in the vicinity of WAFR were the Pony Express Route and later, the Lincoln Highway.

The Hastings Cutoff extended across the salt flats at the southwest corner of HAFR and was used repeatedly between 1846 and 1850 (Hawkins and Madsen 1990). While it saved time, the cutoff often exacted a terrible toll on its travelers. Its notoriety was sealed by the ill-prepared Donner-Reed party, whose wagons became mired in the mud of the salt flats while crossing the range and were abandoned there. This delay contributed to their late-season arrival in the Sierra Nevadas and their resulting experience of exposure, starvation, murder, and cannibalism (Stewart 1936; Hawkins and Madsen 1990).

With the completion of the transcontinental railroad in 1869 and, later, the Lucin Cutoff, the Western Pacific Railroad and the Lincoln Highway, transportation across the treacherous western desert became less hazardous. With the exception of the Hastings Cutoff and associated campsites, trash dumps, and abandoned wagons, there is probably little material manifestation of this period of exploration and transportation. To date, only six sites, all associated with the Hastings Cutoff, have been identified.

3.5.2.2 Development Period

The period of development (1880s to 1930s) can be considered a footnote to the settlement and resource exploitation of the more hospitable portions of Utah and Nevada. Hard rock prospectors were almost certainly the first to develop resources on range lands. Silver and gold ore had been identified in the mountains surrounding UTTR, and by the late 1880s prospectors began locating discoveries and filing patents, especially around Wildcat Mountain and in the Newfoundland and Lakeside Mountains. However, the located ores were poor in quality and transportation costs were high.

On the ranges, only a single mining property was patented (General Land Office [GLO] records 1880–1939). It consisted of four claims located by the Silver Queen Mining Company in 1910. This property has been partially recorded as site numbers 42To675 and 42To676.

In the early 1900s, extensive potash mining developed in the area southeast of Wendover. Between 1919 and 1936, 147 potash exploration permits were issued by the government on the western half of WAFR and extensive mining occurred in the northwest corner during the mid-1930s. Nineteen exploration permits were also issued for the west end of HAFR and another 11 were issued for the area west of Homestead Knoll. These permits were mostly issued to individuals, rather than to corporations, and it is unlikely that these endeavors were heavily capitalized. Similarly, five oil and gas exploration permits were issued to wildcatters working in the Lakeside Mountains in the mid 1920s (GLO records 1916–1939).

A limited amount of agriculture was also practiced on the ranges, especially around Blue Lake in the southwest corner of WAFR. This area was developed and used for capturing feral horses as early as 1907. Two attempts at homesteading were made here around 1910. Again in the mid 1930s, three Stock Raising Homestead Entries (which did not require residency) were applied for and one of these was eventually patented. In addition, between the 1890s and 1920s, the Lakeside and Grassy Mountains may have been used for limited sheep herding (GLO records 1909–1939).

Following the construction of the Western Pacific Railroad in 1907, there was some development south of the town of Wendover on what is now WAFR. This included construction of the Deep Creek Railroad and of a telephone line south to Gold Hill. The 1909 GLO map also indicates several pack trails across the area of the range here, possibly for prospectors to re-supply at Wendover. In 1931, a civil air navigation facility was established south of Wendover, probably for mail planes following the railroad across the desert; in 1941 this facility was taken over by the Army Air Corp. In the area surrounding this airfield, 11 acetylene beacons associated with the civil air navigation activities have been identified; two are on Air Force property and nine are on other property. A number of these locations can still be identified. The approximately one dozen fuel tanks associated with each site have been removed from some sites but are still present inside or outside the beacon structure at other sites (Weder 1996).

With the exception of the abandoned railroad and air field, historic properties from this period tend to deteriorate. These might include miner's prospects, cairns, mines or shacks, drill holes or borings from potash exploration, corrals, trails, and abandoned homesteads. Most of the small campsites and isolated trash scatters found on the range can be attributed to prospectors, sheepherders, or surveyors and probably also date to this period. To date, 16 sites dating to this period have been identified.

3.5.2.3 Military Period

While the military period ranges from the 1940s to the present, the era of historical interest is limited to the 1940s and early 1950s. In 1940 and 1941, the land that now includes the two ranges was withdrawn from public use and given over to military use by Executive Order. Adjacent lands, including much of the Wendover Air Field also withdrawn from public use at this time, have since been excluded from HAFR and WAFR (Ogden Air Logistics Center 1981, 1988). The military period is the least investigated period of UTTR history. Possible cultural resources resulting from bomber training during World War II (including flights by the Enola Gay) and later V-1 aircraft testing might include buildings, V-1 aircraft crash sites, Ground-to-Air Pilotless Aircraft (GAPA) missile towers or launch sites, or pieces of equipment that have been abandoned or used as targets; however, none of these resources has been recorded or evaluated. The cultural "landscape" resulting from the military uses of the range might also be considered for evaluation.

Besides historic properties, cultural resources can include archived documents and oral histories of UTTR. Documents that may prove useful to the history of UTTR include the accounts of explorers, emigrants, miners, homesteaders, and aviators, as well as corporate records. Maps that contain historical information on the range include military transportation maps (1840s to 1870s), General Land Office Maps (1909 to 1932), Box Elder and Tooele County highway maps (1929 to 1930), U.S. Geological Survey (USGS) maps (1912 to 1972), and military ordnance maps (1940 to present). Some documents relating to use of the range are present in the Hill AFB archives; however, most are kept at Maxwell AFB in Montgomery, Alabama, including recently declassified documents relating to experimental testing programs that occurred at UTTR during the 1940s and 1950s.

Perhaps the most important, yet threatened, cultural resources are the oral histories that describe the last years of the development period and early years of the military period. The people involved with mineral extraction or homesteading during the 1930s, or involved with the military use of the ranges in the 1940s and 1950s, can provide very useful information about UTTR. However, given the age of these people, the opportunity to interview them may soon be lost.

3.5.3 Paleontology

Most of HAFR and WAFR, which consists of mud flats or relatively recent eolian deposits, has virtually no potential for paleontological resources; however, sporadic occurrences of well-preserved fossil fishes have been identified. These fossils were found in surface exposures of the Mississippian-age Great Blue Limestone formation, which occurs in the north Lakeside Mountains (Gillette 1994). In addition, bryozoans, blastopods, crinoids, trilobites, and many other groups of organisms can be found within this formation (McKee et al. 1969, Hintze 1974).

Paleoenvironmental assemblages of cave sites from the more recent Holocene and Late Pleistocene provide more paleontological data. In his reviews on the area, Mehringer (1973, 1977, 1986) noted the presence of cave sites in the Oquirrh Formation at Wildcat and the Lakeside Mountains. Assemblages recently excavated from Homestead Cave on HAFR include an undisturbed record of the region's plant and animal community from 11,000 B.C. to the present (Schmitt 1994, Madsen 1994). Similar collections may also be possible from ancient Lake Gilbert beach exposures or from marsh borings in the vicinity of Blue Lake on WAFR (Gillette 1994, Schmitt 1994). All of these potential paleontological locations are encompassed by the proposed NRDs (Workman et al. 1993c).

3.5.4 Proposed National Register Districts

This section is being revised by Hill Air Force Base

3.6 VISUAL RESOURCES

3.6.1 General Characteristics

The visual resources of the lands comprising and adjacent to HAFR and WAFR are typical of the Great Salt Lake Desert. The scenic character is one of isolation, remoteness, expansive open space, and dramatic basin and range landforms. There is little evidence indicative of human settlement in the region.

Visible manmade elements in the region skirt the boundaries of HAFR and WAFR and bisect the two ranges along the I-80 corridor, which lies between and parallel to the boundaries of the two ranges (approximately 9 miles south of HAFR and approximately 6 miles north of WAFR). It encompasses the highway, major electric transmission lines, the Union Pacific Railroad tracks, various fences demarcating grazing areas, and occasional development (industrial and commercial) usually associated with highway exits. Narrow paved roads and associated electric and telephone lines traverse the bases of the mountain ranges; basin lands outside of HAFR and WAFR are crisscrossed by dirt roads.

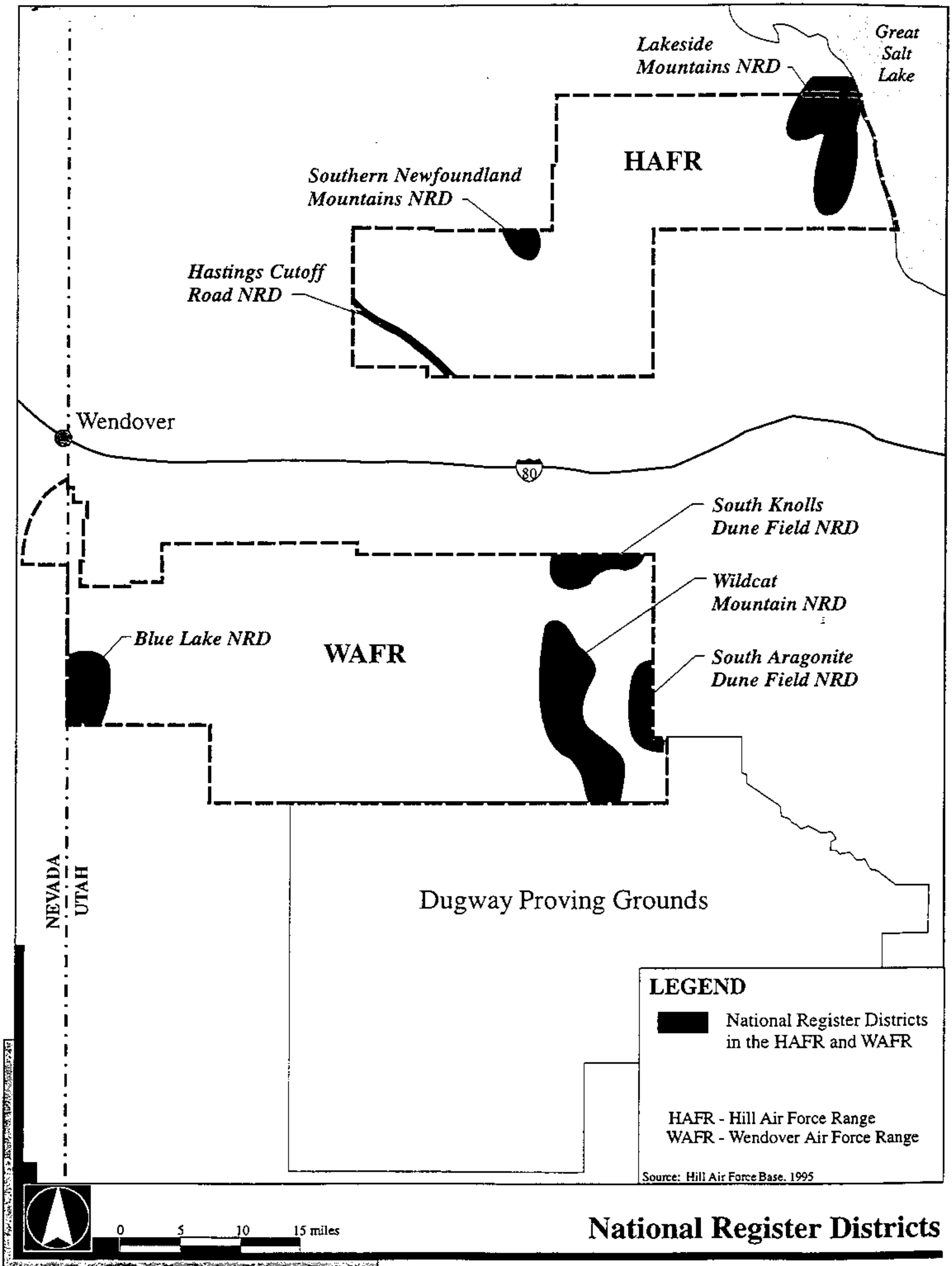
The Great Salt Lake Desert vegetation is limited to scattered shrubs and grasses, low-growing sedges and rushes along the banks of seasonal water bodies, and salt-tolerant plants such as pickleweed and saltbrush in saline soils adjacent to bodies of salt water. The mud flats, which cover large expanses, are virtually devoid of vegetation except at their peripheries.

The lowest elevation in this region is the Newfoundland Evaporation Basin, which lies north of HAFR. From this low elevation to the foothills of the Deep Creek Mountains beyond WAFR and approximately 75 miles to the south, the basin elevation increases a mere 100 to 120 feet to 4,300 feet MSL. The topography is so flat in places that the curvature of the earth is visible.

The relatively flat basin, however, is punctuated with isolated mountain peaks such as Wildcat Mountain in the eastern portion of WAFR and the narrow, long mountain ranges on the periphery of HAFR and WAFR. For example, the Cedar Mountains just east of WAFR are 45 miles in length and extend almost 3,000 feet above the basin floor, yet are only 6 miles wide. These and other nearby north-south trending mountain ranges typically reach elevations of 6,500 feet and greater. The peaks of the Deep Creek Mountains, approximately 55 miles south of the Bonneville Salt Flats and southwest of WAFR, are particularly noteworthy because numerous peaks exceed 10,000 feet (over 5,800 feet above the basin floor).

The water features in this arid basin and range topography add significantly to its visual qualities where they occur. Two key salt-water bodies in the region are the Great Salt Lake and the Newfoundland Evaporation Basin. Seasonal freshwater streams drain from the many mountain ranges and isolated peaks and disappear into desert soils well outside the ranges. The region also contains a few isolated freshwater springs. Each of these water features contribute to the visual interest, especially in locations where the water is accented by seasonally lush vegetation.

Considering the relative lack of topographic and vegetation features, north and south views from I-80 are expansive. Travelers driving westward along I-80, the only major roadway in the region, round the north end of the Stansbury Mountains (30 miles east of the eastern boundaries of HAFR and WAFR) and alternately have views to the north and south of wide-open, flat valleys and dramatic isolated peaks and mountain ranges. Within the 70 miles between the Stansbury Mountains and Wendover on the Utah-Nevada border, the northern views encompass the Lakeside Mountains, Puddle Valley, the Grassy Mountains, the Newfoundland Evaporation Basin, the Bonneville Salt Flats, Floating Island, and the Silver Island Mountains. Similarly, views to the south of I-80 include the north Stansbury Mountains, Skull Valley, the Cedar Mountains, and a wide basin with the Dugway, Thomas, Fish, and Deep Creek Mountain Ranges to the south of WAFR and Dugway. This basin and range landform pattern continues westward across the Nevada desert.



National Register Districts

Figure 3.5-3

In the summer, views are characterized by scrubby low-growing grey-green vegetation, reflective sand or mud flats, heat waves, mirages, distant mountains, and an intense blue sky. In contrast, winter views are monochromatic grey, especially when weather inversions result in dense fogs. Also typical are bright blue clear skies above an apparently lifeless grey-brown desert with views of distant snow-capped mountain peaks.

3.6.2 BLM Evaluation of the Region

HAFR and WAFR are located within the BLM Pony Express Resource Area (Tooele, Utah, and Salt Lake Counties). The lands adjacent to HAFR and WAFR are almost exclusively controlled by BLM, with a scattered checkerboard of state-owned lands. As part of their management of this resource area, BLM has evaluated its visual resources (BLM 1988a, 1988c; Hill 1996). The following is a summary of the agency's findings and management decisions.

BLM's visual resource evaluation process designates lands by one of four visual resource management categories (VRMs). The VRMs encompass Class I, Class II, Class III, or Class IV, with Class IV being the least restrictive category. Class I is generally reserved for designated wilderness areas or other special-use areas where degradation of views is not allowed. Class II areas require retention of existing landscape characteristics, although management activities may be seen but should not attract the attention of casual observers. For Class III areas, the objective is to partially retain the existing landscape character while allowing management activities to attract attention, but not dominate the view of casual observers. The Class IV designation allows for management activities that require major modification of the existing character of the landscape; however, every attempt is to be made to minimize the impact of such activities. These VRM classifications serve as BLM guidelines for the use and management of lands under agency control. When a mountain peak or ridge is designated, it is the views of that feature that are protected, not the viewshed from the designated area. Thus, the VRM designations may restrict activities on the designated lands. Activities on nearby, or nonBLM lands, however, are not restricted by BLM VRM designations.

In BLM's Resource Management Plan for the Pony Express Resource Area, no lands are designated Class I (BLM 1988b). A total of 70,520 acres are designated Class II, including peaks of the Stansbury and Deep Creek Mountain Ranges, the Bonneville Salt Flats, and Floating Island. Class III designations include the peaks of the Cedar Mountains and slopes of the northern Stansbury Mountains to the east of WAFR, the slopes of the Deep Creek Mountains and Dutch Mountain to the south of WAFR, and the Silver Island Mountains just northwest of the Bonneville Salt Flats and immediately southwest of HAFR. The vast majority of lands, a total of 1.8 million acres, are designated Class IV. In addition, the BLM assessment identifies areas requiring enhancement of visual resources to maintain the area's designated VRM classification.

The visual resources of the north Stansbury Mountains and the Deep Creek Mountains, including significant scenic qualities and unique "island ecosystems," were important factors in their designation as Wilderness Study Areas (WSAs) (BLM 1988a). To date, the U.S. Congress has not made a final decision concerning these two WSAs (Kirkman 1996). If they become Wilderness Areas, then it is expected the BLM will re-designate the areas as Class I VRM. If they do not become Wilderness Areas, the BLM plans to designate the mountain ranges as Areas of Critical Environmental Concern in order to restrict certain management activities (BLM 1988b).

3.6.3 UTTR Visual Resources

The visual resources of HAFR and WAFR are largely devoid of the significant scenic qualities present in the north Stansbury Mountains and the Deep Creek Mountains. The lands comprising HAFR and WAFR are almost entirely the open, flat basins of the Great Salt Lake Desert. However, the northern Lakeside Mountains and parts of the Grassy Mountains are in the northeastern portion of HAFR and the Newfoundland Mountains extend into the northwestern portion. Wildcat Mountain and Kittycat Mountain on WAFR provide topographically interesting relief to the otherwise flat landscape.

In general, the viewshed in the vicinity of HAFR and WAFR does not rate a high score for the following visual criteria: color, texture, roadside details, water, diversity in the landscape, edges, form, line, and contrast. The open spaces and wide vistas offer interesting cloud, weather, and landscape interactions. However, there is little color in the setting and little variety in texture or perception of edges. Form is provided by the occasional mountain range that is characteristic of the Basin and Range Physiographic Province. Lines are apparent wherever there is commercial or industrial development, and along the water's edge. Contrast is also most apparent along the water's edge and when the mountains are cast in sunset or sunrise light. Because there are few roadside details, viewers' attention is drawn by the occasional manmade detail. Such details along I-80 include the "rock graffiti" adjacent to the highway right-of-way (names, words, and pictures displayed with cobbles and rocks in the mud), a rest area with observation towers overlooking the Great Salt Lake, a state park on the shore of the Great Salt Lake, and an abstract tree sculpture approximately 30 feet in height near the roadside entrance to the Bonneville Salt Flats.

If the BLM VRM classification of visual resources were applied on the ranges, almost all of the lands within the boundaries of HAFR and WAFR would be designated Class IV, the least restrictive designation. This classification allows major modifications of the existing character of the landscape. The few mountain ranges within HAFR would offer viewpoints of adjacent valleys, the Great Salt Lake, and other mountain ranges. The aquatic habitats of Mosquito Willy's within WAFR would be a unique scenic attraction, however, they are not accessible to the public, which limits their value as a scenic vista. Blue Lake is accessible to the public.

Views of these significant, but not unique, landscape features are limited to distant vistas from adjacent private or otherwise unrestricted lands, many of which are very isolated and difficult to access even though they are open to the public.

Activities occurring within HAFR and WAFR may affect the public's appreciation of visual resources in adjacent accessible areas. For example, supersonic flights (and the noise that draws attention to the use of the area for low-level flights), the distant silhouette of an airplane, and the vapor trails of airplanes conducting training maneuvers are visible from locations such as the Stansbury, Cedar, and Deep Creek Mountain Ranges. Although those seeking a wilderness experience, hiking, backpacking, or camping in these areas may be distracted by the aircraft activity, the remoteness of the region limits the number of users that could be affected.

The viewshed of HAFR and WAFR for the majority of the public is limited to transitory views from within vehicles traveling at high speeds on I-80. A few industrial facilities (minerals extraction plants and a waste incinerator) are visible. However, HAFR and WAFR facilities have generally been sited distant from the I-80 corridor and many are screened by topographic features. Occasionally, travelers can view plumes from TTU activity. Under such circumstances, the noise of a sonic boom, the silhouette of a distant airplane, or the sighting of an airplane vapor trail might or might not distract viewers' attention to the visual qualities of the region; some users may greatly enjoy seeing a B-1 bomber fly by in practice maneuvers.

Table 3.1-1 Temperature Information Collected at the Thermal Treatment Unit on HAFR[1]

Quarter	Approximate Temperature Range (°F)
Fourth, 1994 (October, November, December)	12.5-68
First, 1995 (January, February, March)	11-55
Second, 1995 (April, May, June)	28-88
Third, 1995 (July, August, September)	35-102

1 Graziano 1996 (CH2MHill data in Hill AFB Files).

Table 3.1-2 Wind Rose Information Collected at the Thermal Treatment Unit on HAFR[1]

Quarter	Predominant Direction Wind is From	Percent of Time	Average Wind Speed (miles per hour)
Fourth, 1994 (October, November, December)	Northeast	15.73	7-12
	West-southwest	14.91	17-22
First, 1995 (January, February, March)	Northeast	16.12	12-17
	West-southwest	12.27	17-22
Second, 1995 (April, May, June)	East	11.68	22-27
	East-northeast	10.26	22-27
Third, 1995 (July, August, September)	East	16.8	12-17
	East-northeast	11.36	7-12

1 Graziano 1996 (CH2MHill data in Hill AFB Files).

Table 3.2-1 Pertinent Characteristics of HAFR and WAFR Soils[1]

Soil Code	Soil Type	Acres on HAFR	Acres on WAFR	Percent of HAFR	Percent of WAFR	Permeability	Available Water Capacity	Land Uses[2]
611003	Amtoft, Dry Rock Outcrop Complex, 30 to 70 percent slopes	25,068		6.97%		Moderately Rapid	Very Low	LG - Poor RS - Very Poor CL - Not Available RB - Poor
611004	Amtoft- Rock Outcrop Complex, 30 to 70 percent slopes	309	4,895	0.09%	0.86%	Moderately Rapid	Very Low	LG - Poor RS - Very Poor CL - Not Available RB - Poor
611008	Bramwell Silt Loam		2		0.00%	Not Available	Not Available	LG -Not Available RS - Not Available CL - Not Available RB - Not Available
611011	Checkett-Rock Outcrop Complex, 10 to 40 percent slopes		1,265		0.22%	Moderate	Very Low	LG - Fair RS - Very Poor CL - Not Available RB - Poor
611012	Cliffdown Gravelly Sandy Loam, 2 to 15 percent slopes	13,189	982	3.66%	0.17%	Moderately Rapid	Low	LG - Poor RS - Very Poor CL - Irrigated Crops RB - Limited
611014	Dateman-Podmor-Rock Outcrop Complex, 30 to 70 percent slopes		33		0.01%	Moderate	Low	LG - Poor RS - Not Recommended CL - Not Available RB - Not Available

Soil Code	Soil Type	Acres on HAFR	Acres on WAFR	Percent of HAFR	Percent of WAFR	Permeability	Available Water Capacity	Land Uses[2]
611016	Dune Land		20,122		3.53%	Not Available	Not Available	LG - Not Available RS - Not Available CL - Not Available RB - Not Available
611017	Dynal Sand, 2 to 15 percent slopes	395	11,980	0.11%	2.10%	Rapid	Low	LG - Poor RS - Very Poor CL - Not Available RB - Poor
611018	Dynal-Tooele, Saline, Complex, 0 to 15 percent slopes	27,559	20,022	7.66%	3.52%	Moderately Rapid to Rapid	Low	LG - Poor RS - Not Recommended CL - Not Available RB - Poor
611019	Edra Silt Loam, 1 to 5 percent slopes		35		0.01%	Moderately Slow	High	LG - Good RS - Fair CL - Irrigated Crops RB - Moderate shrink-swell potential and frost action
611021	Hiko Peak Gravelly Loam, 2 to 15 percent slopes	1,461		0.41%		Moderately Rapid	Moderate	LG - Good RS - Fair CL - Irrigated Crops RB - Well Suited
611027	Izamatch-Cliffdown, Alkali, Complex, 2 to 8 percent slopes	2,087	9,138	0.58%	1.60%	Moderately Rapid to Rapid	Low	LG - Fair RS - Very Poor CL - Not Available RB - Not Available

Table 3.2-1 Pertinent Characteristics of HAFR and WAFR Soils[1]

Soil Code	Soil Type	Acres on HAFR	Acres on WAFR	Percent of HAFR	Percent of WAFR	Permeability	Available Water Capacity	Land Uses[2]
611032	Kanosh-Saltair-Logan Complex, 0 to 2 percent		5,252		0.92%	Slow to Moderately Rapid	Very Low to Very High	LG - Very Poor to Good RS - Poor to Fair CL - Not Available RB - Poor
611044	Pits	21	177	0.01%	0.03%	Not Available	Not Available	LG - Not Available RS - Not Available CL - Not Available RB - Not Available
611045	Playas	186,286	320,820	51.76%	56.33%	Not Available	Not Available	LG - Not Available RS - Not Available CL - Not Available RB - Not Available
611046	Playas-Saltair Complex, 0 to 1 percent slopes	51,566	88,203	14.33%	15.49%	Very Slow to Slow	Very Low to Low	LG - Very Poor RS - Not Suitable CL - Not Available RB - Not Suitable
611052	Salt Flats	1,891	8,477	0.53%	1.49%	Not Available	Not Available	LG - Not Available RS - Not Available CL - Not Available RB - Not Available
611053	Saltair-Playas Complex, 0 to 1 percent slopes	290	15,984	0.08%	2.81%	Very Slow to Slow	Very Low to Low	LG - Very Poor RS - Not Suitable CL - Not Available RB - Very Poor

Soil Code	Soil Type	Acres on HAFR	Acres on WAFR	Percent of HAFR	Percent of WAFR	Permeability	Available Water Capacity	Land Uses[2]
611056	Skumpah Silt Loam, 0 to 2 percent slopes	18,461	11,478	5.13%	2.02%	Moderately Slow	Low to Moderate	LG - Poor RS - Very Poor CL - Not Suited RB - Poor
611057	Skumpah Silt Loam, Wet Substratum, 0 to 1 percent slopes		5,591		0.98%	Moderately Slow	Low to Moderate	LG - Good RS - Very Poor CL - Not Suited RB - Poor
611058	Skumpah Silt Loam, Wet Substratum, Saline, 0 to 1 percent slopes		1,273		0.22%	Moderately Slow	Low to Moderate	LG - Poor RS - Very Poor CL - Not Available RB - Poor
611059	Skumpah Silt Loam, Saline, 0 to 1 percent slopes	6,177		1.72%		Moderately Slow	Low to Moderate	LG - Poor RS - Very Poor CL - Not Suited RB - Poor
611060	Skumpah-Yenrab Complex, Saline, 0 to 15 percent slopes	1,805	1,669	0.50%	0.29%	Moderately Slow to Rapid	Low to Moderate	LG - Poor RS - Very Poor CL - Not Available RB - Not Available
611065A	Theriot-Rock Outcrop Complex, 15 to 70 percent slopes		500		0.09%	Moderate	Very Low	LG - Poor RS - Not Recommended CL - Not Available RB - Poor

Table 3.2-1 Pertinent Characteristics of HAFR and WAFR Soils[1]

Soil Code	Soil Type	Acres on HAFR	Acres on WAFR	Percent of HAFR	Percent of WAFR	Permeability	Available Water Capacity	Land Uses[2]
611066	Timpie Silt Loam, 0 to 3 percent slopes	5,124		1.42%		Moderately Slow	Low to Moderate	LG - Fair RS - Very Poor CL - Irrigated Crops RB - Not Available
611067	Timpie Silt Loam, Saline, 0 to 4 percent slopes	1,174	829	0.33%	0.15%	Moderately Slow	Low to Moderate	LG - Poor RS - Very Poor CL - Irrigated Crops RB - Not Available
611068	Timpie-Tooele Complex, Saline, 0 to 5 percent slopes	2,572	15	0.71%	0.00%	Moderately Slow to Moderately Rapid	Low to Moderate	LG - Poor RS - Very Poor CL - Not Available RB - Not Available
611069	Tooele Fine Sandy Loam, 0 to 5 percent	12,493	907	3.47%	0.16%	Moderately Rapid	Moderate	LG - Fair RS - Very Poor CL - Irrigated Crops RB - Not Available
611070	Tooele Fine Sandy Loam, Saline, 0 to 5 percent slopes	149	1,255	0.04%	0.22%	Moderately Rapid	Low	LG - Poor RS - Very Poor CL - Irrigated Crops RB - Not Available
611073	Yenrab Fine Sand, 2 to 15 percent slopes	28	850	0.01%	0.15%	Rapid	Low	LG - Fair RS - Very Poor CL - Not Available RB - Not Available

Table 3.2-1 Pertinent Characteristics of HAFR and WAFR Soils[1]

Soil Code	Soil Type	Acres on HAFR	Acres on WAFR	Percent of HAFR	Percent of WAFR	Permeability	Available Water Capacity	Land Uses[2]
611074	Yenrab Badlands Complex, 2 to 15 percent slopes	208		0.06%		Rapid	Low	LG - Fair RS - Very Poor CL - Not Available RB -Not Available
611075	Yenrab-Tooele Complex, Saline, 0 to 15 percent slopes		9,006		1.58%	Moderately Rapid to Rapid	Low	LG - Fair RS - Very Poor CL - Not Available RB - Not Available
No Data	No Data	1,561	28,823	0.43%	5.06%			

1 SCS 1995

2 LG Livestock Grazing
RS Rangeland Seeding
CL Cropland
RB Roads and Building Site Development

Table 3.3-1 Water Quality Data from the Blue Lake Springs Area

	Blue Lake Springs North[1]	Blue Lake Springs South[1]	Worldwide River Water Mean[2]
Date of Collection	10/5/77	10/5/77	--
Water Temperature (°C)	27	29	--
Silica - SiO2 (mg/L)	28	28	13
Calcium - Ca (mg/L)	140	130	15
Magnesium - Mg (mg/L)	60	56	4.1
Sodium - Na (mg/L)	1,400	1,600	6.3
Potassium - K (mg/L)	110	110	2.3
Bicarbonate - HCO3 (mg/L)	300	290	58
Sulfate - SO4 (mg/L)	240	250	11
Chloride - Cl (mg/L)	2,300	2,500	7.8
Hardness as CaCo3 (mg/L)(Calcium, Magnesium)	600	560	55
Hardness as CaCo3 (mg/L)(Noncarbonate)	350	320	7
Dissolved Solids (mg/L)(Sum of Determined Constituents)	4,430	4,820	90
Specific Conductance (micromhos/cm at 25°C)	7,920	8,470	--
pH	7.7	7.5	--
Percent Sodium	81	83	--
Sodium-Adsorption Ratio	25	30	--

1 Gates and Kruer 1981.
2 Hem 1970.

Table 3.3-2 Properties of Aquifers Beneath the HAFR and WAFR[1]

Aquifer	Transmissivity (ft^2/day)	Coefficient of Storage
Shallow-brine	67 to 6,700	0.12 to 0.00005
Alluvial-fan	20,000 to 70,000	1 to 0.0005
Basin-fill	13,400	0.0004

1 Gates and Kruer 1981, Stephens 1974.

Table 3.3-3 Water Quality Data from Oasis Complex Wells

Constituent	Oasis Water Supply Well 1	Oasis Water Supply Well 2	Landfill No. 5 Monitoring Wells[2,3]
Volatile Organic Compounds (μg/L)	-	-	ND
Semivolatile Organic Compounds (μg/L)	-	-	ND
Pesticides/PCBs (μg/L)	-	-	ND
Herbicides (μg/L)	-	-	ND
Organophosphorus Pesticides (μg/L)	-	-	ND
Aluminum (μg/L)	-	-	ND
Antimony (μg/L)	-	-	ND
Arsenic (μg/L)	-	-	6.1–26
Barium (μg/L)	-	-	ND
Beryllium (μg/L)	-	-	ND
Cadmium (μg/L)	-	-	ND
Chromium (μg/L)	-	-	ND
Copper (mg/L)	-	-	ND
Lead (μg/L)	-	-	ND
Mercury (μg/L)	-	-	ND
Molybdenum (μg/L)	-	-	ND
Nickel (μg/L)	-	-	ND
Selenium (mg/L)	-	-	5.5
Silver (mg/L)	-	-	ND
Thallium (mg/L)	-	-	ND
Zinc (μg/L)	-	-	11
Silica (mg/L)	7.8–47	22	-
Iron (mg/L)	0.02–1.9	0	0.092–0.13
Manganese (mg/L)	0.05–3.6	-	0.011–0.040
Calcium (mg/L)	18–1,470	27	19.0–38.4
Magnesium - Mg (mg/L)	29–2,530	55	10.7–24.5
Sodium - Na (mg/L)	1,310–14,900	1,540	311–379
Potassium - K (mg/L)	86	52	10.7–16.9
Bicarbonate - HCO3 (mg/L)	152–578	348	-
Carbonate - CO3 (mg/L)	0	6	-
Sulfate - SO4 (mg/L)	245-2,350	457	-

Constituent	Oasis Water Supply Well 1	Oasis Water Supply Well 2	Landfill No. 5 Monitoring Wells[2,3]
Chloride - Cl (mg/L)	1,600–27,800	2,060	-
Fluoride - F (mg/L)	1.3–11	2.3	-
Nitrate - NO3 (mg/L)	17–35	55	-
Boron - B (mg/L)	1.7	1.4	-
Hardness as CaCo3 (mg/L)(Calcium, Magnesium)	164–9,320	292	-
Hardness as CaCo3 (mg/L)(Noncarbonate)	0–9,200	0	-
Dissolved Solids (mg/L)(Sum of Detrmnd.Cnsttnts.)	3,550–48,100	4,500	-
Specific Conductance (micromhos/cm at 25oC)	6,140–62,700	7,580	1,630–2,070
pH	6.9–8.1	8.3	7.6–8.0
Percent Sodium	74–92	90	-
Sodium Adsorption Ratio	40–66	-	-

1 Price and Bolke 1970. Well 1 water temperature was 14–18°C when sampled from March 23, 1962 through July 8, 1993. Well 2 water temperature was 17°C when sampled on August 27, 1963.

2 USGS 1992. Water temperature was 15–16°C when sampled from September 28 through September 30, 1992.

ND Not Detected

Table 3.4-1 Acreages of Cover Types Mapped in HAFR and WAFR[1]

Vegetation Information	Acres[2]			Percentage		
Vegcode-Plant Community	HAFR	WAFR	Total	HAFR	WAFR	Total
1-water (mud flat)	99018		99018	27.7		10.7
14-sagebrush	2429	22	2451	0.7	0.004	0.3
16-grassland	7976	4626	12602	2.2	0.8	1.4
20-barren (mud flat)	114222	192191	306413	31.8	34.0	33.1
27-lowland riparian		688	688		0.1	0.1
31-urban		382	382		0.1	0.04
32-desert grassland	78115	132301	210416	21.8	23.4	22.8
36-greasewood	4574	1747	6321	1.3	0.3	0.7
37-pickleweed barrens	52355	232890	285245	14.6	41.1	30.8
38-wetland		1184	1184		0.2	0.1
Total	358689	566031	924720	100.0	100.0	100.0

1 Data from AGRC, Utah Automated Geographic Reference Center.

2 The total number of acres occurring on HAFR and WAFR differ somewhat among different data sources because the boundaries used may differ and the electronic "cutouts" may differ slightly.

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[1] Data from AGRC, Utah Automated Geographic Reference Center.

[2] The total number of acres occurring on HAFR and WAFR differ somewhat among different data sources because the boundaries used may differ and the electronic "cutouts" may differ slightly.

Table 3.4-2 Cover Type Groupings of Vegetation Types Identified on HAFR and WAFR[1]

Cover Type/Vegetation Type	Vegetation Type Description[2]	Vegetation Type Study Plot
Barren		
Rocks/barrens	Bare rock outcrops to rock outcrops with very little vegetation; some sparse shrubs and/or grasses	
Sand/barrens	Sand dunes, shifting sand and silts; less than five percent vegetative cover	
Salt flats/playa/barrens	Dominant cover of salt or alkali	
Mud flats/barrens	Less than five percent vegetative cover on various soil types	
Greasewood/Shadscale		HAFR Residence Center
Sparse salt tolerant vegetation	Shadscale dominant generally on alkali or sand soils	
Shadscale/kochia	Shadscale and kochia spp. dominated areas; areas of short shrubs, i.e., budsage, little rabbitbrush	
Greasewood	Greasewood dominated areas and greasewood shadscale mix	
Desert Shrub/Saltbush		Grassy Mountain foothills
Low shrub mixes	Various low shrubs, grass forbs mixture; winterfat, shadscale, saltbush, halogeton, ephedra, kochia spp., desert grasses, horsebrush, greasewood, budsage	
Low shrub mix/rocky or gravelly soil	Rocky soil types with budsage, short shadscale, little rabbitbrush, and some grasses	
Vegetated sand dunes	Sand soil types with various vegetation types; Indian ricegrass, salt brush, greasewood, rabbitbrush	
Medium Shrubs (Sagebrush)		Newfoundland Mountain
Desert brush/mixes	Similar to low shrubs in composition but taller and/or a higher percent cover; also includes sagebrush	
Tall Shrubs and Trees		Grassy Mountain ridgetop
Pinon-juniper/mountain shrubs	Sagebrush, big rabbitbrush, bitterbrush, juniper, pinion pine, various annual and perennial grasses	

Table 3.4-2 Cover Type Groupings of Vegetation Types Identified on HAFR and WAFR[1]

Cover Type/Vegetation Type	Vegetation Type Description[2]	Vegetation Type Study Plot
Forbs/Grasses (Annual and Perennial)		
Grass-shrub mixes	Grass and shrubs co-dominant	Wildcat Mountain
Grass/cheatgrass	Cheatgrass, Indian ricegrass and other grasses; some areas with high amount of forbs	Lakeside Mountain
Forbs	Tumbleweed and other various nonwoody plants	
Riparian		Radio Tower Springs
Marshland/wetlands	Saltgrass, rushes, sedges	

1 Workman et al. 1992c
2 Not all characteristic components of a cover type may be present on HAFR or WAFR. For example, pinion pine, although characteristic of the pinion-juniper/mountain shrub cover type, is not known to be present on the ranges.

Table 3.4-3 Acreages and Percentages of Vegetation Types Identified on HAFR and WAFR[1]

Cover Type[2]	Acreage		Percent		Acres per AUM[3]	
	HAFR	WAFR	HAFR	WAFR	HAFR	WAFR
Salt flats/playa/barrens	193,093	15,960	52.7	2.8	0	0
Sparse salt tolerant vegetation	39,110	147,842	10.7	25.7	0	0
Desert brush/mixes	38,890	3,054	10.6	0.5	10	10
Sand/barrens	29,580	163,513	8.1	28.4	0	0
Shadscale/kochia	16,824	21,721	4.6	3.8	15	15
Mud flats/barrens	11,693	196	3.2	34.0	0	0
Greasewood	9,457	5,416	2.6	0.9	20	20
Low shrub mixes	6,634	2,074	1.8	0.4	10	10
Grass/cheatgrass	5,718	1,613	1.6	0.3	20	20
Vegetated sand dunes	4,032	9,334	1.1	1.6	0	0
Grass-shrub mixes	3,885	4,091	1.1	0.7	15	15
Rocks/barrens	2,969	173	0.8	0.03	0	0
Low shrub mix/rocky or gravelly soil	2,932	749	0.8	0.1	15	15
Forbs	1,173	173	0.3	0.03	25	25
Pinon-juniper/mountain shrubs	550		0.2	0.0	15	15
Marshland/wetlands		4,436	0.0	0.8		
Total	366,539	576,157				

1 Workman et al. 1992c

2 Not all characteristic components of a cover type may be present on HAFR and WAFR. For example, pinion pine, although characteristic of the pinion-juniper/mountain shrub cover type, is not known to be present on the ranges.

3 An animal unit month (AUM) is the amount of range needed to support one cow and calf or five sheep grazing for 1 month.

Table 3.4-4 Elevation and Relative Percent Frequency of Vegetation in Vegetation Type Study Plots[1]

Cover Type Represented in Study Plot	Elevation Where Type Occurs	Study Plot	Elevation of Study Plot	Relative Percent Frequency of Dominant Grasses	Forbs	Shrubs
Greasewood/Shadscale	4,300 to 4,500	HAFR Residence Center	4,400 to 4,500	cheatgrass, 13.8	halogeton, 8.5	shadscale, 29.8
Desert Shrub/Saltbush	4,500 to 5,500	Grassy Mountain foothills	4500 to 4,600	cheatgrass, 23.9 Salina wildrye, 15.1	prickly lettuce, 2.2	shadscale, 33.8
Medium Shrubs (Sagebrush)	5,000 to 6,000	Newfoundland Mountain	5,000 to 5,200	cheatgrass, 14.3	Hood's phlox, 1.6	big sagebrush, 19.4 greasewood, 11.0
Tall Shrubs and Trees	5,000 to 6,000	Grassy Mountain ridgetop	5,600 to 5,800	Salina wildrye, 39.7	Hood's phlox, 2.9	black sagebrush, 20.0 Utah juniper, 15.1
Grass-shrub mixes	5,800 to 8,000	Wildcat Mountain	4,300 to 4,600	cheatgrass, 31.5	Russian thistle, 6.4	winterfat, 11.0
Grass/Cheatgrass	Various	Lakeside Mountain	4,400 to 4,600	cheatgrass, 51.8 Indian ricegrass, 12.0	halogeton, 8.0	spiny horsebrush, 6.9
Riparian	Various	Radio Tower Springs	4,200 to 4,300	saltgrass, 27.1	gray molly, 1.9	iodine bush, 11.9

[1] Workman et al. 1992

Class Gymnospermae	
Family Cupressacae	
Utah juniper*	*Juniperus osteosperma*
Family Ephedraceae	
Nevada ephedra*	*Ephedra nevodensis*
Family Pinaceae	
Single-leaf pinyon pine	*Pinus monophylla*
Class Angiospermae Subclass Monocotyledonae	
Family Cyperaceae	
Bulrush*	*Scirpus* sp.
Sedge*	*Carex* sp.
Family Juncaceae	
Rush	*Juncus* sp.
Family Poaceae	
Cheatgrass*	*Bromus tectorum*
Foxtail barley*	*Hordeum jubatum*
Needle and thread*	*Stipa comata*
Red three-awn*	*Aristida longiseta*
Great Basin wildrye*	*Elymus cinereus*
Salina wildrye*	*Elymus salinus*
Bull grass*	*Elymus ambiguous*
Blue wildrye*	*Elymus glaucus*
Bluebunch wheatgrass*	*Agrophyron spicatum*
Crested wheatgrass*	*Agrophyron cristatum*
Tall wheatgrass*	*Agrophyron elongatum*
Western wheatgrass*	*Agropyron smithii*
Galleta grass*	*Hilaria jamesii*
Indian rice grass*	*Oryzopsis hymedoides*
Sandberg bluegrass*	*Poa sandbergii*
Nevada bluegrass*	*Poa nevadensis*
Kentucky bluegrass*	*Poa pratensis*
Sand dropseed*	*Sporobolus cryptandrus*
Alkali sacaton*	*Sporobolus arroides*
Family Poaceae (continued)	
Squirrel tail*	*Sitanion hystrix*
Salt grass*	*Distichilis stricta*
Common reed*	*Phragmites communis*
Bentgrass	*Agrostis* sp.

Subclass Dicotyledonae

Family Amaranthacea	
Tumbling pigweed	*Amarantus albus*
Family anacardiaceae	
Squawbush*	*Rhus trilobata*
Family Apiaceae	
Desert parsley	*Lomatium* sp.
Family Asclepiadaceae	
Milkweed*	*Asclepias* sp.
Family Asteraceae	
Rock goldenrod	*Petradoria pumlia*
Pussytoes	*Antennaria* sp.
Dusty maiden	*Chaenactis* sp.
Common sunflower*	*Helianthus* sp.
Budsage*	*Artemisia spinosa*
Big sagebrush*	*Artemisia tridentata*
Black sagebrush*	*Artemisia nova*
California bricklebush	*Brickellia californica*
Tasselflower	*Brickellian microphylla*
Big rabbitbrush*	*Chrysothamnus nauseosus*
Little rabbitbrush*	*Chrysothamus viscidiflorus*
Curlycup gumweed*	*Grindelia squarrosa*
Broom snakeweed*	*Gutierrizia sarothrae*
Slender rushpink	*Lygodesmia juncea*
Spiny rushpink*	*Lygodesmia spinosa*
Spiny horsebrush*	*Tetradymia spinosa*
Spineless horsebrush*	*Tetradymia canescens*
Horsebrush	*Tetradymia glabrata*
Daisy fleabane*	*Erigeron pumilus*
Family Asteraceae (continued)	
Cushion goldenweed*	*Happlopappus acaulis*
Aster	*Aster* sp.
Wire-lettuce*	*Stephanomeria exigua*
Thistle*	*Cirsium* sp.
Graylocks	*Hymenoxis acaulis*
Salsify*	*Tragopogon dubius*
Yarrow*	*Achillea millefolium*
Family Boraginaceae	
Dwarf catseye	*Cryptantha humilis*
White stoneseed	*Lithospermum arvense*
Yellow stoneseed	*Lithospermum ruderale*

Family Brassicaceae	
Rockcress	*Arabis divaricarpa*
Tansy mustard	*Descurainia pinnata*
Western wallflower	*Erysimum asperum*
Peppergrass*	*Lepidium perfoliatum*
Tumbling mustard	*Sisymbrium altissimum*
Little foot mustard	*Thelypodium sagittatum*
Prickly lettuce*	*Lactuca serriola*
Family Cactaceae	
Prickly pear*	*Opuntia polyacantha*
Great Basin fish hook cactus*	*Sclerocactus pubispinus*
Fishhook cactus	*Echinocactus* sp.
Hedgehog cactus*	*Echinocactus* sp.
Family Capparaceae	
Rocky Mountain beeplant*	*Cleome serrulata*
Family Caprifoliaceae	
Mountain snowberry	*Symphoricarpus oreophilus*
Family Chenopodiaceae	
Iodine bush*	*Allenrolfea occidentalis*
Fourwing saltbush*	*Atriplex canescens*
Pickleweed*	*Salicornia rubra*
Shadscale*	*Atriplex confertifolia*
Family Chenopodiaceae (continued)	
Nuttall's saltbush*	*Atriplex nuttallii*
Three-toothed saltbush	*Atriplex gardneri*
Winterfat*	*Ceratoides lanata*
Spiny hopsage*	*Grayia spinosa*
Halogeton*	*Halogeton glomeratus*
Gray molly*	*Kochia americana*
Russian thistle*	*Salsola kali*
Greasewood*	*Sarcobatus vermiculatus*
Seepweed*	*Suaeda torreyana*
Bassia*	*Bassia hyssophifolia*
Goosefoot	*Chenopodium* sp.
Family Fabaceae	
Milvetch	*Astragalus purshia***
Weedy milkvetch*	*Astragalus miser***
Wooly milkvetch*	*Astragalus mollissimus***

Family Geraniaceae	
Geranium	*Geranium fremontii*
Filaree*	*Erodium cicutarium*
Family Loasaceae	
Blazing star*	*Mentzelia laevicaulis*
Family Malvaceae	
Orange globemallow*	*Sphaeralcea munroana*
Scarlet globemallow*	*Sphaeralcea coccinea*
Family Onagraceae	
Evening primrose*	*Oenothera caespitosa*
Family Polemoniaceae	
Hood's phlox*	*Phlox hoodii*
Longleaf phlox*	*Phlox longifolia*
Flaxflower*	*Leptodactylon pungens*
Family Polygalaceae	
Milkwort	*Polygala acanthoclada*
Family Polygonaceae	
Buckwheat*	*Eriogonum* sp.
Family Ranunculaceae	
Columbine	*Aquilegia* sp.
Larkspur	*Delphinium* sp.**
Family Rosaceae	
Cliffrose*	*Cowania mexicana*
Curl-leaf mountain mahogany	*Cercocarpus ledifolius*
Serviceberry	*Amelanchier alnifolia*
Bitterbrush	*Purshia tridentata*
Family Salicaceae	
Cottonwood*	*Populus angustifolia*
Family Santalaceae	
Toadflax	*Comandra umbellata*
Family Saxifragaceae	
Squaw current	*Ribes cereum*
Family Scrophylariaceae	

Beard tongue*	*Penstemon* sp.
Indian paintbrush	*Castilleja* sp.
Flannel mullein*	*Verbascum thapsus*
Family Solanaceae	
Desert thorn	*Lycium andersonii*
Family Tamaracaceae	
Five-stemmed tamarisk*	*Tamarix pentandra*

[1] Workman et al. 1992c

* These plants have been identified in plant inventories of the UTTR area.

** Listed as a primary poisonous plant (Forest Service 1986)

Table 3.4-6 Birds Occurring on HAFR and WAFR[1]

Common Name	Scientific Name	Seasonal Use Status	Population Status	Abundance
Common loon	*Gavia immer*	T		U
American bittern	*Botaurus lentiginosus*	T	SQ	U
Great blue heron	*Ardea herodias*	R	HFI, SQ	U
White-faced ibis	*Plegadis chihi*	T		U
Canada goose	*Branta canadensis*	T		U
Mallard	*Anas platyrhynchos*	S		C
Northern pintail	*Anas acuta*	S		C
Cinnamon teal	*Anas cyanoptera*	S		C
Gadwall	*Anas strepera*	T		C
Canvasback	*Aythya valisineria*	T		FC
Turkey vulture*	*Cathartes aura*	S		FC
Osprey*	*Pandion haliaetus*	T		VR
Bald eagle*	*Haliaeetus leucocephalus*	W	FE	FC
Northern harrier*	*Circus cyaneus*	R		FC
Sharp-shinned hawk*	*Accipiter striatus*	R		U
Cooper's hawk*	*Accipiter cooperii*	R	HFI	U
Goshawk*	*Accipiter gentilis*	R		R
Swainson's hawk*	*Buteo swainsoni*	S		FC
Red-tailed hawk*	*Buteo jamaicensis*	R		FC
Ferruginous hawk*	*Buteo regalis*	R	HFI	FC
Rough-legged hawk*	*Buteo lagopus*	W		C
Golden eagle*	*Aquila chrysaetos*	R	HFI	FC
American kestrel*	*Falco sparverius*	R		FC
Merlin*	*Falco columbarius*	W		R
Peregrine falcon*	*Falco peregrinus*	T	FE	R
Prairie falcon*	*Falco mexicanus*	R	HFI	FC
Gyrfalcon*	*Falco rusticolus*	W		VR

Table 3.4-6 Birds Occurring on HAFR and WAFR[1]

Common Name	Scientific Name	Seasonal Use Status	Population Status	Abundance
Chukar	*Alectoris chukar*	R		U
Ring-necked pheasant	*Phasianus colchicus*	R		U
Sage grouse	*Centrocercus urophasianus*	R		R
California quail	*Callipepla californica*	R		U
Sora rail	*Porzana carolina*	T		FC
American coot	*Fulica americana*	T		C
Sandhill crane	*Grus canadensis*	T	HFI	U
Black-bellied plover	*Pluvialis squatarola*	T		FC
Killdeer	*Charadrius vociferus*	R		C
Spotted sandpiper	*Actitis macularia*	S		C
Common snipe	*Gallinago gallinago*	S		FC
Wilson's phalarope	*Phalaropus tricolor*	T		C
Franklin's gull	*Larus pipixcan*	T		C
Ring-billed gull	*Larus delawarensis*	W		C
California gull	*Larus californicus*	S		C
Forster's tern	*Sterna forsteri*	T		C
Black tern	*Chlidonias niger*	T		FC
Rock dove	*Columba livia*	R		U
Mourning dove	*Zenaida macroura*	R		C
Great horned owl	*Bubo virginianus*	R		C
Burrowing owl	*Athene cunicularia*	S	HFI	C
Long-eared owl	*Asio otus*	S		FC
Short-eared owl	*Asio flammeus*	R		FC
Common nighthawk	*Chordeiles minor*	S		C
Common poorwill	*Phalaenoptilus nuttallii*	S		FC
Lewis' woodpecker	*Melanerpes lewis*	T	SD, HFI	U
Northern flicker	*Colaptes auratus*	R		C

Common Name	Scientific Name	Seasonal Use Status	Population Status	Abundance
Olive-soded flycatcher	*Empidonax traillii*	T		FC
Western wood peewee	*Contopus sordidulus*	S		C
Willow flycatcher	*Empidonax traillii*	T		FC
Dusky flycatcher	*Empidonax oberholseri*	T		C
Say's phoebe	*Sayornis saya*	S		FC
Ash-throated flycatcher	*Myiarchus cinerascens*	S		U
Western kingbird	*Tyrannus verticalis*	S		C
Horned lark	*Eremophila alpestris*	R		C
Violet-green swallow	*Tachycineta thalassina*	T		C
Northern rough-winged swallow	*Stelgidopteryx serripennis*	S		FC
Cliff swallow	*Petrochelidon pyrrhonota*	S		C
Barn swallow	*Hirundo rustica*	S		C
Scrub jay	*Aphelocoma coerulescens*	R		C
Pinyon jay	*Gymnorhinus cyanocephalus*	R		U
Clark's nutcracker	*Nucifraga columbiana*	T		FC
Black-billed magpie	*Pica pica*	R		C
American crow	*Corvus brachyrhynchos*	T		U
Common raven	*Corvus corax*	R		C
Black-capped chickadee	*Parus atricapillus*	T		C
Plain titmouse	*Parus inornatus*	S		FC
Bushtit	*Psaltriparus minimus*	T		FC
Rock wren	*Catherpes mexicanus*	T		U
House wren	*Troglodytes aedon*	S		C
Marsh wren	*Cistothorus palustris*	T		C
Blue-gray gnatcatcher	*Polioptila caerulea*	S		FC
Mountain bluebird	*Sialia currucoides*	S	SQ	FC
Townsend's solitaire	*Myadestes townsendi*	T		FC

Table 3.4-6 Birds Occurring on HAFR and WAFR[1]

Common Name	Scientific Name	Seasonal Use Status	Population Status	Abundance
American robin	*Turdus migratorius*	R		C
Gray catbird	*Dumetella carolinensis*	T		U
Sage thrasher	*Oreoscoptes montanus*	S		FC
Northern shrike	*Lanius excubitor*	W		U
Loggerhead shrike	*Lanius ludovicianus*	S		FC
European starling	*Sturnus vulgaris*	R		C
Warbling vireo	*Vireo filvus*	T		C
Orange-crowned warbler	*Vermivora celata*	T		C
Yellow warbler	*Dendroica petechia*	S		C
yellow-rumped warbler	*Dendroica caronata*	T		C
Black-throated gray warbler	*Dendroica nigrescens*	T		U
Townsend's warbler	*Dendroica townsendi*	T		U
Northern waterthrush	*Seiurus noveboracensis*	T		R
MacGillivray's warbler	*Oporornis tolmiei*	S		C
Common yellowthroat	*Geothlypis trichas*	S		FC
Wilson's warbler	*Wilsonia pusilla*	T		U
Yellow-breasted chat	*Icteria virens*	S	SQ	FC
Wetern tanager	*Piranga ludoviciana*	T		C
Lazuli bunting	*Passerina amoena*	S		C
Chipping sparrow	*Spizella passerina*	S		C
Brewer's sparrow	*Spizella breweri*	S		C
Vesper sparrow	*Pooecetes gramineus*	T		C
Lark sparrow	*Chondestes grammacus*	S		C
Black-throated sparrow	*Amphispiza bilineata*	T		U
Sage sparrow	*Amphispiza belli*	T		U
Lark bunting	*Calamospiza melanocorys*	T		R
Savannah sparrow	*Passerculus sandwichensis*	S		C

Table 3.4-6 Birds Occurring on HAFR and WAFR[1]

Common Name	Scientific Name	Seasonal Use Status	Population Status	Abundance
White-crowned sparrow	*Zonotrichia leucophrys*	W		C
Bobolink	*Dolichonyx oryzivorus*	T		R
Red-winged blackbird	*Agelaius phoeniceus*	S		C
Western meadowlark	*Sturnella neglecta*	R		C
Yellow-headed grackle	*Xanthocephalus xanthocephalus*	S		C
Boat-tailed grackle	*Cassidix mexicanus*	S		R
Brewer's blackbird	*Euphagus cyanocephalus*	R		C
Northern oriole	*Icterus galbula*	S		FC
Cassin's finch	*Carpodacus cassinii*	S		C
House finch	*Carpodacus mexicanus*	R		C
Pine siskin	*Carduelis pinus*	T		C
American goldfinch	*Carduelis tristis*	T		U
House sparrow	*Passer domesticus*	R		C

1 Workman et al. 1992c, Workman and Peterson 1989.

Seasonal Use Status:
R = Resident
S = Summer
W = Winter
T = Transit

Population Status:
FE = Federal Endangered
HFI = High Federal Interest
SQ = Utah Status Questioned

Abundance:
C = Common -observed anytime
FC = Fairly common - observed most of the time
U = Uncommon - observed infrequently
R = Rare - observed rarely
VR = Very rare

* Diurnal raptors identified on or near HAFR and WAFR (Workman and Peterson 1989).

Table 3.4-7 Mammals Occurring on HAFR and WAFR[1]

Common Name	Scientific Name	Location Sighted[2]
Vagrant shrew	*Sorex vagrans*	T,G
Water shrew	*Sorex palustris*	
Big myotis	*Myotis lucifugus*	
Long-eared myotis	*Myotis evotis*	
Hairy-winged myotis	*Myotis volans*	
Small-footed myotis	*Myotis subulatus*	T
Silver-haired bat	*Lasionycteris noctavagans*	
Big brown bat	*Eptesicus fuscus*	
Hoary bat	*Lasiurus cinereus*	
Western pipistrelle	*Pipistrellus hesperus*	
Brazilian free-tailed bat	*Tadarida brasiliensis*	
White-tailed jackrabbit	*Lepus townsendi*	
Black-tailed jackrabbit	*Lepus californicus*	T,L,N,G,H
Mountain cottontail	*Sylvilagus nuttalli*	G
Desert cottontail	*Sylvilagus auduboni*	F,T,L,N,G
Pygmy cottontail	*Sylvilagus idahoensis*	
Yellow-bellied marmot	*Marmota flaviventris*	
Townsend ground squirrel	*Spermophilus townsendi*	N,G
Uinta ground squirrel	*Spermophilus armatus*	
Rock squirrel	*Spermophilus variegatus*	
Golden-mantled ground squirrel	*Spermophilus lateralis*	
Antelope ground squirrel	*Ammospermophilus leucurus*	F,W,N,G
Uinta chipmunk	*Eutamias umbrinus*	
Cliff chipmonk	*Eutamias dorsalis*	
Least chipmunk	*Eutamias minimus*	H
Northern pocket gopher	*Thomomys talpoides*	
Botta pocket gopher	*Thomomys bottae*	
Longtail pocket mouse	*Perognathus formosus*	N
Great Basin pocket mouse	*Perognathus parvus*	S,I,L,N,G,H,T
Ord kangaroo rat	*Dipodomys ordi*	S,W,N,H,G
Chisel-toothed kangaroo rat	*Dipodomys microps*	S,N,G
Dark kangaroo mouse	*Microdipodops megacephalus*	
Western harvest mouse	*Reithrodontomys megacephalus*	T,L,N,H,G
Deer mouse	*Peromyscus maniculatus*	S,H,G,T,F,L,N,I
Canyon mouse	*Peromyscus crinitus*	F
Pinyon mouse	*Peromyscus truei*	
Northern grasshopper mouse	*Onychomys leucogaster*	
Desert woodrat	*Neotoma lepida*	I,G,L,N,T
Bush-tailed woodrat	*Neotoma cinerea*	

Table 3.4-7 Mammals Occurring on HAFR and WAFR[1]

Common Name	Scientific Name	Location Sighted[2]
Sagebrush vole	*Lagurus curtatus*	G,N[3]
Meadow Vole	*Microtus pennsylvanicus*	
Montane vole	*Microtus montanus*	F,T
Long-tailed vole	*Microtus longicaudus*	
Big jumping mouse	*Zapus princeps*	
Porcupine	*Erethizon dorsatum*	F,L,N,G,H
Coyote	*Canis latrans*	L,G,I
Kit fox	*Vulpes macrotis*	
Ring-tailed cat	*Bassariscus astutus*	
Ermine	*Mustela erminea*	
Long-tailed weasel	*Mustela frenata*	
Badger	*Taxidea taxus*	G,H
Striped skunk	*Mephitis mephitis*	T
Spotted skunk	*Spilogale putorius*	
Bobcat	*Lynx rufus*	N
Mountain lion	*Felis concolor*	H[3]
Mule deer	*Odocoileus hemionus*	G,H,S
Pronghorn	*Antilocapra americana*	G,L,H

1 Workman et al. 1992c

2 Key to Location Sighted:

N = Newfoundland Mountains
L = Lakeside Mountains
G = Grassy Mountains
W = Wildcat Mountain
T = Twin Springs
H = Hogup Mountain
I = Floating Island
S = Stansbury Island
F = Fish Springs

3 Sightings not confirmed

Table 3.4-8 Endangered Species, Threatened Species, and Species of High Federal Concern Potentially Occurring in Utah[1]

Common Name	Scientific Name	Status[2]
Mammals		
Utah prairie dog	*Cynomys parvidens*	FE
Black-footed ferret	*Mustela nigripes*	FE
Wolf	*Canis lupus*	FE
Grizzly bear	*Ursus horribilis*	EX
Fisher	*Martes pennanti*	EX
Dwarf shrew	*Sorex nanus*	SL
Desert shrew	*Notiosorex crawfordi*	SL
Red bat	*Lasiurus borealis*	SL
Mexican big-eared bat	*Plecotis phyllotas*	SL
Spotted bat	*Euderma maculatum*	SL
Big free-tailed bat	*Tadarida macrotis*	SL
Abert squirrel	*Sciurus aberti*	SL
Belding ground squirrel	*Spermophilis beldingi*	SL
Richardson's ground squirrel	*Spermopilis richardsoni*	SL
Thirteen-lined ground squirrel	*Spermophilis tridecemlineatus*	SL
Spotted ground squirrel	*Spermophilis spilosoma*	SL
Yellow pine chipmunk	*Eutamias amoenus*	SL[4]
Rock pocket mouse	*Perognathus intermedius*	SL
Wyoming pocket mouse	*Perognathus fasciatus*	SL
Merriam's kangaroo rat	*Dipodomys merriami*	SL
Desert kangaroo rat	*Dipodomys deserti*	SL
Cactus mouse	*Peromyscus eramicus*	SL
Rock mouse	*Peromyscus difficilis*	SL
Southern grasshopper mouse	*Onychomys torridus*	SL
Stephen's woodrat	*Neotoma stephansi*	SL
Mexican meadowmouse	*Microtus mexicanus*	SL
Wolverine	*Gulo gulo*	SL
River otter	*Lutra canadensis*	SL
Canada lynx	*Lynx canadensis*	SL
Birds (All bird species in Utah are protected)		
Bald eagle*	*Haliaeetus leucocephalis*	FE
Peregrine falcon*	*Falco peregrinus*	FE
Whooping crane	*Grus americana*	FE
California condor	*Gymnogyps californicus*	EX
Long-billed curlew*	*Numenius americanus*	SD, HFI
Lewis' woodpecker*	*Ansyndesmus lewis*	SD, HFI

Table 3.4-8 Endangered Species, Threatened Species, and Species of High Federal Concern Potentially Occurring in Utah[1]

Common Name	Scientific Name	Status[2]
Western bluebird*	*Sialia mexicana*	SD, HFI
Snowy plover	*Charadrius alexandrinus*	SD
Yellow-billed cuckoo	*Coccyzus americanus*	SD
Osprey*	*Pandion haliaetus*	SL, HFI
Spotted owl*	*Strix occidentalis*	SL, HFI
White pelican*	*Pelecanus erythrorhynchos*	SL
Double-breasted cormorant*	*Phalacrocorax auritus*	SL
Caspian tern*	*Hydropronge caspis*	SL
Purple martin	*Pronge subis*	SL
Bell's vireo	*Vireo bellii*	SL
Grasshopper sparrow	*Ammodramus savannarum*	SL
Roadrunner	*Geococcyx californianus*	SL
Great blue heron*	*Ardea herodias*	HFI, SQ
Pileated woodpecker	*Dendrocopus pileatus*	HFI, SQ
Golden eagle*	*Aquila chrysaetos*	HFI
Prairie falcon*	*Falco mexicanus*	HFI
Ferruginous hawk*	*Buteo regalis*	HFI
Merlin*	*Falco columbarius*	HFI
Cooper's hawk*	*Accipiter cooperi*	HFI
Burrowing owl*	*Athene cunicularia*	HFI
Flammulated owl*	*Otus flammeolus*	HFI
Williamson's sapsucker	*Sphyrapicus thyroikeus*	HFI
Band-tailed pigeon	*Columba fasciata*	HFI
Sandhill crane*	*Grus canadensis*	HFI
Black swift	*Cypseloides niger*	HFI
Scott's oriole	*Icterus perisorum*	HFI
Grace's warbler	*Dendroica graciae*	HFI
American bittern	*Botaurus lentiginosus*	SQ
Western grebe*	*Aechmorphorus occidentalis*	SQ
Black-crowned night heron*	*Nycticorax nycticorax*	SQ
Mountain bluebird*	*Sialia currucoides*	SQ
Yellow-breasted chat*	*Icteria virens*	SQ
Fox sparrow	*Passerella iliaca*	SQ
<u>Fish</u>		
Colorado squawfish	*Ptychocheilus lucius*	FE
Bonytail chub	*Gila elegans*	FE
Humpback chub	*Gila cypha*	FE

Table 3.4-8 Endangered Species, Threatened Species, and Species of High Federal Concern Potentially Occurring in Utah[1]

Common Name	Scientific Name	Status[2]
Woundfin	*Plegopterus argentissimus*	FE
Lahontan cutthroat trout	*Salmo clarki henhawi*	FT
Virgin River bonytail chub	*Gila robusta seminuda*	ST
June sucker	*Chasmistes liorus mictus*	ST
Razorback sucker	*Xyrauchen texanus*	ST
Least chub	*Iotichthys phlegethontis*	SD
Virgin River spinedace	*Lepidomeda mollispinus*	SD
Leatherside chub	*Gila copei*	SQ
Longnose dace	*Rhinichthys cataractae*	SQ
<u>Reptiles and Amphibians</u>		
(All reptiles and amphibians are protected)		
Desert tortoise	*Gopherus agassizi*	FT
Gila monster	*Heloderma suspectum*	SL
Desert iguana	*Dipsosaurus dorsalis*	SL
Chuckwalla	*Sauromalus obesus*	SL
Desert night lizard	*Xantusia vigilis*	SL
Western banded gecko	*Coleonyx variegatus utahensis*	SL[3]
Zebra-tailed lizard	*Callisaurus draconoides*	SL
Many-lined skink	*Eumeces multivirgatus*	SL
Plateau whiptail	*Cnemidophorus velox*	SL
Arizona toad	*Bufo microscaphous*	SL
Pacific tree frog	*Hyla regilla*	SL
Relict leopard frog	*Rana onca*	SL
Speckled rattlesnake	*Crotalus mitchelli pyrrhus*	SL
Mojave rattlesnake	*Crotalus scutulatus scutulatus*	SL
Sidewinder rattlesnake	*Crotalus cerastes cerastes*	SL
Utah black-headed snake	*Tantilla planiceps utahensis*	SL
California kingsnake	*Lampropeltis getulus californiae*	SL
Desert glossy snake	*Arizona elegans*	SL
Utah blind snake	*Leptotyphlops humilis utahensis*	SL
Mojave patched-nosed snake	*Salvadora hexalepis mojavensis*	SL
Arizona lyre snake	*Trimorpodon lamda*	SL
Utah mountain kingsnake	*Lampropeltis pyromelena*	SQ
Utah milk snake	*Lampropeltis triangulum*	SQ
Great Plains rat snake	*Elaphe guttata emoryi*	SQ
Western smooth green snake	*Opheodrys vernalis blanchardi*	SQ
Western spotted frog	*Rana pretiosa pretiosa*	SQ

Table 3.4-8 Endangered Species, Threatened Species, and Species of High Federal Concern Potentially Occurring in Utah[1]

Common Name	Scientific Name	Status[2]
Insects		
Great Basin silverspot butterfly	*Speyeria nokomis nokomis*	SL
Plants		
Bear poppy	*Arctomecon humilis*	FE

[1] U.S. Department of the Air Force, nd-a

[2] FE = Federal Endangered
SE = State Endangered
SD = State Declining
SQ = Utah Status Questioned
HFI = High Federal Interest
FT = Federal Threatened
ST = State Threatened
SL = State Limited
EX = Extirpated

* Listed by Workman et al. 1992c as occurring on or near HAFR and WAFR

4.0 RANGE USES AND ASSOCIATED CONSIDERATIONS

HAFR and WAFR are owned, managed, and primarily used by DOD for the following types of direct use, which are discussed in the remainder of this section:

- Military personnel and weapons system training and testing
- Disposal of ordnance and other materials
- Use of facilities (e.g., targets, test pads, pads used for disposal of munitions and missiles)

Associated with these uses are infrastructure and support services. Infrastructure uses include instrumentation for measurement or scoring of training and testing performance, communication networks, which may include fiber-optic or other cabling, telemetry, and radar; storage areas; and transportation infrastructure. Support services include those functions or activities that are required for the primary direct uses to be accomplished, but that cannot be allocated to a single direct use (e.g., scheduling, range safety, facility maintenance, and construction).

A number of factors contribute to the value and utility of UTTR for these kinds of uses. First, its remote location and relative isolation from major population centers makes it a secure and safe place for uses involving training, testing, and disposal as these uses often involve explosives, projectiles, unmanned air vehicles, or other potentially dangerous objects or equipment. Second, adjacent land areas and their uses complement HAFR and WAFR uses. Dugway, immediately adjacent to the south boundary of WAFR, effectively increases the land base, or large safety footprint, usable for training, testing, and other UTTR uses. Third, UTTR is just one of several areas that may be used in a coordinated fashion for long-range testing purposes. By coordinating UTTR uses with uses at sites in California, Nevada, New Mexico, Idaho, and other states, long-range corridors may be delineated and used for specialized testing and training missions. Finally, these kinds of uses have a historical basis at UTTR that lends legitimacy to and minimizes conflict during the development of specific technical uses and in the interpretation of their results. Although much less land in northwestern Utah is now under DOD control than during World War II (down from 6 million acres to 2 million acres), areas near Wendover, Utah, have been used since World War II for training and for testing. The area south of WAFR was officially designated as

Dugway in the late 1950s, but had been DOD land prior to that. In addition, much of the land adjacent to HAFR and WAFR boundaries is also federally administered by BLM for various uses.

The land use setting and an overview of the geographic areas and groups associated with UTTR are discussed in Section 4.1. This discussion provides a framework for Section 4.2, a detailed discussion of the training and testing uses of the UTTR and the services supporting those uses. The legal, environmental, and health/safety considerations associated with range uses are discussed in Section 4.3 and the UTTR budget is discussed in Section 4.4. Finally, range use issues are discussed in Section 4.5.

4.1 LAND USE SETTING, GEOGRAPHIC AREAS, AND USERS OF UTTR

The lands adjacent to HAFR and WAFR have only limited economic resources and their attractions are not readily accessible to the public. The setting provided by these surrounding lands (Section 4.1.1), the geographic areas of the UTTR (Section 4.1.2), and the interrelationship of UTTR user groups (Section 4.1.3) are discussed below.

4.1.1 Land Use Setting

The lands surrounding HAFR and WAFR are owned by federal and state governments and by private individuals. They are used to a limited extent for commercial and residential purposes and for recreation, and are supported by a limited infrastructure.

4.1.1.1 Land Ownership

Federal lands surrounding HAFR and WAFR are managed primarily by DOD and BLM. A large block of land adjacent to the southern boundary of WAFR is managed by DOD as Dugway Proving Ground. Portions of Dugway's 801,000 acres are used by the Air Force on a share-use basis through an agreement with the Army. The land base of HAFR and WAFR is approximately 928,000 acres (HAFR—351,539 acres; WAFR—576,157 acres). WAFR shares approximately 30 miles (48 kilometers) of common boundary with Dugway. Together, these land areas comprise over 1,700,000 acres, while the air space of the UTTR occupies approximately 3,000,000 acres

(Myers et al. 1995). When these areas are used collectively, they provide a very large contiguous area with a variety of support facilities and resources available for military testing and training functions.

BLM lands in the vicinity of HAFR and WAFR are managed for multiple use, as directed under the Federal Land Policy and Management Act of 1976. These uses include livestock grazing, support of wildlife, dispersed and developed recreation, and mining.

Eleven parcels of federal land within Utah and within the vicinity of HAFR and WAFR have been identified as WSAs for potential inclusion in the National Wilderness Preservation System (BLM 1980, 1990a). These areas are within the West-Central Regional Study Group (BLM 1990b, U.S. Department of the Air Force and USDI 1990). As of March 15, 1996, the Utah Wilderness Bill was introduced into both houses of the U.S. Congress, was marked up in both houses, and was due out on the floor of the Senate for discussion (Kelsey 1996). Until this bill is passed (possibly in 1996) all 11 of these areas will remain WSAs, including the King Top WSA, which was not recommended for final wilderness status by the current bill. Of the 11 WSAs in the West-Central Region, the 50,500-acre Cedar Mountains area approximately 13 miles southeast of HAFR and 5 miles east of WAFR, the 52,500-acre Fish Springs area approximately 34 miles south of WAFR, and the 68,910-acre Deep Creek Mountains area approximately 18 miles south of WAFR are the closest to WAFR and are within the UTTR airspace (Figure 4.1-1) (BLM 1990b). The Swasey Mountain, Howell Peak, Conger Mountain, Notch Peak, King Top and Wah Wah Mountain WSAs are also all within the UTTR airspace. The closest WSAs in Nevada, the Goshute Mountains WSA and Bluebell WSA, are about 60 miles north of Ely in the Cherry Creek Mountain portion of the Egan Range, and less than 2 miles west of WAFR (BLM 1983, BLM 1988b). Other nearby areas, which were considered as WSAs but did not meet all the wilderness characteristics criteria, also exhibit many wilderness qualities. These areas include the Newfoundland Mountains, the North Salt Desert, Big Creek, Dry Canyon, Big Hollow, the Onaqui Mountains, north Cedar Mountains, the Silver Island Mountains, the Dugway Mountains, and areas partially in Nevada, such as Ferber Flat.

The State of Utah owns four sections of land (each is 1 square mile, or 640 acres) within most of the townships of public land (BLM) in west-central Utah (generally Sections 2, 16, 32, and 35). These sections are known as state school lands, and they are managed by the State for the benefit of the State's public schools. In general, these sections are offered, mostly through leases, for enterprises (e.g., mining, forestry) to generate income for the State's schools. While there were state school trust inholdings on HAFR and WAFR at one time, all of these inholdings have been acquired by DOD and there are currently no school trust inholdings within the ranges (Wilcox 1994). In addition, there are some state lands adjacent to the Great Salt Lake near the eastern boundary of HAFR.

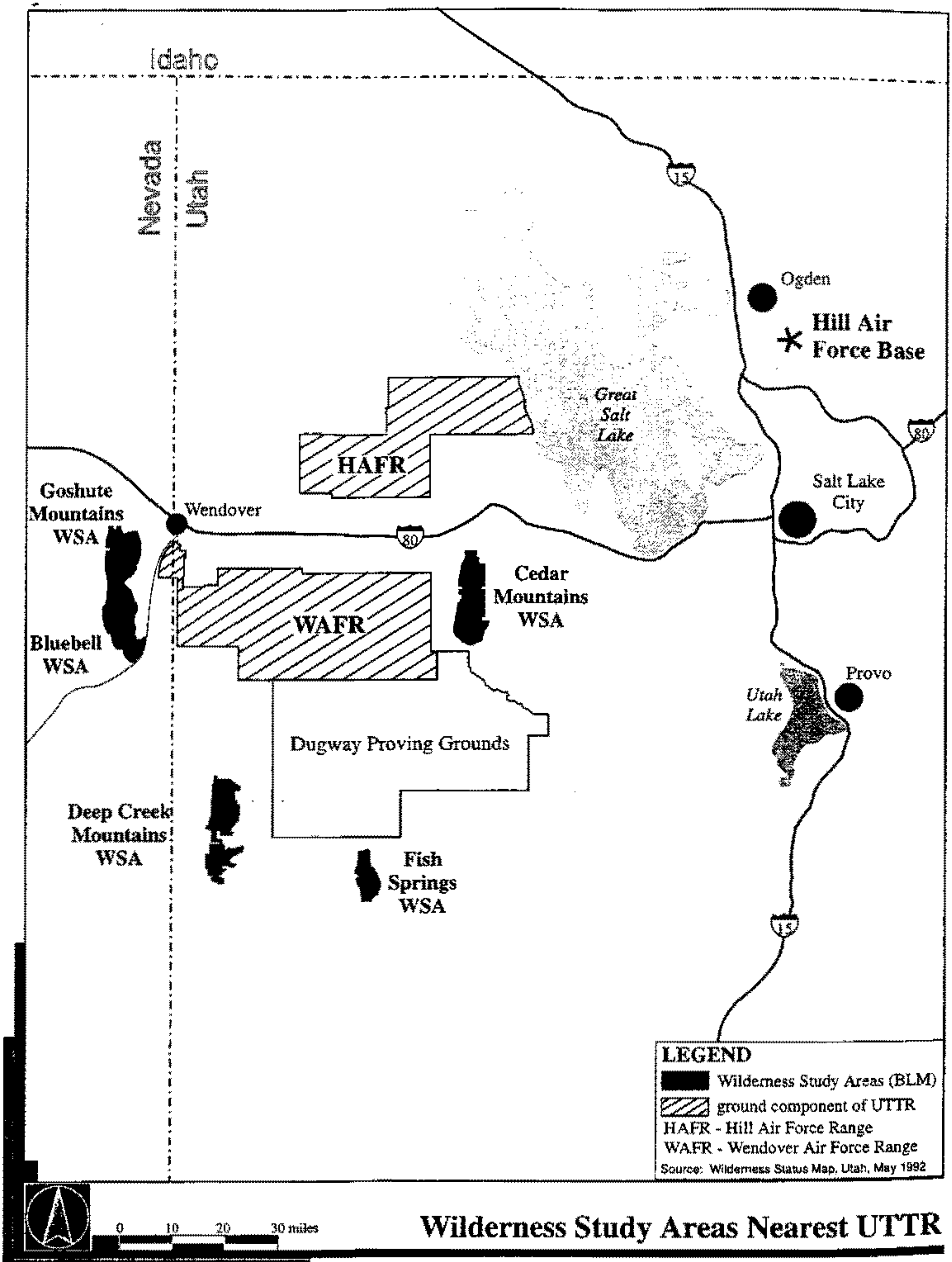
4.1.1.2 Land Uses

There is public access to the ranges in the immediate vicinity of Blue Lake at the western edge of WAFR and from a country road that traverses the eastern edge of HAFR. Near the ranges, there are some developed land uses and recreation land uses.

Developed Uses

In the immediate vicinity of HAFR and WAFR there is little industrial, commercial, or residential development. Some industrial uses on lands adjacent to the ranges include minerals extraction and processing, mining, landfills/waste incineration, and brine shrimp collection.

The companies involved in minerals extraction from the waters of the Great Salt Lake include AMAX and Morton. Facilities relating to these operations include processing plants, evaporation ponds, canals, and settling basins. Mining activity occurs just south of DOD lands, and areas of known mineralization are common (Section 3.2.5). Current operations include gold, silver, barite, fluorospar, and beryllium (SAIC and Wyle 1989). Solid waste landfill and waste incineration facilities owned by Laidlaw, the Aptus incinerator owned by Westinghouse, and Envirocare, a low-level nuclear waste landfill, are located between HAFR and WAFR along the I-80 corridor. There are currently no producing oil or gas fields or wells in the area (SAIC and Wyle 1989). A few test holes have been drilled, but exploration activity has been sporadic.



Wilderness Study Areas Nearest UTTR

Figure 4.1-1

The only significant commercial development in the immediate vicinity of HAFR and WAFR is at Wendover. Casinos, hotels and motels, service stations, stores, recreational vehicle camps, and related tourist facilities are found here. (Wendover is divided by the Utah-Nevada state line into Wendover, Utah (population: 1,127) and West Wendover, Nevada (population: 2,007). Gambling is allowed in West Wendover.) The city is mostly known for its casinos and entertainment, and much of the trade and economic activity here is related to gambling.

Other settlements in the area include a number of small communities near HAFR. Although official census estimates are unavailable, population estimates (Webster 1995) are as follows: Park Valley (200), Grouse Creek (175), Lin (10), Etna (15), Montello (200), Oasis (west of Wendover; 400–500). Near WAFR are Ibapah (100), the Goshute Indian Reservation (100), Gold Hill (12), Callao (50), Trout Creek (35), Partoun (200 on weekdays; 9 on weekends), Gandy (4), Pleasant Valley (also known as Uvada; 25), and Eskdale (utopian community; 300). Montgomery (1991) mentions a resident (one individual) who lives at Lakeside (approx. 9.6 km north of the TTU; this is a remote repair site for the railroad, and on any given night, there might be up to 20 railroad people staying there for the night (Webster 1995). Several ranches and agricultural and mining operations may be found near these small communities.

Recreation

Recreation on lands adjacent to and near the HAFR and WAFR boundaries is generally associated with the mountain ranges, springs, and seeps in the basin. The Deep Creek Mountain Range, administered by the BLM, has been developed as a recreational area and now offers primitive camping, trails, and off-road vehicle access for public use. The Knolls is a BLM recreational area along the north boundary of WAFR. Some encroachment of all-terrain vehicles from this area into the range occurs. There have been no major conflicts regarding the use of HAFR and WAFR for recreational activities because the ranges are remote, the nearby population is sparse, and there are large tracts of nearby land available for public access. Specific areas that are popular for outdoor recreation, such as the Blue Lake area (on the western edge of WAFR), have been separated out of the range boundaries and made available for public recreational activities. In general, however, HAFR and WAFR lands have been closed to public use for decades.

The Bonneville Salt Flats in Tooele County are also managed by the BLM. This area is internationally renowned as a speedway, and numerous land speed records have been set here. The Salt Flats are found approximately 9 miles southwest of HAFR (the race track extends even closer), and are accessed from Interstate Highway 80.

Hunting is a popular recreational activity in Utah, and the mountains near HAFR and WAFR, such as the Stansbury and Cedar Mountains, are used very often by hunters during hunting season (usually several weeks in October). In addition, the marshes, sloughs, and wetlands near the Great Salt Lake and the boundaries of HAFR offer opportunities to waterfowl hunters. Some upland game bird hunting may also occur near the outer fringes of the area, but this use is probably minimal.

Some livestock grazing occurs on adjacent BLM lands, and some roads on HAFR are used for access to these grazing allotments. No grazing, except for this limited-access use, is permitted within the range boundaries. According to the 1975 Preliminary RMP for the Ogden ALC Test Range (Ogden ALC Directorate of Operations 1975), these surrounding lands have little or no value for grazing (Section 3.4.2.1). However, cattle and sheep are grazed over much of the public land in the vicinity of HAFR and WAFR. The Draft EIS for Electronic Combat Test Capability (ECTC) - UTTR (SAIC and Wyle 1989) documents and describes the current grazing situation in the area just south and southwest of WAFR. AUM values for this area are provided in Table 3.4-3.

4.1.1.3 Infrastructure

The 1975 Preliminary RMP for the Ogden ALC Test Range describes the regional transportation hub in which the range complex is located. The Salt Lake City metropolitan area is the largest populated area in the region. Denver, Colorado, is about 500 miles east; Las Vegas, Nevada, is about 600 miles south, and Boise, Idaho, is nearly 400 miles northwest of HAFR and WAFR. The

Salt Lake International Airport is about 50 miles east (by air) from the eastern boundary of HAFR. Several transportation corridors are in the area, including two railroad corridors (the Southern Pacific Lucin Cutoff and Western Pacific) and I-80. The Southern Pacific Lucin Cutoff railway route approaches within 3 miles of the northern boundary of HAFR near the Lakeside Mountains. The Western Pacific railway right-of-way is about 6 miles north of and parallel to the northern boundary of WAFR. Several county roads afford public access to BLM lands and other areas in the west desert and the Great Salt Lake in the vicinity of HAFR and WAFR. In addition, U.S. Highway 93 near Wendover, Nevada, is near the western boundary of WAFR.

The main access route to both HAFR and WAFR is I-80. On HAFR and WAFR, improved access routes are generally utilitarian and associated with specific, frequent activities. Therefore, access is good in the eastern portion of HAFR where the Oasis compound, the nearby TTU and missile dissection labs, Eagle Range Complex, and test targets are located and where maintenance, construction, operations, or other such activities are almost constantly ongoing. Primarily access is provided by a county road that runs parallel to the west side of the Lakeside Mountains and across HAFR lands and connects to a network of improved roads that link facilities in this area (target areas, radio and communication facilities, administrative and operations facilities).

Elsewhere on the ranges, ground vehicular access is difficult because the area is isolated and undeveloped, the environment is harsh, and there has been a long-term policy of limiting public access. On the western side of HAFR, limited access for target maintenance activities is provided by a network of mostly unimproved roads. Access to WAFR is entirely by unimproved roads. From the north, access is via a county road parallel to and west of the Cedar Mountains. Once within the WAFR boundary, the Kittycat, Wildcat, and Sand Island Target Complexes are accessible. The Sand Island Target Complex is near the WAFR/Dugway boundary; although the Baseline Technical Manual places it on Dugway (Myers et al. 1995), WAFR maps show TS-2A and TS-4 on Air Force ground. Permanent gravel roads provide access to WAFR from the south through Dugway; a continuation of one of these roads through WAFR was completed in 1994. On the western side of WAFR, access is via Nevada State Highway 93A and then county roads through

BLM land to the WAFR boundary. Some of the county roads that pass through BLM lands in this area follow an abandoned railroad grade. Once within WAFR, the internal unimproved road system connects with roads within Dugway.

Much of the perimeter of HAFR and WAFR is fenced. While an unimproved road runs parallel to much of the fence line, locked gates on the roads that lead into the ranges prevent unauthorized entry.

Minimal information regarding the use of fuels/utilities by HAFR and WAFR is available. When the West Desert Pumps, found just north of HAFR, were built in 1987, a natural gas line was installed. Because of the proximity of this line to existing Oasis facilities, natural gas was provided to Oasis as well, and HAFR is in the process of converting some of their utility use at Oasis to natural gas. In addition, a generator station (that currently uses diesel fuel) is located on the west side of the WAFR/Dugway boundary road. It provides power to the Sand Island Target Complex, including TS-1, TS-2, TS-2A, and TS-4.

4.1.1.4 Regional Socioeconomics

While HAFR and WAFR are fairly isolated, on-site activities do affect the economies of nearby counties. The presence of Hill AFB and supporting facilities (including UTTR) has a dramatic socioeconomic effect on the Wasatch Front specifically, and on Utah as a whole (Cost and Information Team 1991). Because UTTR is an integral part of Hill AFB operations, a brief synopsis of the Hill AFB influence on the UTTR setting is provided here.

In 1990, Hill AFB was the largest employer in Utah, retaining approximately 5,000 military personnel and approximately 14,000 civilian personnel. The civilian workforce is primarily recruited from schools, colleges, and the general Wasatch Front population. The remainder are civil service or other civilian employees. The annual payroll generated by Hill AFB is estimated to be $602,149,511 and local contracts inject more than $1.5 billion into Utah's economy (Cost and

Information Team 1991). Table 4.1-1 shows how payroll levels have fluctuated between 1981 and 1990 (Cost and Information Team 1991).

These wages are distributed throughout the community through local purchases of goods and services, state and local tax revenues, and personal individual contributions of time, money, and resources to the community at large. Other economic effects include the presence of retirees in the community and the multistate regional service that Hill AFB facilities provide.

Many of the civilian and military personnel who spent all or part of their careers at Hill AFB retire in the area. Estimates in 1990 placed approximately 20,000 civilian and an additional 8,000 military retirees in Utah. About half of the military retirees are estimated to reside in the economic zone of Hill AFB; the remainder reside in various locations throughout the State. One of the attractions for military retirees is Hill AFB, which includes amenities such as a base exchange, commissary, clubs, medical facilities, and golf course (Cost and Information Team 1991). Another of the many services Hill AFB provides to military personnel, their dependents, and military retirees is health care through an on-base hospital. The service area for this hospital includes Utah and parts of Idaho, Nevada, and Wyoming. In 1990 there were 2,090 admissions, a 65 percent occupancy rate, approximately 22,000 emergency room visits, and more than 167,000 outpatient visits.

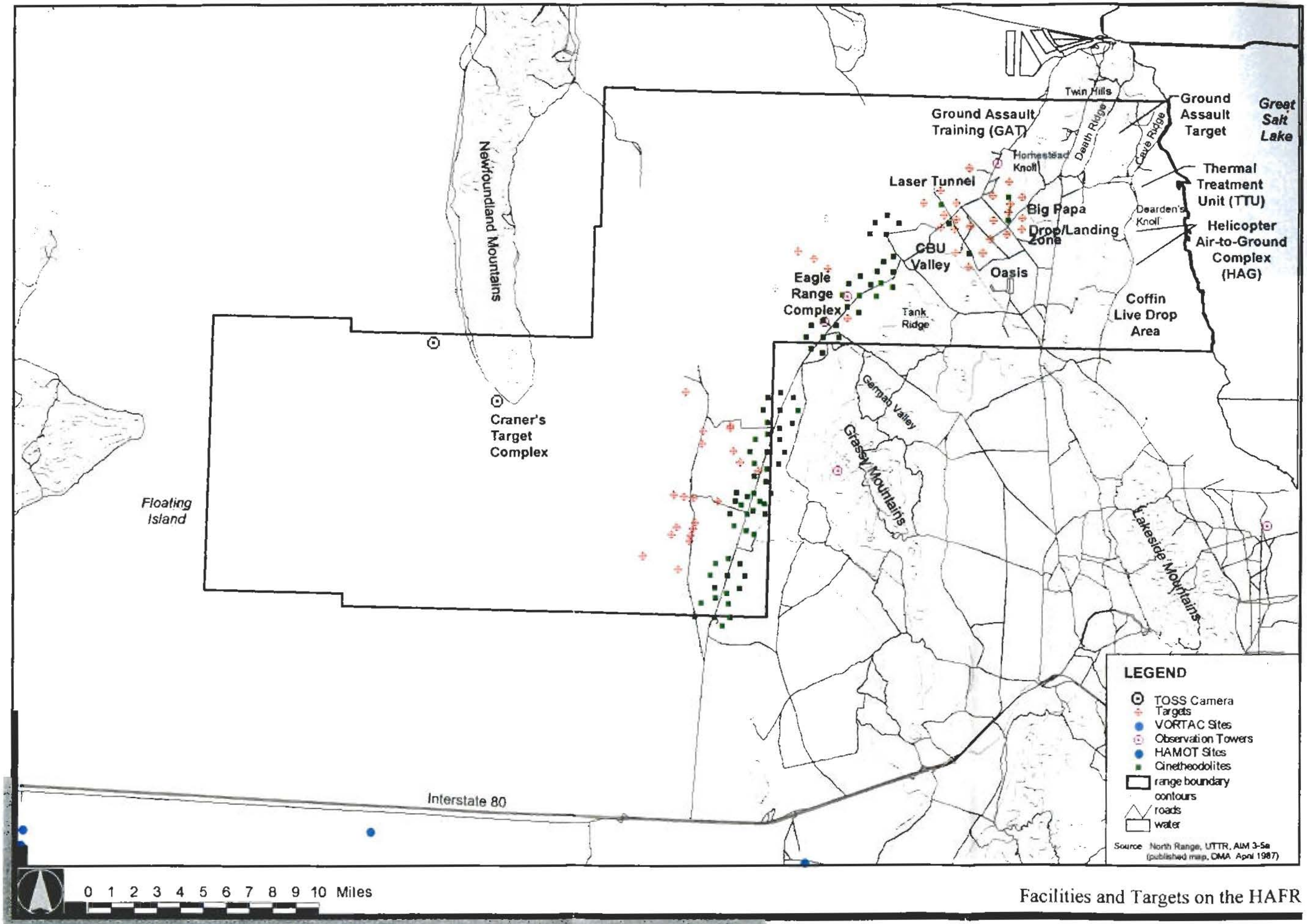
The Hill AFB runway is one of the busiest runway operations in the Air Force and is the busiest air traffic control tower in the Air Force Logistics Command (AFLC). Runway facilities there can serve almost every type of aircraft in the Air Force inventory (Cost and Information Team 1991). A substantial number of the planes using the Hill AFB runways are headed for UTTR, where in FY94 there were 22,388 aircraft flights tracked by the 501st RANS/RC (Smith 1995).

4.1.2 Geographic Areas of Range Use

The combined land base of the ranges is almost 1 million acres: 351,539 acres in HAFR and 576,157 acres in WAFR. The acreages noted only include DOD lands under Air Force management—they do not include adjacent government lands such as the 801,000 acres at Dugway. The airspace used for many of the operations at UTTR reaches well beyond the airspace immediately above HAFR and WAFR and includes several distinct elements, extending over adjacent DOD and non-DOD lands. Uses of the overall airspace are described in sufficient detail to provide a context in which the overall function of UTTR can be understood. Impacts from uses of the airspace extending horizontally beyond the boundaries of HAFR and WAFR are addressed only generally in this document when they differ from impacts from airspace uses directly above HAFR/WAFR.

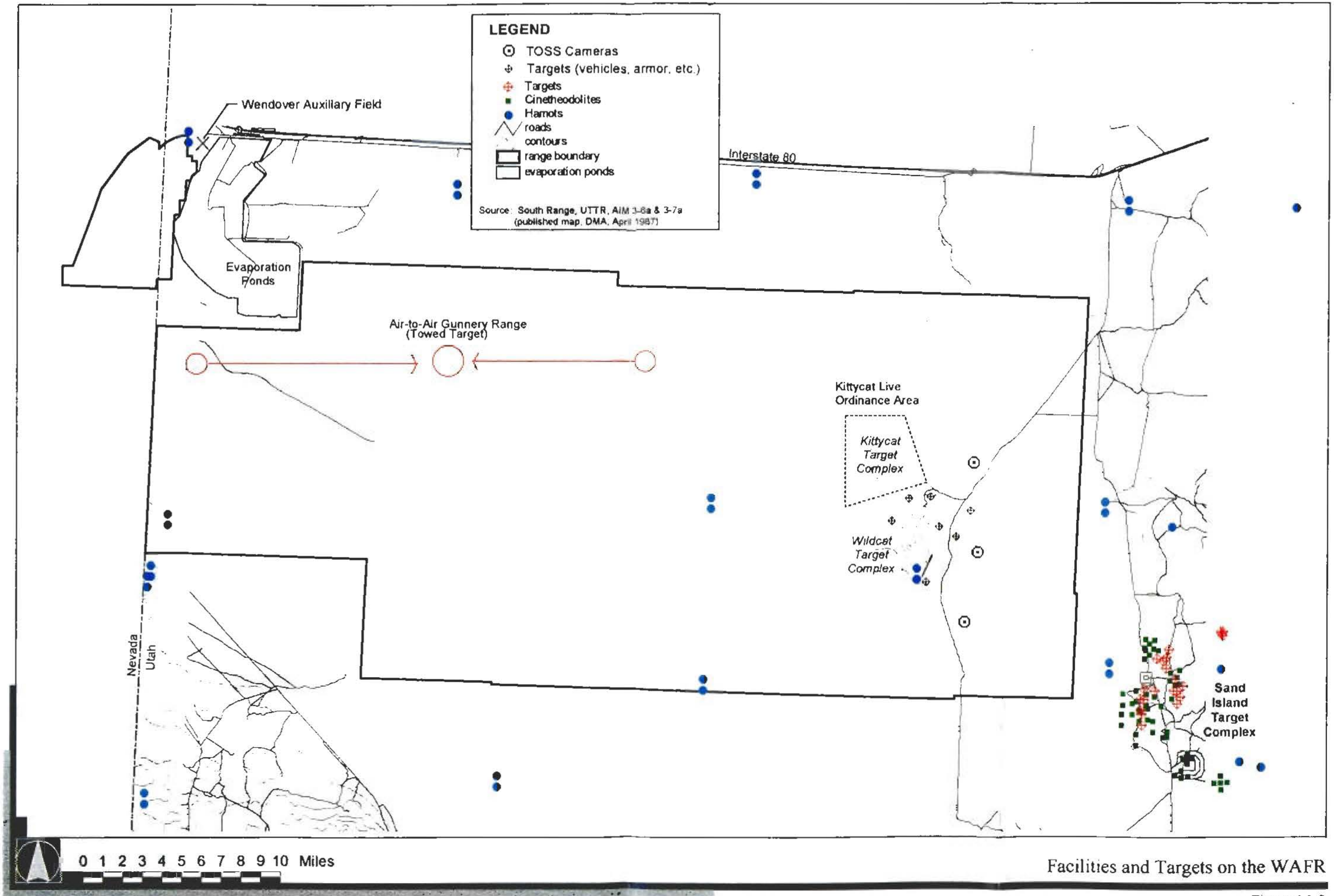
The majority of lands within the HAFR and WAFR boundaries are mud flats and sand dunes. Approximately 98 percent of the total land base in the ranges is unimproved. As shown in Figures 4.1-2 and 4.1-3, both HAFR and WAFR contain targets used for training and testing. Dugway contains targets for both types of uses as well. Most targets are clustered into formal target complexes, often in the vicinity of an isolated mountain range or its foothills. A few targets are in areas where they are inundated with brackish water at least part of the year. Only HAFR contains developed facilities such as buildings.

HAFR is roughly bordered by the Lakeside Mountains, the Grassy Mountains, the Great Salt Lake, the Newfoundland Evaporation Basin, Floating Island, the Silver Island Mountains, and Bonneville Salt Flats. The southern boundary of HAFR is approximately 7 miles north of and parallel to the I-80 corridor (Figure 1.0-1). HAFR contains administrative and test facilities/structures to support testing, training, and munitions disposal missions, as well as target areas that are generally divided into live and inert operating areas, with specific areas designated for specific uses. The administrative and test facilities/structures are generally clustered in the Oasis compound in the east-central portion of HAFR. The administrative facilities at Oasis include billeting, food services, communications, security offices, maintenance facilities, and other support services. An $8.9 million project to develop and construct a new dormitory, remodel and alter the existing office, dormitory and billeting facility, and improve the storm water, water, and waste water utilities should begin in late 1996 or early 1997 at Oasis (U.S. Department of the Air Force 1996a, Moroney



Facilities and Targets on the HAFR

Figure 4.1-2



Facilities and Targets on the WAFR

Figure 4.1-3

1996, Short 1996). The missile storage and test facilities are just northwest of Oasis. There are also permanently manned facilities at the Eagle Tower Complex that are in part associated with support of the target use, but also include a maintenance shop. Important training and testing areas on HAFR are discussed below in Sections 4.2.1.1 and 4.2.1.2.

WAFR includes lands west of the Cedar Mountains, north of Dugway, and generally east of the Utah-Nevada state line. This range is mostly salt flats, which are almost completely devoid of rocks, soil, or plant life. There are no permanently staffed facilities on WAFR. An irregularly shaped, contiguous property parcel is attached to the main WAFR property, immediately adjacent to Wendover and extending into Nevada. This parcel includes facilities that were historically part of Wendover Field, an installation that was extensively used during World War II, as well as Wendover Air Field, which was quit claim deeded to the City of Wendover in 1977 (Muller, Sirhall, and Associates 1991). The airfield has two runways and is still available for both military and commercial use; however, there are no repair or hangar facilities available. Important training and testing areas on WAFR are discussed below in Sections 4.2.1.1 and 4.2.1.2.

The airspace used by airplanes approaching the targets on HAFR and WAFR (and on Dugway), as well as by airplanes engaged in air-to-air maneuvers, extends considerably beyond the boundaries of the DOD lands (Figure 1.0-2). This airspace is subdivided into restricted area sectors (e.g., R6404A) and military operating area sectors (e.g., Sevier A). Within each of the restricted and military operating area sectors, a specific altitude structure is defined for aircraft operations (U.S. Department of the Air Force 1994b).

Further detail about these geographic areas of UTTR is provided in the discussion of specific range uses associated with them (Section 4.2).

4.1.3 Interrelationships of Range Users

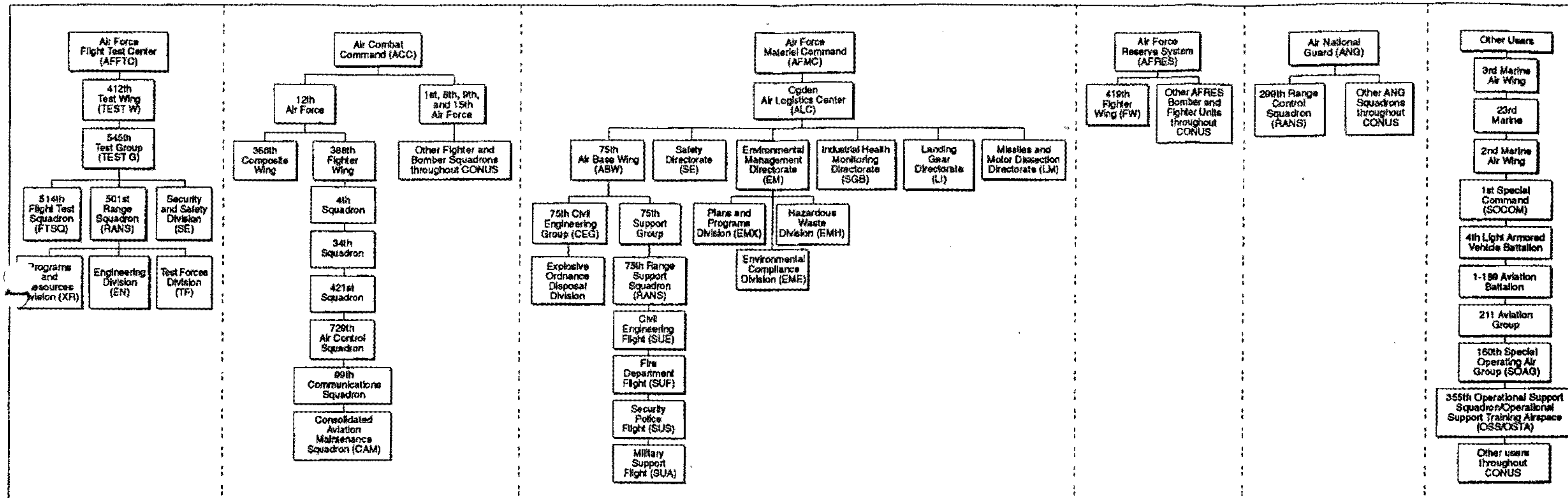
As noted in Section 1.0, the groups associated with UTTR are currently being reorganized. To allow this new organization time to settle in and definitize, the organization that was in place at the time data were being collected for this RMP/EA has been retained in this document, both here and in Section 1.0. Based on these January 1995 data, there are five primary groups associated with UTTR (Figure 4.1-4):

- The Air Force Flight Test Center (AFFTC)
- The Air Combat Command (ACC)
- The Air Force Materiel Command (AFMC)
- The Air Force Reserve System (AFRES)
- The Air National Guard (ANG)

The interrelationships and components of each of these groups are described below and illustrated in Figure 4.1-4. Group functions are discussed below as well. The reporting affiliations of these groups may change depending on the task in which they are engaged. For example, to perform quick force exercises, a number of the groups mentioned here may temporarily report to the U.S. Central Air Force Command (CENTAF), which may coordinate large Composite Force Training (CFT) missions.

In comparing this document with previous documents addressing users of the UTTR and Hill AFB, it should be noted that the names of the various groups, squadrons, and offices change rapidly. For example, in 1990 many of the numeric designations of user and support groups had an initial "6" as part of their number. Thus the 514th Test Squadron was 6514 TESTS, the 501st Range Squadron was 6501 RANGES, the 545th TESTG was 6545 Test Group (Air Force 1990).

Under the current status of the reorganization, the 545th TESTG and all its components have been dissolved. Personnel remaining from the 501st RANS, SE, XR, EN, and TF Divisions are now collectively DET 1. DET 1, based at Hill AFB, reports to the 412th Test Wing (TW) based at Edwards AFB, as the 545th previously did (Webster 1996). By October 1997, DET 1 will report to the 388th FW to implement the recommendation of the 1995 Base Realignment and Closure (BRAC) Commission (Inguaggiato 1996). The 514th FTSQ, which also previously reported to the 545th TESTG, has been dissolved as well, and its remaining personnel who are associated with UTTR now report to LI, a component of Ogden ALC (Webster 1996). The current (August 1996)

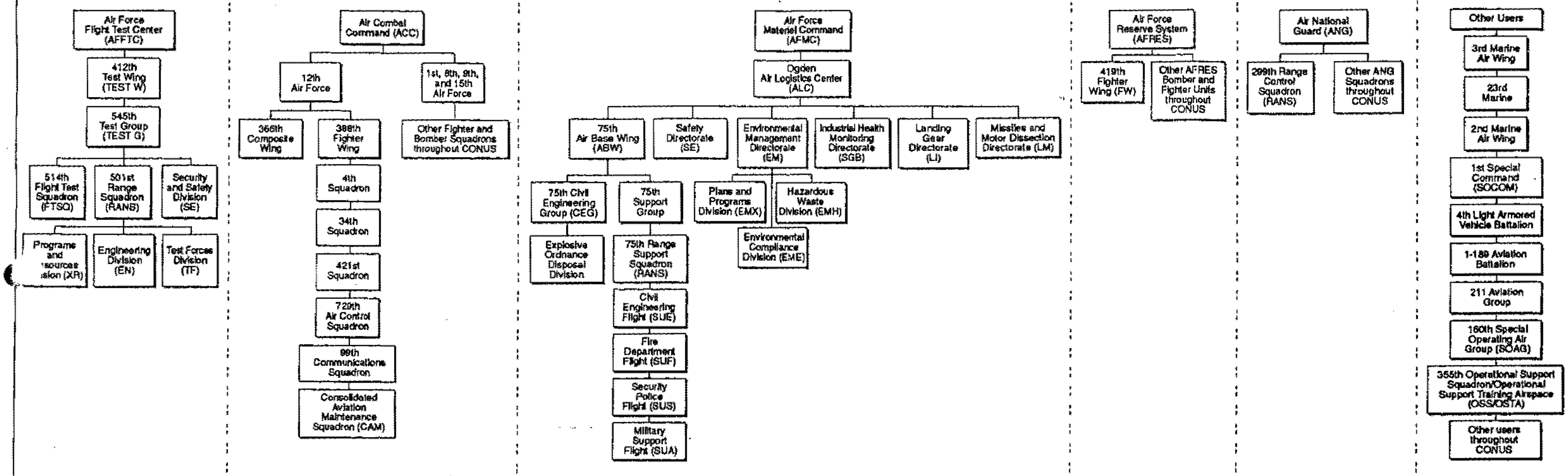


Prepared for:
Hill Air Force Base
Environmental Management Division

Prepared by:
Foster Wheeler Environmental Corporation

Figure 4.1-4

Interrelationships of UTTR Range Users — January 1995



Prepared for:
Hill Air Force Base
Environmental Management Division

Prepared by:
Foster Wheeler Environmental Corporation

Figure 4.1-5

Interrelationships of UTTR Range Users — August 1996 organizational structure is illustrated in Figure 4.1-5. The changes between January 1995 and August 1996 can be seen by comparing Figures 4.1-4 and 4.1-5.

Despite all these changes, the responsibilities and functions of these groups has remained much the same. In this document, all references to organizational structure, unless quoted from prior documents, reflect January 1995 designations as they are understood.

4.1.3.1 545th Test Group

The AFFTC, which is based at Edwards AFB, California, is represented at Hill AFB by the 545th TESTG, which is composed of the 501st Range Squadron, the 514th FTSQ, and several support divisions. (Note that these groups have recently been dissolved and their remaining personnel are now collectively DET 1, based at Hill AFB and reporting to the 412th TW as the 545th TESTG previously did.) The mission of the 545th TESTG is to manage UTTR for the testing and evaluation of aircraft, cruise missiles, munitions, and to a minimal extent UAVs, in partnership with customers (range users not assigned to UTTR), and to provide customized test and training services and facilities to enhance combat readiness, superiority, and sustainability. UTTR airspace is consolidated under the single authority of the 545th TESTG, which therefore controls the airspace over lands owned by Ogden ALC (beneath R6404 and R6406), Dugway (beneath R6402 and R6407), U.S. Fish and Wildlife Service (USFWS), four BLM District Offices, the USFWS, an Indian reservation, private individuals and two railroads. Further, the land owned by Hill AFB (HAFR and WAFR) by support agreement is all operated by the 545th TESTG except for Oasis and the TTU. The 545th TESTG is responsible for safety, security and providing a commander. It manages a full-time technical security staff. Except at Oasis and the TTU, the Safety Office (545th TESTG/SE) plans all aspects of UTTR test and training exercises and performs any post-accident investigations. The 545th TESTG also oversees and coordinates the work of the 501st RANS and the 514th FTSQ. Prior to a recent reorganization, many of the support divisions now reporting to the 501st RANS reported directly to the 545th TESTG.

The 501 RANS is responsible for UTTR airspace and management and for scheduling UTTR assets. The 501 RANS ensures that UTTR ground and airspace is used safely, responsibly, and efficiently and provides support for testing weapon systems and training operational air crews and other combat units on UTTR. The unit is responsible for all operations and maintenance of instrumentation and support systems on UTTR. Specifically, the responsibilities of the 501 RANS include the following:

- Operation and maintenance of the HAMOTS (High Accuracy Multiple Object Tracking System) ground stations and ACMI (Air Combat Maneuvering Instrumentation) ground systems
- Operation and maintenance of tracking photography equipment (cinetheodolite and cinesextant units)
- Operation and maintenance of field and other support vehicles
- Assistance to EOD personnel in the safe removal of hung ordnance (i.e., ordnance that failed to release)
- Scheduling and monitoring of flight activities
- Film and video acquisition of mission data
- Range support and safety support for all UTTR aircraft operations (although this safety responsibility may be passed on to the customer's responsible safety officer or Ogden ALC safety officer)
- Collection, analysis, and processing of telemetry and time-space-position information (TSPI) for test programs at UTTR
- Airspace management

In addition, in a recent organization, a number of support divisions that were originally directly under the 545th TESTG are now under the 501st (i.e., XR, EN, TF). The Engineering Division (501 RANS/EN) provides engineering services for the test and evaluation of manned aircraft, UAVs, and munitions. This division also manages the improvement and modernization program for UTTR and is subdivided into two branches—Test Engineering and Acquisition. Projects are managed by the TF Division, which coordinates all of the group's resources. The SE Division was retained by the 545th TESTG in the recent reorganization. The XR Division assists new customers and is responsible for many planning, documentation, and other administrative functions needed by the 545th TESTG.

The responsibilities of the 514th FTSQ include support for a variety of manned missions. Their traditional, and historically primary, role was to provide support for testing of UAVs, but this is no longer done at UTTR. The specific responsibilities of the 514 FTSQ include the following:

- Maintenance and operation of a variety of aircraft
- Safety and photo chase during missions
- Radar evaluation and low altitude mapping
- Aircraft maintenance
- Equipment and personnel transport in support of field and remote site maintenance operations

More detailed information on units within the 545th TESTG may be found in several sources, including the 1990 "EA of 6545th Test Group Operations and Facilities on US Army Dugway Proving Ground (U.S. Department of the Air Force 1990) and the "545th Guide to Capabilities" (U.S. Department of the Air Force 1994a).

4.1.3.2 Air Combat Command

The ACC components using the range are both fighter and bomber units. The fighter units that use UTTR most frequently are components of the 12th Air Force, the 388th FW, which is based at Hill AFB, and the 366th CW, which is based at Mountain Home AFB, Idaho. The 388 FW is composed of a number of squadrons: the 4th, 34th, and 421st Squadrons (SQ), as well as the 729th Air Control Squadron and the Consolidated Aviation Maintenance (CAM) Squadron. The 99th Communications Squadron (COMSQ) is a mobile unit independently stationed at UTTR with the sole function of operating the Multiple Utility Tracking Electronic System (MUTES) and Tactical Radar Acquisition Intercept System (TRAINS), which provide programmed threat scenarios that simulate enemy radar and evaluate airborne and ground electronic warfare equipment emissions, respectively. Numerous other ACC fighter and bomber units, components of the 1st, 8th, 9th, and 15th Air Force and from a variety of bases in the CONUS, are also UTTR customers. The ACC fighter pilot groups train using the targets on HAFR and WAFR and the airspace above and beyond them. Training exercises for these two fighter units may be performed separately or jointly, or in combination with AFRES fighter squadrons.

4.1.3.3 Air Force Materiel Command

The AFMC is represented in Utah by Ogden ALC (OO ALC), to which the 75th Air Base Wing (75th ABW) is responsible for the operation of Hill AFB and a number of directorates report. Under the 75th ABW are several groups, each with responsibility for specific components of Hill AFB resources and personnel. The 75th Civil Engineering Group (75th CEG) and the 75th Support Group are two groups with UTTR responsibilities. Other groups, such as the 75th Medical, are not directly relevant to UTTR operations. The 75th CEG manages civil engineering functions on the main base, but the EOD Division, a component of the 75th CEG, is responsible for clearing of targets and munitions disposal at UTTR.

Civil engineering at UTTR is the responsibility of a flight under the command of the 75th Support Group, which is also under the command of the 75th ABW. The 75th Support Group commands seven squadrons, including Hill AFB security police, Hill AFB civilian personnel, and the 75th RANS. The 75th RANS is responsible for infrastructure support at UTTR. The 75th RANS provides BOS that directly impacts mission accomplishment and quality of life for all range personnel and the variety of range users. The 75th RANS is the real property manager for all UTTR Air Force-owned property. However, the support agreement between the 545th TESTG and Hill AFB transfers much of this operational control to the 545th TESTG, with the 75th RANS retaining direct responsibility for all UTTR property and operational control of Oasis and the TTU. The 75th RANS is responsible for customer requirements involving any UTTR property (security, fire protection, civil engineering, and safety activities). With regard to health and safety, the 75th RANS is responsible for safety at Oasis and the TTU, while safety of aircraft and at targets is the responsibility of the 545th TESTG. Thus, to some extent, the support capabilities of the 75th RANS overlap with those of the 545th TESTG support divisions.

There are four flights under the command of the 75th RANS. Their responsibilities are to provide civil engineering (flight SUE), fire department (flight SUF), security police (flight SUS), and military support (flight SUA). The civil engineering flight handles civil engineering tasks specifically at UTTR. The fire department and security police are responsible for fires, crashes, accidents, and security of the UTTR. The military support flight is responsible for billeting, fuels, munitions, personnel, administrative and medical support to customers.

The Ogden ALC directorates associated with UTTR are responsible for testing (LI and LM), safety and health oversight (SE and SGB), and environmental compliance (EM). LI tests munitions infrequently, but periodically, on UTTR. LM performs tests on missile motors including sustainability tests, propagation tests, static firings, and dissection. SE reviews safety procedures for all operations at UTTR and also coordinates and has oversight of all others with responsibility for safety at UTTR, including 545th TESTG and customer safety personnel. SGB is responsible for monitoring industrial health of UTTR personnel that perform these and other tests and for compliance with Occupational Safety and Health Act (OSHA) standards. EM is a directorate based at Hill AFB, but has three divisions that have responsibilities at UTTR: Plans and Programs (EMX), Environmental Compliance (EME), and Hazardous Waste (EMH). EMX is responsible for the 5-year budget plan, the oversight of funds for environmental programs (except for DERA funds which are for Comprehensive Environmental Response, Compensation and Liability Act [CERCLA] sites), the management of natural and cultural resources, and for NEPA compliance. EME is responsible for permitting with the State, interaction with EPA, Title V air quality permits, asbestos and TTU permits, compliance with clean water standards, and for range liaison. EMH is responsible for the tracking, permitting, and disposal of hazardous waste.

4.1.3.4 Air Force Reserve System

The primary AFRES user is the 419th FW based at Hill AFB. Other AFRES bomber and fighter units in the CONUS deploy to use the UTTR.

4.1.3.5 Air National Guard

The ANG is permanently represented at UTTR by the 299th RCS. The 299th RCS, also known as "Clover Control," is a Utah Air National Guard unit responsible for managing air traffic and weapons control on UTTR and is the air traffic control authority for UTTR and surrounding area. The 299th RCS also provides radar control, emergency assistance, and coordination with the civilian air traffic control services in the vicinity of UTTR. They were the first military radar unit certified to control civilian air traffic in civilian airspace. Other ANG units are users of the UTTR for training.

4.1.3.6 Other Users of the UTTR

Other users of the UTTR may be categorized as "customers" and use the ranges more or less infrequently. Some of the regular users include the following:

- 3rd Marine Air Wing
- 23rd Marine
- 2nd Marine Air Wing
- 1st Special Command (SOCOM)
- 4th Light Armored Vehicle Battalion
- 1-189 Aviation Battalion
- 211 Aviation Group
- 160th Special Operating Air Group (SOAG) USA, Fort Campbell, Kentucky
- 355th Operational Support Squadron/Operational Support Training Airspace (OSS/OSTA)

Other users of the ranges in fiscal year 1994 included the following: 24 air refueling (AR) groups, 2 air refueling wings (ARW), 1 air refueling squadron (ARS), 2 air groups (AG), 2 air squadrons, (AS), 1 air utility helicopter group (AU), 1 air wing (AW), 17 bomber wings (BW, BMW), 5 bomber squadrons (BS, BMS), 5 carrier air groups (CAG; Navy probably, Marines possibly), 1 carrier Navy weapons group (CVW), 1 electronics communications squadron (ECS), 12 fighter squadrons (FS), 7 fighter groups (FG), 17 fighter wings (FW), 1 ground test by the LA Directorate ([LA] office symbol), 4 Marine air groups (MAG), 5 combined Marine/Navy groups (VM), 1 Navy experimental group (VX), 24 navy attack squadrons involved in air to ground interactions (AV, VA), 16 Navy fighter squadrons involved in air to air interactions (VF), 7 Navy attack/fighter squadrons (VAF, VFA), 1 operational squadron (OS), 1 range squadron (RS), 1 special squadron (SS), 2 special operations squads (SOS), 1 special operations wing (SOW), 1 special force (SF), 1 special test squadron (STS), 3 test squadron (TS), and 1 test and evaluation group (TE), as well as personnel from Dugway (DUG), the Federal Aviation Administration (FAA), TV channel 5 (KSL), the National Aeronautics and Space Administration (NASA), the Texas Air National Guard (TANG), the U.S. Department of Agriculture (USDA), and Utah State University (USU).

4.2 USES OF THE RANGE

Past and present uses of UTTR (Section 4.2.1) and future uses of UTTR (Section 4.2.2) are discussed below. The information presented was collected by reviewing a large number of published documents, interviewing numerous Air Force and civilian personnel at Hill AFB and Oasis, and reviewing partially and fully completed questionnaires and other materials provided by UTTR personnel. Each of these sources is cited in association with the information they provided. A summary of the interviews and questionnaires is provided in Appendix A.

4.2.1 Past and Present Uses

Past and present uses on UTTR fall in three major classifications—training exercises, test functions, and range maintenance. Targets and other resources on HAFR and WAFR are generally dedicated to either training or testing, and only certain uses are allowed or possible within these classifications. For example, live munitions are allowed only in very specific areas, and other limitations (e.g., size, types, methods of deployment) are noted for other areas. Also, instrumentation, cameras, and other infrastructure are available at some sites and not at others.

The types of uses vary considerably in the support and infrastructure that they require. For example, several training activities may take place concurrently in UTTR, each using separate areas or different levels of the airspace. Test functions, in contrast, may sometimes require the land resources and airspace of the entire UTTR for the duration of the test. Another difference between test and training activities is seasonality. For example, training missions are regularly scheduled throughout the year, while most of the testing is scheduled between March and September. There is virtually no TTU activity between December and February (Graziano 1994). These kinds of differences are highlighted in detail in the following sections.

The range capacity study for the UTTR (SAIC 1993a, 1993b) notes that historical use and schedule trends are maintained by the 501 RANS. In their report, SAIC (1993a) reviewed 1992 figures and estimated that testing and training each account for roughly 30 percent of the hours scheduled on the range (Tables 4.2-1 through 4.2-3). The remaining 40 percent of the hours scheduled are used for all other activities, including functional flight checks and range maintenance. However, training actually uses about twice as much total time on the UTTR as testing because a test that will take only 1 day is often scheduled for many days to allow for flexibility when weather conditions are poor (Maquet 1994). Since only 1 day of the scheduled test time is expected to be used, training groups may schedule backup times to avoid going elsewhere (Maquet 1994).

Tests may also require the use of the entirety of UTTR in order to ensure a large safety footprint, thus preventing any other users from scheduling activities on any part of the range during the period of the test. In contrast, training functions in one part of the UTTR do not necessarily preclude other uses in other areas of the range (Maquet 1994).

For both training and testing exercises, one of the primary advantages of the UTTR is the size of the airspace complex above and surrounding the land boundaries. This size contributes greatly to the utility of UTTR for missions that require a large safety footprint. The airspace is classified as either restricted airspace where only military aircraft may fly or MOAs where nonmilitary use is carefully monitored and controlled. A restricted area is airspace designated under federal air regulations within which the flight of aircraft is subject to restriction; it may be designated as joint-use, and may be used by others by permission of the controlling air traffic control facility when it is not being used by the authorized agency. A MOA is an airspace of defined vertical and lateral dimensions established outside positive control areas (like restricted areas) to separate/segregate certain military activities from commercial air traffic operating under instrument flight rules (IFR) or visual flight rules (VFR). The UTTR restricted airspace lies over about 7,958 square miles and the MOAs cover an additional 8,693 square miles, for a total of 16,651 square miles.

Airspace must be viewed in three dimensions. This three-dimensional airspace is controlled by DOD (AFFTC Regulation, 1 March 1994; SAIC 1993b). As shown in Figure 1.0-2, both the restricted area and the MOAs are subdivided horizontally into areas of use:

- UTTR-N
  - Restricted Area
    - R-6404A, B, C
  - MOAs
    - Lucin A
    - Lucin B
- UTTR-S
  - Restricted Area
    - R6402
    - R6405
    - R6406A, B
  - MOAs
    - Sevier A, B
    - Gandy
- Lucin C MOA (a corridor between UTTR-N and UTTR-S)

The restricted area of the UTTR airspace complex is also divided vertically into high- and low-altitude sectors. The high-altitude sectors are numbered subdivisions of the restricted airspace (HAFR, Sectors 3 and 4; WAFR, Sectors 2, 5, 6, and 7). High altitude sectors are primarily defined from 10,000 feet MSL to 58,000 feet MSL. The low-altitude sectors are lettered subdivisions of the restricted airspace (HAFR, C, E–H, K, N, Q, and S; WAFR, B, L, M, R, and W). Low-altitude sectors are primarily defined as 100 to 9,000 feet MSL except above DOD land where they start at the ground surface (Figure 1.0-2).

The airspace ceiling is considerably lower in MOAs than in restricted areas. For example, in NUTTR, the Lucin A MOA is restricted to airspace at or below 9,000 feet MSL and the Lucin B MOA is restricted to airspace at or below 7,500 feet MSL; the lowest ground level in NUTTR is at 4,200 feet MSL, while the highest peaks exceed 9,000 feet MSL, which limits aircraft maneuvers. There is a current proposal to increase the ceiling in both Lucin A and B MOAs to 18,000 feet MSL and incorporate the R6404C restricted area into the Lucin A MOA. This would provide more flexibility in flight maneuvers in NUTTR, which is closer to Hill AFB and is used less frequently for test missions; reduce travel time, fuel consumption, and aircraft exhaust pollutant concentrations below the atmospheric mixing layer; and also reduce overall noise levels because the aircraft will be further from ground-level listeners. It would not increase the number of sorties but would increase the sorties in NUTTR by about 50 percent with a corresponding reduction in SUTTR activity and would relinquish the restricted status of R6404C (Parsons, Engineering Science, Inc. 1995a).

4.2.1.1 Training

Training uses of the range may be generally classified based on the land and/or air resources they require. Training missions simulate actual conflict missions where air crews and ground troops are able to conduct operations against targets and simulated aggressors using the same ordnance and weapons systems that would be available to them in wartime.

The subdivision of the airspace and the ground of HAFR and WAFR facilitate their use by multiple training exercises or by a single training exercise involving numerous components. Within each of the restricted and MOA sectors, a specific altitude structure is defined for aircraft operations (U.S. Department of the Air Force 1994b). As a result of the various airspace subdivisions, the NUTTR is divided into 12 sectors, 1 corridor and air traffic control (ATC) airspace and SUTTR is divided into 12 sectors, 1 corridor, an ATC transition area, and the Wendover Shelf. When DOD does not own the land below the airspace, their flights and other activities cannot extend below 100 feet (Webster 1995). These horizontal and vertical subdivisions of airspace do not constrain aircraft, but permit scheduling and use of different parts of the range at the same time. The boundaries coincide with natural terrain features when possible, with the altitude restrictions serving to provide an even "floor" to separate air-to-air and air-to-ground missions (U.S. Department of the Air Force 1994b). In addition to the definition of sectors within the airspace, there is an air-to-air gunnery area located on the SUTTR in Sectors 3 and L and primarily used by tactical aircraft conducting air-to-air gunnery training against tow targets.

For use of this airspace, there are specified responsibilities, range scheduling procedures, range use procedures and restrictions, and range safety protocols (U.S. Department of the Air Force 1994b) that address such topics as the following:

- Preliminary and revised scheduling procedures, deadlines, and scheduling status
- Preferred range entry and departure routes
- Information, frequencies, and ATC sectors for communication with air traffic control
- Air crew communications and interactions
- Restrictions from any use of hot airspace, any weapons delivery in closed areas, and relative to flight profiles of unmanned aerospace vehicles
- Free use (within target restrictions) of cold areas
- Safe flight distances from EOD ground parties and other armed and unarmed aircraft
- Hung ordnance recovery
- Supersonic flight
- Responsibilities, monitoring, waiver procedure, and reporting requirements for range safety
- Specifications regarding approach to delayed fuse munitions and lasers

On the ground at HAFR and WAFR are a number of well defined targets that are described by several documents and publications, including especially the "UTTR Training Pamphlet, 545 TGP 55-18" (U.S. Department of the Air Force 1995) and the "545th Test Group Guide to Capabilities" (U.S. Department of the Air Force 1994a). These documents list, describe, and precisely define the training target complexes that are identified in Table 4.2-4. Figures 4.1-2 and 4.1-3 show the general location of these areas. The more important of these training target complexes in HAFR and WAFR are described below.

HAFR training areas include especially the following:

- The Eagle Range Complex is a manned, scored air-to-ground gunnery range near the northwest corner of Grassy Mountain. It is a series of scorable air-to-ground targets including two bomb circles, four strafing targets, two rectangular skip targets, two applied-tactics targets, one "Smokey" target and Targets 15, 16, 17, and 18. These areas are variously authorized for use of test product (TP) rockets, TP and other strafe munitions, flares, special protective cluster (SP) chaff, and heavy-case inert bombs. No high explosives (HE) munitions are allowed at Eagle. In support of its scoring capability, there are two observation towers positioned at a right angle to each other and a main Eagle Tower. Scoring is accomplished by using spotters and/or cameras, as well as a recently installed Television Ordnance Scoring System (TOSS) system. Potential cutbacks in staff at Eagle Range Complex (Winn 1995) may result in greater reliance on electronic scoring.
- The HAG is an unmanned air-to-ground range authorized as an HE and inert-training ordnance drop zone. An area known as the "Coffin Area" is at the southern end of the HAG, and a number of tactical targets, such as tanks, tracked howitzers, and other vehicles, are found there. The Coffin Area is the only UTTR area authorized for live heavy-case HE bombs.
- Craner's Target Complex is just south of the Newfoundland Mountains and is an unmanned scorable air-to-ground complex of six target areas that simulate earthen revetted areas with gun positions, a factory complex, a surface-to-air missile (SAM) site, a vehicular convoy, an airstrip with small aircraft and a helicopter, and a convoy of two cargo haulers and two fuel trucks. At Craner's, various areas are authorized for TP ordnance, heavy-case training ordnance, and SP flares (but not illumination flares). Sorties at Craner's can be scored by TOSS.
- The ground assault target (GAT) is near the shore of the Great Salt Lake at the north end of the Lakeside Mountains and borders the HAG on the north. It is used for ground troops in developing their assault capabilities, and is authorized for ground personnel and small arms firing/impact only up to and including 50-caliber ball ammunitions. The area cannot be used for air-to-ground ordnance delivery/impact and has restrictions as to coordinated use with the HAG, the TTU, and overflying aircraft. Larger weapons may be fired from this area into the HAG. There is an assault landing strip about 5 miles away (near Target 22) that may be used for exercises into the GAT.
- The Drop/Landing Zones associated with Target 22 allow personal parachute drops and low-altitude parachute extraction system use and allow use of the target for assault landing training, respectively. Each of these targets has very particular specifications as to when they can be used, the type of weapons that can be used and the way they can be delivered via straffing or bombing and the coordination, procedures, and restrictions to be followed as part of their use. These specifications are very well explained in the "UTTR Training Pamphlet, 545 TGP 55-18" (U.S. Department of the Air Force 1995).

WAFR training areas include especially the following:

- The Wildcat Target Complex has multiple targets (an airfield, train, convoy, headquarters/command post, artillery installations [SA-2, 155mm antiaircraft artillery], storage area, industrial complex, simulated transportation infrastructure [rail yards, road bridges], assault strip and motor park) strategically scattered around Wildcat Mountain. These targets are TOSS scorable and can be used for all training/inert bombs (with size restrictions for specific targets), TP strafe, inert laser-guided bombs (LGBs), and inert Rockeye (in restricted locations). Delivery of HE ordnance is not allowed here.
- The Kittycat Target Complex is 3 miles northwest of Wildcat Mountain, with TOSS scorable targets located south, southeast, and north of the mountain. HE ordnance is allowed, but only point detonating/impact fusing is authorized. A line of reflectors separates the Wildcat area, where only inert munitions are used, from Kittycat, where live munitions (except live cluster bomb unit [CBU] munitions) can be used. Live munitions include air-to-ground munitions (AGM-65), HE/TP Strafe, and live heavy-case bombs/ LGBs (on restricted targets).
- The Air-to-Air Gunnery range is northwest of the Kittycat/Wildcat area. This area is used for training crews conducting air-to-air gunnery missions against towed targets. Live ammunition is used, and caution is exercised to ensure that no munitions leave the gunnery range area.

In addition to the above target areas described by the "UTTR Training Pamphlet 545 TGP 55-18" (U.S. Department of the Air Force 1995), and the "545 Test Group Guide to Capabilities" (U.S. Department of the Air Force 1994a), the 545th EA for Dugway Proving Grounds Operations (U.S. Department of the Air Force 1990) discusses training activities for air crews to recover or retrieve UAVs in support of testing activities. In these exercises, dummy vehicles (DVs) are dropped from a C-130 aircraft at an altitude of 13,000 to 15,000 feet MSL, and a parachute deploys on the DV. As the DV falls to around 10,000 feet, a helicopter crew recovers it using special equipment on board the helicopter. If the crew misses, a tracked vehicle retrieves the DV and parachute on the ground.

Training resources beyond HAFR and WAFR are available to users of the UTTR at Dugway. Of particular importance at Dugway are the laser target at Baker Strongpoint, the Sand Island Target Complex, WS166, and TS-3. A user of the UTTR may take advantage of targets and target complexes throughout these DOD lands. The instrumentation and facilities available at Dugway

(Ogden ALC 1975; U.S. Department of the Air Force 1994a, 1994b, 1995; Computer Sciences Corporation 1990; and Myers et al. 1995) are well integrated with those on HAFR and WAFR.

The following types of training missions are common at the UTTR:

- Air to ground
- Air to air
- Ground troop

These types of training missions may each be conducted independently. The general percentages of these types of training missions on UTTR are 50 percent simulated air-to-air training and 50 percent live air-to-ground training (Maquet 1994). A typical F-16 squadron flies 60 percent air-to-ground and 40 percent air-to-air missions, while F15Cs fly 100 percent air-to-air missions. An exercise is live when something physically comes off an airplane. About 80 percent of the live exercises use a practice bomb with a spotting charge, 10 percent use an inert full-weight 500- to 2000-pound bomb, and about 10 percent use live C4 munitions such as the Mark 82 and Mark 84 (Maquet 1995, Webster 1995). Live munitions are used about twice a year and exclusively in the Kittycat and HAG Coffin areas. The other 50 percent of the air-to-air training exercises rely on electronic simulation. Missions involving solely ground troops are infrequent (Webster 1995). At times, complex missions may involve two or more types of training (e.g., air-to-ground, air-to-air, and ground troop activities occurring simultaneously).

Air-to-Ground Training

Air-to-ground training involves bombers and/or fighters carrying weapons systems and land-based targets at HAFR and WAFR (and Dugway). The targets typically used for air-to-ground training are the HAG, the Eagle Range Complex, Craner's Target Complex, Wildcat, and Kittycat. They are usually used day and night, Monday through Thursday, during the day only on Friday and Saturday, and with a reduced frequency on Saturday; normally they are not used on Sunday (Van Wagenen 1994). This training uses airspace for both ingress and egress. Direct use of the airspace is supplemented with ground-based tracking or data acquisition systems. Hits and misses may be electronically scored using simulated weapons and electronic targets or may be visually scored using cameras or spotters.

The following are the typical types of air-to-ground missions conducted in the UTTR:

- Air interdiction strike—Deliver a bomb or other munitions against an enemy communication or transportation center
- Fighter sweep, screen, air escort—Protect interdiction aircraft from interception by enemy fighters
- Suppression of enemy air defenses—Neutralize enemy air defense systems on the ground
- Close air support—Disable enemy ground-based threat systems that are in close proximity to friendly ground forces
- Airborne airlift—Bring personnel, equipment, or supplies into or out of a combat area
- Special air support—Use helicopters to transport personnel for special operations
- Strategic strike—Simulate bombings of strategic targets, often without supporting aircraft
- Jamming and electronic support measures—Ensure that specific parts of the airwaves are available for use by friendly forces

While some of these mission types are not specifically air to ground, an air-to-ground training mission may require some of these elements in order to be successful.

One additional aspect of the training function is the discharge of devices for defensive practice or as aids in mock battle. For example, in certain areas, the release of chaff and flares from aircraft is permitted. Chaff are bundles of aluminum-coated fiberglass strands that are dropped from an aircraft being tracked by radar. When released, the fibers in the bundles disperse, thus confusing the radar tracking the aircraft. Flares may be used to mislead guidance systems of heat-seeking missiles or heat-sensitive targeting mechanisms.

Training in air-to-ground weapons delivery may also involve bombers and fighters, which may be supported by air-to-air activities of cargo/transport planes, refueling planes, and by helicopters. Fighters or bombers are the aircraft most commonly used at UTTR (SAIC 1993a, 1993b).

Either conventional or simulated nuclear weapon systems may be used in these missions; the main difference between the two during training is the trajectory of munitions release. Both inert and live conventional bombs are used during training. Even inert bombs, however, still carry small explosive 'spotting' charges. Some exercises over SUTTR include the use of air-to-ground Maverick missiles in specified shoot boxes or areas of the range. Strafing weapons (used to attack ground positions from low-flying aircraft) are also used during training.

Specific targets are authorized for certain types of ordnance. "The UTTR Training Pamphlet, 545 TGP 55-18" describes each target in detail, and includes information about each, including authorized ordnance, use restrictions, available scoring systems, protocol for use, flight pattern information, and other detailed target information for planners, users, and potential users of the various targets.

Use of airspace usually entails an approach (often low altitude), followed by the release of munitions. The approach usually originates outside HAFR and WAFR boundaries at either supersonic or subsonic approach speeds. The approach may entail avoidance of simulated enemies, either airborne or ground based. Airspace outside the UTTR boundaries may also be used for air-to-air exercises, refueling, or transit to the UTTR airspace. Ground-based equipment may be employed as simulated threats to the pilot and aircraft.

The range utilizes an interconnected system of land-based and aircraft-based data acquisition and communication devices. Collectively this system is known as instrumentation. Some targets are equipped with laser devices, fiber optics systems, sophisticated cameras, and other recording devices. The data that are collected at these sites can be merged with other data from radar stations and from other systems such as HAMOTS and the HAMOTS upgrade system (HUS) and sent to Mission Control Center (MCC). This data stream may be sent on to the ACMI Center for analysis using the UTTR telemetry system. If the data stop at MCC, they are not useful to the pilots. The data may be used for pre-mission, real-time, or post-mission analysis. This electronic data system is augmented with a system of cameras and other devices capable of making a visual record of training events. Cinetheodolites are very sophisticated cameras that can supply TSPI when several are used simultaneously and when used in a previously surveyed location. The data are processed post-mission in order to produce TSPI. Cinesextants are also used for providing film records, but cannot be used to produce TSPI. They may be used to provide real-time television data as well as post-mission processed information. Other camera systems include the video metric analysis system, static cameras, Flitevision, and static video recording. For the most part, the cinetheodolites and Video Metric Analysis system are used for testing, not training, because of their high accuracy.

The ability to score hits and misses off the target is critical to the air-to-ground training function. Because of this importance, considerable detail on range target scoring capabilities is provided below.

The target scoring systems at the Eagle Range Complex include primary scoring by a recently installed Television Ordnance Scoring System (TOSS) with backup visual scoring by spotters from the main and flank towers and mechanical acoustic scoring for the four strafing targets. Visual scoring targets include two bomb circles, two applied tactical targets, and two skip targets.

Targets at Kittycat, Wildcat, and Craner's Complex are scored using a TOSS. This system is an array of cameras (two cameras at each of the sites listed) that are remotely controlled from Dugway. The remote control enables the cameras to be reoriented to the various tactical targets in the specific areas. Post-mission processing provides scoring information for the targets of interest within the specific target complex. TOSS scoring may be conducted during daytime and nighttime hours.

Some of the target scoring systems on UTTR work in conjunction with electronic equipment aboard the aircraft to simulate the actual use of ordnance. Several systems may be used in this simulation. The Heads Up Display (HUD) is video filmed to record altitude, dive angle, and airspeed on the approach, as the "bomb" is "dropped," and during the escape maneuver, as well as the position of the aiming dot when the bomb is dropped. To simulate Maverick missile use, either video or infrared systems are used to tell what the Maverick is looking at during the process of locking onto the target, uncaging the missile, firing it, and escaping. Both the range and launch cell are recorded to determine whether the missile would have hit the target had it actually been fired. The infrared system or a radar system can provide return data used to aim the weapon. The radar system also provides air-to-ground mapping, so that the crosshairs of the aiming device can be put on a picture of the target and guide the "bomb" automatically to that spot. Some airplanes are equipped with laser capability as part of a targeting pod; an infrared system is used to aim the laser. The crew conducts all of the actions that would occur in the case of an actual discharge of ordnance except for the actual weapon release switch sequence, and no weapon is used. Rather, the tripping of a sensor or the photographic record of events are used to give the crew feedback on the exercise.

Other test and training resources include various Electronic Combat (EC) threat simulators. These devices are emitters of radio frequency signals that simulate enemy threats to aircraft. Examples of these include MUTES, Mini-MUTES, and TRAINS. Some of these EC threat simulators are relatively new; for example, the MUTES at Granite Peak became operational after 1990 (Rydman 1994b). The ECTC preliminary draft EIS (SAIC and Wyle 1989) describes this facet of training and testing, including a plan for developing UTTR into a simulated electronic battlefield. The capability to use electronic devices on a battlefield to detect, identify, and interdict (to impede the enemy by firepower) enemy aircraft is common today; however no area has yet been developed at which allied forces can test equipment against these kinds of threats or train crews in the avoidance of or defense against these threats. Although various types of EC threat simulators are found at various training areas, there is no area where an integrated air defense system (IADS) is present to simulate an actual combat situation (Hadley 1996). The ECTC preliminary draft EIS (SAIC and Wyle 1989) discusses this aspect of battle in detail, and offers information on ECTC, including representative types of missions and equipment needed to develop this capacity.

Air-to-Air Training

Air-to-air training, in contrast to air-to-ground training, is a simulated battle between two or more aircraft. One or several such operations can take place simultaneously in various levels of the airspace. Many of these operations include flights into the portion of the airspace complex extending beyond the HAFR and WAFR ground boundaries. Air-to-air missions are typically flown above 5,000 feet above ground level (AGL) since at lower elevations there are limited rules of engagement. In fact, most air-to-air missions typically occur above 10,000 feet to enable maximum mobility. These missions occur both day and night between Monday and Thursday and only during daylight hours between Friday and Sunday; they are scheduled daily on weekdays and less frequently on weekends (Van Wagenen 1994). Both NUTTR and SUTTR are used for air-to-air missions, but SUTTR is used most often because it has more air space. Between 1976 and 1991, dart training, which involved one aircraft shooting at a projectile towed by another aircraft, also occurred in Sector 3 of SUTTR during daylight hours (Van Wagenen 1994).

Many of the elements of air-to-ground training also apply to air-to-air training. The discussions on chaff and flares, on-board sensors and emitters, and the ECTC all apply in whole or in part. Ground-based scoring systems used for air-to-air combat training are the ACMI and HUS. The ACMI is available in the airspace over WAFR (SAIC 1993a, 1993b) and the HUS is available on HAFR.

The following types of exercises are specific to air-to-air training (SAIC and Wyle 1989):

- Air combat training (ACT)
- Air combat intercept (ACI) (i.e., detect, identify, and destroy opposing aircraft)
- Air combat maneuvers
- Basic fighter maneuvers (BFM) (Maquet 1994) (loops, hard turns, other rapid changes in position)
- Fighter sweep, air escort (protect interdiction aircraft from interception by enemy fighters)
- Aerial refueling (refueling aircraft in the air)
- Airborne warning and control system (AWACS) (aircraft in high altitude orbits detect, track, and identify all aircraft in an area)

Ground Troop Training

Ground troop training consists of various exercises that are conducted using ground-based troops and equipment (e.g., ground assault training, communications exercises, and mobile radar unit training). Ground troops participate in movement exercises involving ground vehicles and/or helicopters to move troops and equipment in response to two tactical threat scenarios: live fire exercises involving the firing of live munitions using ground weapon systems, and joint air attack tactics (JAAT) involving cooperation between air and land fire support assets in attacking simulated ground threats. JAAT training exercises, which involve close air support for the ground units, are the most common. Civilian exercises are also conducted and include users such as the Utah Highway Patrol.

Training Missions

The types of training activities conducted in an aircraft are shown in Table 4.2-5. These activities can be minimally combined in a typical daily training mission or complexly combined into a single CFT mission (Maquet 1995, Trainor 1995, Webster 1995). The components of a typical daily training mission provide a small portion of a bigger mission where 20 aircraft may be hitting five different targets simultaneously. Both of these types of missions are described below.

In a typical daily training mission, individual aircraft or formations of aircraft take off and first perform a series of weapons checks on each other to verify that missiles, radars, and special munitions, such as Mavericks, are working properly. On a typical air-to-ground mission, these pilots would then fly at low level in the MOAs or other sectors that do not contain developed targets for 10 to 30 minutes to practice low level navigation, formation turns, air threat reactions, ground threat reactions, and simulated attacks on "first look" targets, which are fortuitous, informal targets such as a windmill in a remote valley. The next component would be to do one or several real attacks at a target complex like Wildcat or Craner's, dropping practice or live bombs on targets there. The aircraft could be at 25,000 feet or at low level during their bomb runs, which is determined by both the weather and whether the attack scenario assumes there are small arms in the target area or fighters guarding a target from above. Once their bombs are gone, the pilots might do low-altitude intercepts on each other, dry attacks, or return to Hill AFB to practice patterns, simulated flameouts (SFOs), or instrument approaches, finally landing when they have run out of fuel in all tanks, including the external tanks used because of the increased drag from the bombs they carry initially.

A typical air-to-air daily practice mission would involve four airplanes without external fuel tanks, but with missiles and an electronic counter measures (ECM) pod to jam an opponent's radar. Two of these aircraft would be on the blue team and two on the opposing red team. To create as realistic a scenario as possible, the blue team would use the full capabilities of their F16s, while the red team would try to simulate the capabilities of an adversary aircraft, such as a Fulcrum, MIG, or Mirage, as to air tactics, radar capabilities, flares and weapons. The teams would start at opposite ends of the area and try to find their opponents, identify them as adversaries, and "kill" them, using radar, radar jamming, ground control radar, and situational awareness in a three-dimensional chess game.

The timing of such a typical daily mission varies depending on the target and on the type of aircraft. For the primary targets used (Eagle Range Complex, the HAG, Craner's Target Complex, Wildcat Target Complex, Kittycat Target Complex, and Baker Strongpoint) generalizations can be made regarding the timing of use. At Eagle Range Complex, the HAG, or Craner's Target Complex, F16s spend about 15 minutes en route through the Lucin A and B MOAs and about 30 minutes using the targets. B-1 and B-52 bombers are not used on these targets. At Wildcat or Kittycat, F-16s take 5 minutes southbound through Sevier A and B and 5 minutes northbound through Sector M and R corridor (Romeo) for a total of 10 minutes inbound transport. They might then spend about 25 minutes using the targets. B-1 and B-52 bombers (typically half a squadron, each carrying half a load of bombs) might arrive either via a northwest or northeast access route, spend about 5 minutes in transit through Sevier A, M, and R corridor, and then about 20 minutes using the targets. The bombers typically return to their home base when they are finished. The Navy or Marines might spend 10 minutes enroute through Gandy MOA and Sector L and then about 40 minutes using the targets at Wildcat or Kittycat.

In a CFT mission, the goal is to include as many players as possible to increase its realism. The larger the number of players and the more roles being played, the larger the airspace that is needed. CFTs are typically scheduled from surface to 58,000 feet over SUTTR for large time periods during the day. The goal of the mission for the blue team is to get to their targets and destroy them, then return safely; any red team aircraft shot down are a bonus. For the red team the goal is to kill the striking aircraft before they get to their targets. The blue team striking aircraft, typically fighters like the F16s, try to carry their munitions to their assigned targets, deliver them, and escape. Bombers like B-1s or B-52s might come from as far away as the east coast to try to make it to a target and escape without being "shot down". Some blue team fighters might assume the role of escort and try to keep the red team fighters from engaging the striking aircraft.

To minimize warning the red team that the blue team is attacking, ECM support aircraft (F-111s) will jam enemy aircraft radar from a distance of 100 to 200 miles away because their jamming equipment is much stronger and has more frequency agility than the jamming equipment on the fighters (chaff and flares). An AWACS aircraft (EC-135s) might hold position at high altitude to direct the blue team against the red team and warn the blue team when they are about to be attacked. Additionally, suppression of enemy air defense (SEAD) aircraft like the F-4G try to suppress red team defenses like triangulation (AAA) radars or SAM systems so the striking aircraft are able to get out successfully. Tankers might be holding off to the south-southeast. A full-scale exercise may also include tanks and artillery that come from Dugway, close air support to disrupt the tank attack, and A-10s to strike the tanks. There may also be stationary and well-dug-in ground troops participating. Colored water may be sprayed to simulate germ warfare. On another day, the scenario might be changed and a defensive counter air (DCA) mission approach assigned. In this case, the blue team flies their own F-16s and tries to engage striking red team fighters and bombers that try to simulate the capabilities of adversary aircraft.

The biggest difference between a CFT and a typical daily mission is complexity, not just in the number of aircraft and roles, but also in the multiplicity of roles for a single pilot, since a given pilot may be attacking and be attacked by other aircraft at the same time, as he or she tries to reach a specific target to drop munitions.

4.2.1.2 Testing

Testing is a major ongoing activity at HAFR and WAFR, with many of the target areas dedicated exclusively to specific testing functions and use of ordnance and munitions specifically allowed for that target. Testing involves the launching, deployment, or ignition of weapons systems or components and the subsequent monitoring of performance. Instrumentation and communication systems link targets with mission control command offices at Oasis (HAFR), Dugway and Hill AFB, or control stations in the immediate vicinity of the target. Fiber optics and other land-based systems, directly and through microwave and telemetry links, are used to transmit data to monitor test results.

The location of the UTTR gives it distinct over land testing advantages compared to other military munitions testing areas. A sparse population and an isolated location make HAFR and WAFR attractive in terms of security and public safety. Additionally, HAFR and WAFR are located near Hill AFB and Dugway, allowing for coordinated uses. Existing infrastructure and investment in targets, instrumentation, and communication capabilities at HAFR, WAFR, and Dugway also combine to increase the utility of the area for tests.

Testing activity is initiated by a request from a test proponent to the 545th TESTG. The 545th TESTG itself also may be the test proponent for a number of test activities. Test requirements, UTTR range capability, scheduling, safety, and cost are some of the issues that are considered by the 545th TESTG in evaluating each request. Once a test scenario has been agreed upon, the range is set up to accommodate it.

Specific targets are used for specific types of testing. These are identified on Table 4.2-4, which describes each of the target areas and their use for testing as well as training. Their general locations are shown on Figures 4.1-2 and 4.1-3.

Tests may be broadly classified as to whether they are ground-based tests or airborne tests. Aircraft testing may be manned or unmanned, and may optionally include munitions testing. The test activities identified by the 1975 RMP for UTTR (Ogden ALC Directorate of Operations 1975) and by the 545th TESTG (Rydman 1994b) do not overlap substantially. The following uses were identified in the 1975 RMP:

- Ground testing of high explosives
- Munitions disposal
- Service engineering testing
- Static testing of rocket motors
- Propulsion evaluation
- Testing of inert munitions
- Helicopter air-to-ground rocketry and gunnery
- Specialized equipment testing

The following uses were identified by the 545th TESTG (Rydman 1994b):

- Department of Energy (nuclear weapons) payload development/sustainment certification testing—1976-1989, 1990-1994
- Weapon system effectiveness program (air-to-ground [A/G] weapons)—1976–89, 1990–94
- UAV flight test and evaluation (including target drones)—pre-1976, 1976–89
- UAV launch and recovery systems test and evaluation—pre-1976, 1976–89
- Cruise missiles flight test and evaluation—1976–89, 1990-94
- Surface to surface (S/S) missile launchers test and evaluation—1976–89
- Target-seeking/radiation-homing missile target complex development and use—1990–94
- Precision-guided weapon target complex (combat hammer area)—1990–94
- Submunition weapon test target complex (TS 2)—1990–94
- Conventional munitions sustainment/life-cycle testing for Ogden ALC—pre-1976, 1976–89, 1990–94
- Unitary warhead weapon target complex (Barber Buster, future joint direct attack missile [JDAM])—1990–94
- Conventional air launch cruise missile (CALCM) development and live warhead demonstrations (AGM-86C))—1976–89, 1990–94

- Over land (versus over water) developmental weapon test range (ground recovery of test or sensitive items versus water recovery issues)—1976–89, 1990–94
- Over land (versus over water) operational weapon training range (388th, 419th realistic overland scenarios/joint exercises)— 1976–89, 1990–94
- Theater missile defense (TMD) program target launch, booster impact (potential)—1990–94
- Intercontinental ballistic missile (ICBM) rocket motor storage (Ogden ALC)—pre-1976, 1976–89, 1990–94
- ICBM rocket motor firings, tests, demilitarization/destruction (Ogden ALC)—pre-1976, 1976–89, 1990–94

The dates following each of these testing uses indicate that the uses of the UTTR have changed substantively since 1976. Uses of the UTTR have changed over time for various reasons. As new technology and systems were developed, new testing needs were identified. When the 1975 RMP was developed, the 545th TESTG had been present at Hill AFB for only a short period. Thus the uses reflected in the 1975 RMP do not include any activities proposed or currently conducted by the 545th TESTG or by current customers. The 545th TESTG has traditionally conducted most of their activities on WAFR, where many of the uses added since 1975 now occur.

Ground Testing

Ground testing includes rocket/missile motor testing, study, and analysis; aircraft weapons systems tests; HE tests; S/S missile launcher testing and evaluation; and munitions (including rocket/missile motor) disposal. The tests of aircraft weapons include weapons used on F15s, F16s and other aircraft, including the A-10, which is armed with a cannon that shoots thick-walled and very destructive shells. Each of these types of test is performed in a specified area.

Rocket/missile motors are tested, studied, and analyzed at the Missile Dissection Laboratory and at the static firing pads near the laboratory. These facilities are located just west of Oasis, between the complex and the Grassy Mountains. Tests conducted on these motors include sustainment/life-cycle tests (to determine whether materials are still stable and usable even after their expiration date), and propagation tests (to determine under what circumstances an explosion will trigger simultaneous or sympathetic explosions of stored materials in adjacent buildings at CBU Valley). These motor tests are carried out by LMSMHR (the office symbol for the missile maintenance branch, which is now LMSH(3)) and LMSIP (the office symbol for the propellant analysis section). LMSHMR is responsible for performing static firing of Minuteman and Tactical rocket motors; for storage, handling, and transporting ICBM missiles and motors at Oasis; for operation and maintenance of facilities for proofloading rocket motor carriages and missile suspension systems; for ALCM and Advanced Cruise Missile (ACM) recovery and support activities at Dugway; and for maintenance, shipping, and storage of ICBM lithium batteries (McBride 1995).

Missile motor static firing facilities include the following:

- Three test pads, two of which are fully instrumented and one of which has limited instrumentation (i.e., serves as a "hazard pad" for motors that might be damaged and detonate or deflagrate)
- One data recording building bunker
- Two conditioning annexes

In addition, approximately 30 buildings are in use on more than 6,400 acres for missile storage and transfer. Two additional buildings are used for the storage of lithium batteries. Currently 800 lithium batteries are stored at the UTTR (Air Force, nd-b, Air Force, nd-c). This stored equipment is tested from time to time.

LI has regularly conducted tests of the A-10 weapon, the GAU-8. This is a 100-round functional test that lasts only about 1.5 seconds. Short-term research and development tests have also been conducted to test the reliability of the ammunition and the longevity of the component parts. These tests use dummy rounds and may shoot up to 30,000 rounds. In the past, these tests have been conducted no more than 12 times per year. During operation, this weapon is aircraft-mounted, but for the tests, a static mount is used. The rounds are fired into a knoll or hillside. Noise levels from A-10 cannon tests may be as high as 225 decibels (dB) (Rydman 1994b).

HE ground test capability is available in the CBU Valley and at Big Papa for propagation (of insensitive munitions and adjacent dissimilar weapons), warhead fragmentation effects, munitions storage design, artillery, and mortar tests. The UTTR Mission Control Center is linked to these sites via a microwave communications system and a data transmission system. These sites are also voice linked to similar facilities operated by Dugway to facilitate range control, scheduling, and test operations as well as to minimize duplication of test resources (Nass 1994). Propagation testing began in 1969 at both CBU Valley and Big Papa. These tests evaluate the degree to which an explosion of one munition propagates throughout munitions that are stored nearby. For example, one test conducted between 1973 and 1974 evaluated propagation throughout 100,000 pounds of live munitions that were stacked in a simulated ship hull dug underground (Fudge 1995). Propagation tests in the CBU Valley used live conventional munitions such as CBUs, bombs, land mines, and missiles. In both of these areas, high-speed cameras were used to record results of the tests. These tests produced about 130 to 165 dB of noise 2 to 3 miles from ground zero. In the early days of propagation testing, about one test per quarter was performed, during daylight hours only. Similar tests are still ongoing in both areas every 2 to 3 months (Fudge 1994, VanWagenen 1994). Originally, the EOD Division and the 75th RANS/SUE cleaned up the targets after each test. Since about 1990, test target cleanup has been performed by the EOD Division and the 545th TESTG/EN (Nass 1996).

S/S missile launcher testing and evaluation occurred primarily between 1976 and 1989 in association with the launching of UAVs or cruise missile flight test vehicle use. Every 3 to 4 years during this period there was a new program with unique launching characteristics or flight parameters that influenced the choice of the launch site. Most of these programs occurred at Dugway, which is higher in elevation and therefore drier and more accessible by existing roads. However, these programs were associated with overall use of UTTR by UAVs and cruise missiles. The launcher vehicles were diesel tractor/trailer vehicles, tracked vehicles with diesel or gas turbine engines, or fixed launch stands with auxiliary power generation carts. The launch systems were powered by turbine or reciprocating engines using a solid rocket motor booster of 5 to 20 seconds firing time. On site, noise levels were probably 90 to 120 dB. Launch activities usually occurred during the day, with about one launch per month for up to 20 launches. However, one of these programs, the ground-launched cruise missile (GLCM) program, ran daily, 5 days a week for 18 months. The GLCM site was essentially dismantled to comply with requirements of the Intermediate Nuclear Forces (INF) Treaty. Once UAV testing diminished, the S/S missile launcher testing and evaluation ceased. The last "ground launch" activity was conducted in 1992–93. If Air Force interest in UAVs is renewed, S/S missile launches testing and evaluation might resume.

Disposal of munitions, including excess/unserviceable munitions and large rocket/missile motors, occurs in the TTU, which is located on HAFR about 6 miles northeast of Oasis. Munitions disposal may become necessary because munitions age or are determined to be excess or no longer usable or because they are identified for disposal by international treaty or agreement requirements. The TTU has been utilized weekly or biweekly since before 1976 and is used only during daylight hours when there is minimal or no cloud cover. Every possible conventional munition/propellant in the Air Force inventory might be disposed here. Some materials to be destroyed are placed in an excavated, lined pit and ignited using a time-delay device and C4 explosive. Noise levels are estimated at 70 dB. On the day following the disposal, EOD technicians and augmentees conduct "sweep and clean" procedures. As needed, site/pad repair, road repair, and electrical grounding stake placement maintenance are performed by CE. Rocket motors are placed in the TTU along with several pounds of explosives, which are then detonated using C4 explosive. The rocket motor casing splits open and ignites the propellant, which burns. Most munitions burn in just a few minutes and the remainder of the burning operations are completed within hours. After 24 hours, the TTU is examined for any visible presence of unburned materials. Use, cleanup, noise, and maintenance procedures are the same as for munitions disposal (U.S. Department of Energy, SAIC 1990; Blake 1994, VanWagenen 1994).

Air Testing

The testing of missiles and UAVs in UTTR airspace relies on the large safety footprint available at the entire complex. The many specific programs related to air testing have similarities. Generally, these tests involve the release or launch of a weapons system that either tracks an air target or follows a predetermined course to a ground target. The air target may be a UAV target drone (released or launched). For ground targets, instrumentation and proximity to the launch or release sites are important considerations.

A variety of TSPI, photographic, and other tracking instruments are used. HAMOTS, cinetheodolites, and cinesextants are among the instruments used to collect, transmit, and analyze performance data. For safety reasons, no other uses are scheduled concurrently with these tests.

UTTR supports cruise missile (CM) tests and UAV tests, although the current role of UAVs is much diminished from what it was in years past. CMs may fly thousands of miles at low level, and UAVs may fly at low altitude for a few hours or at a very high altitude for more than 24 hours. The cruise missile corridor from Point Mugu, California, to UTTR provides an inland route through the western ranges to support a full spectrum of CM testing and evaluation. For both CMs and UAVs, low-flying, terrain-following capabilities need to be evaluated over a variety of smooth, rough, and very rough terrain such as is uniquely available at HAFR, WAFR, and Dugway. UTTR is fully instrumented to provide this evaluation, with 2 instrumentation radars, 64 HAMOTS, 8 remotely controlled cinetheodolites and 13 manually controlled cinetheodolites, 6 cinesextants, 2 Kineto tracking mounts, 3 Video Metric Analysis Systems, 3 fixed and 1 mobile telemetry receiving stations, and 1 airborne platform with telemetry receiving recording/display, reradiation, flight termination systems and command and control (Nass 1994).

UAV flights within the SUTTR restricted airspace occurred about twice a week until 1978, about once a week between 1978 and 1981, and except for isolated instances have been discontinued since 1982. These UAV tests included launch aircraft testing, series unmanned vehicles, and helicopter mid-air-retrieval systems. Noise levels associated with the takeoff of launching C130 aircraft and with recovery helicopters were estimated to be about 145 dB. Although additional UAV programs are not currently planned by the Air Force, the Army and Navy are very strong supporters of UAVs and may test them in UTTR airspace (Rydman 1994b). Meanwhile, the Alpha program tests ground impact with a UAV at the Sand Island Target Complex (TS-1, TS-2, TS-2A, and TS-4). This program, begun in 1993, will run for a 5-year period. About four to six nonimpact preliminary tests involving only one or two aircraft are completed before each full-scale impact test, which involves about eight aircraft (F-16s, C-130s, KC-141s, or B-52s) in launch, chase, tanker, or reradiation roles. At their closest point to the ground, their estimated noise level is about 90 dB. All of these tests include range radars, communications, and, perhaps, the ground telemetry stations. The full-up tests also use HAMOTS, cinetheodolites, cinesextants, and static ground cameras. To date, these tests have all been conducted using inert munitions, but have included both unitary UAVs focusing their impacts on a concrete building and a stucco building and bomblet UAVs focused on a gravel target pad (Hayden 1994).

Currently, open-air testing and evaluation of CMs is the core testing mission of UTTR, which is the Air Force's primary over land range for testing CMs. The tests are fully instrumented, with more than 60 ground stations that supply daylight-dependent TSPI data that track the CMs at low altitude throughout UTTR/Dugway complex. The large aeral extent of the range also provides the required area necessary to test warheads. For example, the CALCM development and live warhead demonstration program operates an average of about one flight per year in the SUTTR. Flights are confined to airspace over DOD lands, with target/impact sites in the vicinity of North Wig Mountain on Dugway. These tests began in about 1989 and are expected to continue until at least 1997. CALCMS use unique HE warheads, the effect of which may be monitored by overpressure/blast pressure instrumentation in the target buildings. The launch/drop aircraft is typically a B52 that flies in from someplace other than Hill AFB, which does not have B52 support facilities. Noise levels from the B52 are about 30 to 160 dB. CALCMs have not been flown at any over land range except UTTR because of public safety concerns. There are no inert warheads for test and training exercises in the inventory, so every missile carries a live warhead and is launched with the expectation that it will detonate at the planned target. CALCM missions are combined with operational training exercises for bomber/launch crews. UTTR receives an advance notice of about 1 year on such exercises. Also associated with the CALCM test program are DOE payload development/sustainment certification programs that perform about three or four tests per year (versus about two per month between 1980 and 1984), again using bombers (B1s, B2s, or B52s) from a base other than Hill AFB (Rydman 1994b).

Air-to-ground precision-guided munitions (PGM) tests and active target PGM/UAV test capability tests use air-launched guided weapons against inactive and active ground targets, respectively. These tests may use munitions that are launched from any one of a number of western ranges (Tonopah, 200 nautical miles southwest; Edwards/China Lake, 300 nautical miles southwest; Fallon, 200 nautical miles west; Saylor Creek, 150 nautical miles northwest; and White Sands, 500 nautical miles southwest) with which UTTR is connected via microwave and fiber optics. Munitions flying from any one of these ranges to UTTR would almost exclusively cross government land. For PGM tests, the two targets used at the TS-3 Complex allow delivery of boosted or gravity munitions (live or inert) launched from nearly any azimuth and provide maximum flexibility for both developmental and operational test missions. These tests are fully instrumented, using two instrumentation radars, HAMOTS, cinetheodolites, video metric analysis system, 3 fixed and one mobile telemetry receivers, and one fiber optics sensor/transmission system for real-time processing and display. By using HAMOTS, TSPI on 16 aircraft can be simultaneously displayed. For active target PGM/UAV tests, the TS-4 target complex is used. At this active target, realism is achieved by remotely controlling ground threats such as SAMS, armored vehicles, and command posts to present a simulated threat to the pilots or weapons systems. TS-4 can be remotely controlled via fiber optics from TS-1 and TS-3 simultaneously, or independently from the Wig Mountain Operation Facility on Dugway. TS-4 contains 20 target pads, underground bunkers, and interconnecting roads within 4 square miles with instrumentation including terminal area telemetry, high-resolution TSPI for end-game scoring, independent monitoring of radio frequency environment, and an integrated power system. TS-4 can simultaneously score up to three pads (Nass 1994).

On HAFR, a collection of targets is used for the engineering and testing of any and all types of air-to-ground conventional munitions in the Air Force inventory. The primary mission is to support aging, surveillance (shelf-life), and in-service flight tests (e.g., warranty, first article of second source, lot acceptance tests) of munitions for the Ogden ALC. Given the unique characteristics of many of the targets, the air-to-ground test capability on HAFR is unique in that it can handle high-altitude gravity type releases, a large volume of live and inert munitions at separated targets, and a variety of munitions. The variety of target characteristics is illustrated by the descriptions in Table 4.2-4. UTTR's capability to handle BLU-82 bombs, guided munitions, and CBU munitions is unique in the CONUS. These targets are variously supported by cinetheodolites, cinesextants, video and high-speed film cameras for precision impact scoring, audio/seismic equipment, weather data collection equipment, and fully instrumented F-16s (Nass 1994).

The testing of munition shelf life has been conducted weekly since before 1976 on weekdays during the daylight hours at Big Papa, CBU Valley, and Targets 3, 13, 21, 23, 24, and 82 on HAFR. In these munitions tests, any of the conventional munitions in the Air Force inventory might be dropped from B52, F4, F16, or C130 airplanes from an altitude of 2 miles. In the early days of these tests (1969 to 1975), most of the munitions tested were 500-pound inert bombs. Live flares were also tested for shelf life between 1969 and 1972. The noise level associated with munitions shelf life testing is estimated to be 70 dB. The day following the test, EOD personnel perform "sweep and clean" procedures. Site, pad, and road repair are provided by the 545th TESTG.

Also occurring at Targets 3, 13, 21, 23, and 24 as well as at the HAG, GAT, Coffin Live Drop Area, Craner's Target Complex, and Eagle Range Complex is the disposal of dud munitions, which might be dropped from F4, F16, C130, B1, B52, F111 or F117 airplanes from an altitude of 2 miles. Finally, clearance of dud munitions is performed by dropping them from F4, F16, C130, B1, B52, F111, and F117 aircraft from an altitude of 2 miles over the HAG, GAT, Coffin Live Drop Area, Craner's Target Complex, and Eagle Range Complex. The associated noise level, cleanup, and maintenance procedures for disposal and clearance of dud munitions are the same as for munitions shelf-life testing (Blake 1994, Fudge 1995).

On occasion, the target rather than the munitions are the focus of a test. For example, in 1970 to 1971, a variety of doors on three large concrete aircraft hangars were tested with everything from rifle fire to 2,000 pound bombs dropped from F4s (Fudge 1995, Van Wagenen 1994).

4.2.1.3 Services Supporting Range Uses

The above discussion on the uses of UTTR provides only part of the picture of range use. In order to keep UTTR functioning effectively and to be able to meet the needs of users, support services are consistently required. While these support services are not really 'uses' in the same sense of the word as 'training' and 'testing,' they are nonetheless critical to UTTR infrastructure and to everyday activity on the range. The primary support services provided to the range are communications, construction of targets and other facilities, and range cleanup, including explosive ordnance disposal and target maintenance and cleanup.

Communications

There are two primary groups supporting range communications, the 299th RCS and the 501st RANS. Both the 299th RCS and the 501st RANS are under the command of the 545th TESTG. There are also two ground operations networks, one out of Hill AFB (Hill Range Control) and one out of Dugway (Dugway Range Control). Hill Range Control provides ground communications for most UTTR activities but coordinates with Dugway Range Control as necessary, particularly for Air Force activities in SUTTR or involving Baker Strongpoint. Other voice communications systems are also available as part of UTTR test capabilities; the "545th Test Group Guide to Capabilities" (U.S. Department of the Air Force 1994a) provides additional information. Much of the equipment used for communication and for data acquisition, transmission, and processing has been noted earlier. Microwave stations, fiber optics, and telemetry stations are available for training and for testing activities.

The 299th RCS, also known as "Clover Control," is a Utah Air National Guard Unit based at Hill AFB and at HAFR. They are under the control of the 545th TESTG while they are active; they are otherwise funded through the 545th TESTG, receiving their authority from the ANG (Webster

1995). They are responsible for complete air traffic and weapons control service for UTTR and the maintenance of supporting electronic equipment at various locations both on and off UTTR (i.e., at Air Operations Center, Building 1276, Hill AFB; Salt Lake ANG Base, Central Repair Facility; Francis Peak Radar Site; Delle Peak Communications Site; Grassy Mountain Communication Site; Cedar Mountain Radar Site; Wendover Field Communications Site, Central Repair Facility; Trout Creek Radar Site; Bovine Mountain Radar Site; and Frisco Peak Communications Site). The following are functions of the 299th RCS:

- Clearance to enter and depart UTTR airspace
- Radar control for traffic separation and surveillance
- Close radar control for tactical training (weapons control)
- Radar handoffs to adjacent facilities
- Radar advisory service
- Emergency assistance
- Maintenance of gapfiller radars on UTTR
- Maintenance of microwaves and radios
- Maintenance of air traffic control and weapon control systems in the Air Operations Center at Hill AFB

The 299th RCS uses published, standard air traffic control frequencies to control UTTR air traffic. The 299th RCS also has "HaveQuick" compatible radios, which are capable of transmitting encrypted information. Six UHF frequencies are currently dedicated to ground-to-air communication between the Range Training Officer and air crews. The 299 RCS shares these frequencies when communicating with air crews.

The 501 RANS, as mentioned in Section 4.1.3, is responsible for the acquisition, transmission, and processing of all data generated during testing and training on UTTR.

<u>Construction of Targets and Other Facilities</u>

Two different units are responsible for construction and engineering activities on HAFR and WAFR, the Engineering Division of the 545th TESTG and the 75th RANS/SUE at Oasis, which is part of the 75th Support Group. Regardless of who initiates or does the construction, all construction must be approved by the 75th RANS in conjunction with the 75th CEG before it is initiated. This provides a mechanism to coordinate the project with NEPA requirements. Most construction of new targets is for testing uses. Training uses employ primarily well established, existing targets that are periodically refurbished.

The 75th RANS' responsibilities are more focused on the civil engineering aspects of construction, maintenance, and repair of existing facilities on UTTR. They maintain the existing HAFR and WAFR infrastructure, primary roads, buildings and other real property on a long-term, established schedule. They may work with the 545th TESTG Engineering Division (TESTG/EN) on specific target projects, if the timetable for project completion fits into their schedule.

The Engineering Division of the 545th TESTG together with the Target Support Section of the 501st RANS are responsible for maintaining target access, targets, and target areas, as well as the building of new access roads and new test and training targets. The 545th TESTG/EN disposes of deployed material and coordinates and schedules the disposal of bombs and munitions. Recyclable scrap material is taken to the Services Group (formerly Military Welfare Recycling [MWR]) for disposal. They are also responsible for long-range planning of instrumentation and data communication systems. When money for improvements to the range is allocated, the Engineering Division staff works with the 501st RANS to determine the anticipated needs of potential customers (test proponents). Once these needs are determined, they are analyzed in light of the existing system and infrastructure on the range. Compatibility issues, potential conflict with other systems or uses, feasibility, and potential to sell the enhancements to customers are some of the criteria considered. The Engineering Division may then ask for proposals from private contractors to construct the new capability.

Range Cleanup

With the variety and number of activities on UTTR, there is an ongoing need for maintenance and cleanup of facilities. As target areas are used for tests and for training, damage to those areas or facilities may occur that must be repaired prior to further use. Bombs, munitions, and material deployed on targets must be collected and disposed. The scheduling of these support activities is necessary in order for direct uses of HAFR and WAFR to continue. The two main support activities are disposed of explosive ordnance and maintenance of target areas.

All explosive ordnance disposal at HAFR and WAFR is handled by the EOD Division, which is under the command of the 75th CEG. EOD personnel support range operations by clearing and disposing all munitions expended on HAFR and WAFR. EOD personnel also provide escort in hazardous range areas and surveys HAFR and WAFR in support of new targets (U.S. Department of the Air Force 1994a).

Specific activities conducted by the EOD Division include the following:

- Disposal of excess/unserviceable munitions
- Disposal of large rocket motors
- Testing of munitions
- Disposal of live munitions
- Clearance of inert munitions

The first three uses, because they have been discussed in earlier sections, are mentioned here only to give a complete picture of the kinds of activities for which the EOD Division is responsible. The last two uses, disposal of live munitions and clearance of dud munitions, are ongoing activities that occur at several distinct areas throughout HAFR and WAFR (Table 4.2-6).

The EOD Division performs disposal activities in the areas where live munitions are found. Because live, unexploded bombs are very unstable and cannot be transported, they are destroyed where they are found and their fragments are collected.

EOD personnel clear target areas where only inert bombs are used by collecting munitions and fragments. Inert bombs that are removed may be reused or set up as simulated ammunition dumps in target complexes or deposited in landfills on Air Force property. Even inert bombs (which at some targets are the only ordnance allowed) usually have a small spotting charge, ranging from the explosive equivalent of a shotgun shell up to 4 or 5 pounds of explosive. These inert bombs are collected by the EOD Division, which blows any unexploded spotting charges. In addition, an ordnance that has been "lost" may occasionally "float" up to the surface, and EOD personnel are responsible for collecting, identifying, and disposing of these as well.

The clearance of dud munitions from targets and target areas is conducted periodically to identify and collect all munitions deployed over the course of normal training and testing missions. Cleanup within the perimeter of individual targets is performed as needed. Targets at the Eagle Range Target Complex are cleared after 50 days of use, although the strafing panels are cleared more frequently. Some targets are cleared quarterly because of high use and customer requirements, while other target areas are cleared once per year. A complete clearance outside all target perimeters is done once every 5 years (Blake 1994a). In coordination with the EOD Division's clearance of a target, the 545th TESTG does any needed maintenance and refurbishment.

EOD Division operations need airspace clearance because they may explode ordnance. These operations are conducted exclusively during daylight hours and may employ a variety of vehicles, depending on the terrain and the ordnance to be collected. It is common for them to use tracked vehicles, wheeled vehicles, backhoes and front-end loaders, and all-terrain vehicles (ATVs). In some situations, helicopters may be used. Clearance of an area requires preparation of a "358 Report," which details the acreage cleared, the tonnage of munitions collected, and the number and type of ordnance found.

In the process of deploying munitions against targets, targets and surrounding areas become damaged and eventually unusable. This is particularly true of tactical targets, targets that are buildings and structures, and the ground itself. The 545th TESTG is fully responsible for target maintenance and cleanup as well as for new target construction. They provide both general maintenance in association with the EOD Division's clearance of a target, as well as quick turn-around maintenance in response to the needs of specific customers.

Once a tactical target in a complex (e.g., a tank, an armored personnel carrier, a truck) becomes too damaged to be used as a target, it is hauled off and the materials recycled (e.g., as scrap steel). New targets are then hauled into the complex. At Oasis, there are areas set aside for preparing vehicle hulls to be taken to the range for use as targets. In these staging areas, any fluids, glass, hazardous materials, materials valuable for recycling, tires, and other parts are removed. The vehicle hulls are then stored until needed on HAFR and WAFR.

4.2.2 Future Uses

UTTR provides a unique area for air vehicle training and testing over varied terrain, as has been repeatedly documented above. It would, therefore, be appropriate for future uses of UTTR to parallel past and present uses, particularly emphasizing those training missions and testing operations that are most benefited by the remoteness, varied topography, size, and undeveloped land area provided by UTTR. Planning objectives associated with future uses of UTTR are:

- Continued provision of space and facilities for complex air to air, air to ground and ground training exercises involving bombers, fighters, ground troops, having multiple roles and particularly emphasizing those training missions and testing operations that are most benefited by the remoteness, topography, size, and undeveloped land area provided by UTTR (Webster 1995)
- Increased coordination among user groups to provide interactive and cost effective testing and training opportunities (Gubler 1995)
- Increased use of the sophisticated systems at the Sand Island Target Complex (Gubler 1995)
- Increased use of the TTU, which would be supported by upgrading the facility and its capability (Hennessey et al. 1995)
- Increased storage capacity in the MSA to accommodate Delta II storage, for example (Hennessey et al. 1995)
- Continued provision of test facilities for both manned and unmanned aircraft and munitions

In addition, a number of future uses of UTTR have been proposed and at least partially evaluated under NEPA (Unknown 1991a, 1993). For example, future use of UTTR by Comet program (Department of Transportation 1992) for Comet Space Vehicle retrieval (U.S. Department of the Air Force 1993a) and for storage of Peacekeeper missile motors (Raymond 1992a, 1992b) have all been proposed.

While there is no current plan to use WAFR as the landing site for the Comet Space Vehicle, this recommendation (Webster 1995) provides a good illustration of the type of project for which WAFR is considered. For the Comet Space Vehicle, the safety zone required is 59.0 by 27.6 miles, which could be centered over the WAFR area, which is 47.5 by 21.3 nautical miles. This was the alternative preferred by Space Industries Inc., the project proponent. No other alternative location was found acceptable in the EA of this proposed project (U.S. Department of the Air Force 1993a).

The storage of 50 missile sets of Stage I, II, and III rocket motors as part of Peacekeeper missile system downsizing is planned to come on-line in FY99 (Raymond 1992b). Evaluation of building aboveground missile storage bunkers in the Oasis complex at HAFR for these rocket motors has been requested. At the time of the request, the bunkers were scheduled for completion in FY96, but the first motor storage was not scheduled until FY99 (Raymond 1992a).

Personnel currently working at or using UTTR (Arnold 1995, Blake 1994b, Fudge 1994, Rydman 1994b, and VanWagenen 1994) anticipate that training and testing uses will be ongoing, and specific programs, such as Project Alpha Testing, will be completed as scheduled. Predictions for the next 5 years are that UTTR will serve functions that are somewhat to very similar to current and past functions and that the demand for UTTR functions will be a little less (1 respondees), about the same (1 respondee), to much more (2 respondees). The same questions for the next 25 years resulted in the same responses. It is thought that any changes in use will include more training and less testing, testing of new electronic weapons that require the large safety footprint and varied topography provided by UTTR to demonstrate their operational characteristics (VanWagenen 1994, Rydman 1994b, Fudge 1995), and the use of munitions that are more accurate, more lethal, and less polluting (Arnold 1995).

In the interviews and questionnaires, comments regarding specific activities on the range were made regarding TTU activity, DOE payload development/sustainment certification testing, UAV flight test and evaluation, surface-to-surface missile launcher test and evaluation, and CALCM development and live warhead demonstrations. TTU activity has increased dramatically and is expected to continue to grow. With the actions of environmental groups resulting in the closure of many disposal sites in other states (Hennessey et al. 1994), the ongoing development of treaties for arms reduction including reduction of Poseidon (Fudge 1995) and other rocket motors (Blake 1994b), and the continual upgrading of munitions (Blake 1994b), the TTU workload will surely increase. Further, there is a proposal being considered to combine Tooele Army Depot open burning/open detonation (OB/OD) activities with activities at Dugway or at the TTU if an ongoing health risk assessment indicates these activities should be moved from Tooele Army Depot-South (Winn 1995, Barnes 1996).

With regard to DOE payload development/sustainment certification testing, it is thought that over the next 5 years this will remain about the same with perhaps a little less frequency of testing unless a new payload were to be used. In that case, the frequency of testing would increase for about 1 year. With regard to UAV flight test and evaluation, the expectations are for use to remain somewhat similar, with about the same frequency as currently observed. UAV testing may not be conducted by the Air Force, but will continue to be conducted by the Army and Navy, perhaps using Michaels Army Airfield and UTTR airspace, although UTTR is not the Army or Navy's first test-site choice (Rydman 1994b). With regard to surface-to-surface missile launcher test and evaluation, the type of use is expected to be very similar and the demand about the same—which is minimal. Some ongoing programs for UAVs at Wendover or Michaels Air Fields or the use of target drones might occur (Rydman 1994b). With regard to CALCM development and live warhead demonstrations, the type of use is expected to be very similar and the demand about the same over the next 5 years. UTTR has been the only location where CALCMS have been flown since 1989 and will likely also be used for new or improved CALCM weapon tests (Rydman 1994b). The type of and demand for these specific uses cannot be predicted for the next 25 years, however (Rydman 1994b).

Recommendations for improvements in planning for future uses include the consolidation of UTTR use under one government organization and the focusing of facilities on UTTR toward specific uses that it is particularly good at supporting. The current situation, one in which UTTR is in a reactive mode to provide services requested by outside customers, does not allow UTTR to focus on improvement and modernization of range support equipment. The result, particularly with decreasing manpower and funding, is that efforts to remain technically superlative are diluted because there is no specific aim (Rydman 1994b).

4.3 LEGAL, ENVIRONMENTAL, AND HEALTH/SAFETY CONSIDERATIONS

This section presents the legal, environmental, and health/safety considerations associated with UTTR uses. These topics are discussed in Sections 4.3.1, 4.3.2, and 4.3.3, respectively.

4.3.1 Legal Considerations

4.3.1.1 Legal Agreements and Their Implementation at UTTR

Legal considerations at UTTR include but are not limited to memoranda of understanding, memoranda of agreement, letters of agreement, ingrants, and outgrants. All of these documents establish a specific cooperative legal agreement for land use or land management at HAFR and WAFR. They are in addition to the requirements flowing from general federal environmental laws and regulations and Utah environmental laws and regulations, which are discussed in Section 4.3.2.

The memoranda of understanding, memoranda of agreement, ingrants, and outgrants address administrative and maintenance issues and joint use of or assigned responsibility for airspace and the land. There are nearly 100 of these agreements, which establish procedures and requirements for managing the resources on UTTR. A complete list of agreements related to use of UTTR and copies of those agreements are present in the offices of the 545th Test Group Programs and

Resources Division (TESTG/XRP). A brief perusal of a subset of these agreements, which is on file with the Plans and Programs Branch of the 299th RCS, revealed 40 such agreements. Of these, 24 address airspace use, 7 address land use, 4 address administrative issues, 4 address maintenance issues, and 1 addresses reporting agreements. These agreements are tracked in a computerized system that identifies their effective date, last review date, and next scheduled review date and schedules a date by which to begin the review.

Particularly pertinent to the natural resources at HAFR and WAFR are several memoranda of understanding or agreement between the Air Force and federal or state agencies. Copies of these memoranda are included in the "Composite Natural Resource Management Plan" (Workman et al. 1992c). The memoranda of understanding are between the Air Force and the following agencies: UDWR; Utah Division of Parks and Recreation (UDPR); U.S. National Park Service; USFWS; and Federal Aviation Administration (FAA). Of particular interest is the memorandum of understanding that makes the Utah Division of Wildlife Resources responsible for the management of the wetlands, wildlife, and wildlife-related activities around the Blue Lake Waterfowl Management Area, a 216-acre parcel that has been formally deeded to the State, although this document is currently being modified (Blood 1996). The memorandum of agreement is with BLM. Table 4.3-1 provides further information on each of these memoranda.

UTTR has a number of outgrants that transfer HAFR or WAFR property rights to others and ingrants that allow UTTR to use land beyond their ground boundaries (Johnson, L. 1995). The outgrants that exist to date allow uses of HAFR or WAFR for the following purposes:

- Right-of-way for collection ditches—Reilly Tar and Chemical Corporation
- Underground telephone cable—Beehive Telephone Company
- Road easement—City of Wendover
- Operate a waste treatment facility—County of Elko

The ingrants that exist to date allow UTTR to use the following property owned by others:

- Use of relicted (land newly exposed when the Great Salt Lake recedes) land—State of Utah
- Water pipeline and sewer line—Interstate Commerce Commission

- Power line to Grassy Mountain—State of Utah

In addition, the real estate office at Hill AFB has been working on the following outgrants (Johnson, L. 1995, 1996):

- Underground telephone lines—Alltel Telephone Company (expected to be complete by the end of 1996)
- Natural gas line—Mountain Fuel Natural Gas (being redone, unknown completion date)
- Electrical power lines—Wells Electric Company (expected to be complete by the end of 1996)

4.3.1.2 Interface of Legal Considerations With Range Uses

Memoranda of understanding, memoranda of agreement, ingrants, and outgrants all establish a specific cooperative legal agreement for land use or land management at HAFR and WAFR. Based on these documents, training, testing, and support services at UTTR must be conducted in accordance with the procedures, responsibilities, terms, agreements, and jurisdictions for use of airspace; special use of and access to land; management of wetlands and outdoor recreational resources; and protection of endangered species and other fish, wildlife, and natural resources.

4.3.2 Environmental Considerations

The term "environmental considerations" collectively refers to the components of the environment that interface with range use in ways that must be considered because of regulatory requirements. Management of UTTR has included and will include compliance with many federal laws and regulations, State of Utah Department of Environmental Quality (DEQ) regulations, Utah environmental statutes, and local environment requirements to ensure that human health and the environment are protected. The primary environmental considerations governed by these laws and negotiations include the following:

- Air quality
- Noise
- Natural resources
- Cultural resources
- Hazardous materials

- Solid waste and recycling
- Hazardous waste
- Other regulated materials (e.g., polychlorinated biphenyls and asbestos)
- Water quality
- Underground storage tanks
- Spill response
- Emergency planning and community right-to-know regulations
- Transportation of hazardous materials

The Utah State DEQ implements and enforces most of the environmental laws and regulations promulgated in Utah. Utah has been delegated authority from the EPA to administer, implement, and enforce most of the federal environmental programs and laws. An overview of the driving regulations (those providing impetus to the environmental considerations) and a discussion of their implementation on UTTR is provided for each of these environmental considerations in Sections 4.3.2.1 through 4.3.2.13. The more specific interface of these environmental considerations with training, testing, and support service activities on UTTR is addressed in Section 4.3.2.14.

4.3.2.1 Air Quality

Regulatory Overview

Activities at UTTR are governed by the federal Clean Air Act (CAA), which is largely implemented through the Utah Air Conservation Act (Title 19, Chapter 2, U.C.A.) and Air Conservation Regulations (R307-1 U.A.C.), and by any portions of the federal regulations that have not been adopted or implemented by the State. The State of Utah has been delegated authority by EPA for implementation and enforcement of the CAA regulations. The State implementation plan contains emission controls to ensure that State air quality control areas meet National Ambient Air Quality Standards (NAAQS). UTTR is located within a Class II attainment area; therefore, it is subject to regulations designed for the prevention of significant deterioration (PSD) of air quality.

The regulations noted above address potential pollutants of concern, opacity, and hazardous air pollutant emissions. Potential pollutants of concern at UTTR for which federal or state ambient air quality standards have been established include ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), total suspended particulates (TSP), particulate matter less than 10 microns in aerodynamic diameter (PM-10), and lead. Visible emissions from installations are regulated by State opacity standards (R307-1-4 U.A.C.), which vary between 20 percent and 40 percent depending on the type and age of the source. Fugitive dust from material storage and handling activities, construction/demolition activities, and roadways must meet State control requirements (R307-12 U.A.C.). Emissions of hazardous air pollutants are controlled through National Emission Standards for Hazardous Air Pollutants (NESHAPS). NESHAPS define emission limits, monitoring requirements, and restrictions on material use for emissions of asbestos, beryllium, mercury, vinyl chloride, benzene, inorganic arsenic, and radionuclides. Hazardous air pollutants (HAPs) are regulated under the CAA air toxics provisions. Standards for sources that emit any of 189 listed HAPs are scheduled for development. If certain types of new facilities, such as incinerators or steam-generating units are installed, the New Source Performance Standards require installation of the best available control technology (BACT) to reduce emissions.

Air quality in a given location within the region of influence is described by the concentration of various pollutants in the atmosphere. The significance of measured ground-level pollutant concentrations is determined by comparison with federal and state air quality standards that represent allowable pollutant concentrations for the protection of public health and welfare. Air quality is affected by pollutant emission rates, emission parameters, topographic features, the cumulative effect of other emission sources, chemical reactions, and meteorological conditions. Meteorological parameters that affect pollutant dispersion are wind speed, wind direction, atmospheric stability, mixing height, temperature, and relative humidity.

UTTR Implementation

An air emission study was performed over a 2-year period between 1993 and 1995 at the four HAFR air quality/meteorological stations as described in Section 3.1. Air samples were analyzed for hydrogen chloride (HCl) and PM-10, two potential pollutants of concern (CH2MHill 1992). No substantive amounts of HCl or PM-10 were identified (Graziano 1996). The monitoring data are summarized by quarter and are on file with Air Quality personnel at Hill AFB.

The draft CAA Title V operating permit has been completed for UTTR. It provides information on UTTR emission sources, actual emissions, potential emissions, and other pertinent permitting data. This document is on file with air quality personnel at Hill AFB.

The TTU operates under a Part A operating permit that is not limited to a specific number of operations (Tadje 1995). This permit stipulates the number of tons of munitions that can be disposed at the TTU; this weight limit has not yet been a constraint to TTU operations. Activities at the TTU have also been subjected to a risk assessment (Unknown 1991b). There are no stacks, nor are there any other permitted sources at UTTR. Dust from vehicle traffic on dirt roads is controlled with magnesium chloride to reduce fugitive dust emissions.

Air emissions from ground transport to and from off-range facilities (e.g., the facilities at Hill AFB), from overflying aircraft, from target detonation, from the TTU, from missile and other testing, and from other miscellaneous transient sources have been modeled in or referred to in EISs, EAs, the Poseidon approval order, and the Title V permit application. Table 4.3-2 provides a general summary of this air quality information and Table 4.3-3 provides a specific summary of the available data.

4.3.2.2 Noise

Regulatory Overview

The Noise Control Act (NCA) requires federal facilities to implement measures to reduce noise emissions. Generally, federal agencies whose activities result in increased environmental noise in the surrounding community are responsible for compliance with state and local environmental noise requirements. The operating federal agency is responsible for conducting studies necessary to determine the impact of environmental noise on the surrounding community and for making the community aware of these impacts. The Aviation Safety and Noise Abatement Act (ASNAA) is intended to provide assistance to those preparing and implementing noise compatibility programs under the NCA. The State of Utah has no noise control regulations, although State Code 10-8-16 gives cities the authority to develop noise control regulations or standards. The Tooele County Planning Division has performance standards that regulate the sound pressure level radiated by facilities in the county; the Box Elder County Zoning Department has no noise abatement requirements and places HAFR in zone MU-160, where most uses are permitted by a conditional permit (Beecher 1996).

Noise is unwanted sound that interferes with normal activities or otherwise diminishes the quality of the environment. Noise may be manifested as continuous, intermittent, or impulsive (i.e., impact) noise. Also, noise may be steady or may fluctuate. Continuous noise is defined as broadband noise of approximately constant level and spectrum. Intermittent noise is defined as a given broadband sound-pressure level that occurs several times during a period of time. Impulsive, or impact, noise is a sharp burst of sound. In general, sounds repeated more than once per second are considered steady noise, while impulsive or impact noises, generally less than one-half second in duration, are repeated no more frequently than once per second. Noise may involve several sources and frequencies, or have a specific, readily identifiable source. Human responses to noise vary in accordance with the type and characteristics of the noise source, the sensitivity of the receptor, the time of day, and the number of occurrences or amount of time the noise occurs. The responses of wildlife to noise were discussed in Section 3.4.2.2.

Noise is measured as a sound pressure level (SPL) and is expressed in dB. For most environmental assessment purposes, sound is measured on the A-weighted scale (dBA) and C-weighted scale (dBC). The A-weighted scale applies a frequency-dependent weighting to a continuous or intermittent sound level measurement. This approximates the sensitivity of normal human hearing by de-emphasizing the frequencies below 500 hertz (Hz) and above approximately 10,000 Hz. Continuous or intermittent noise is measured on the A-weighted scale. Impulsive or impact noise is usually measured on the C-weighted scale, which is nearly unweighted, except at very low frequencies.

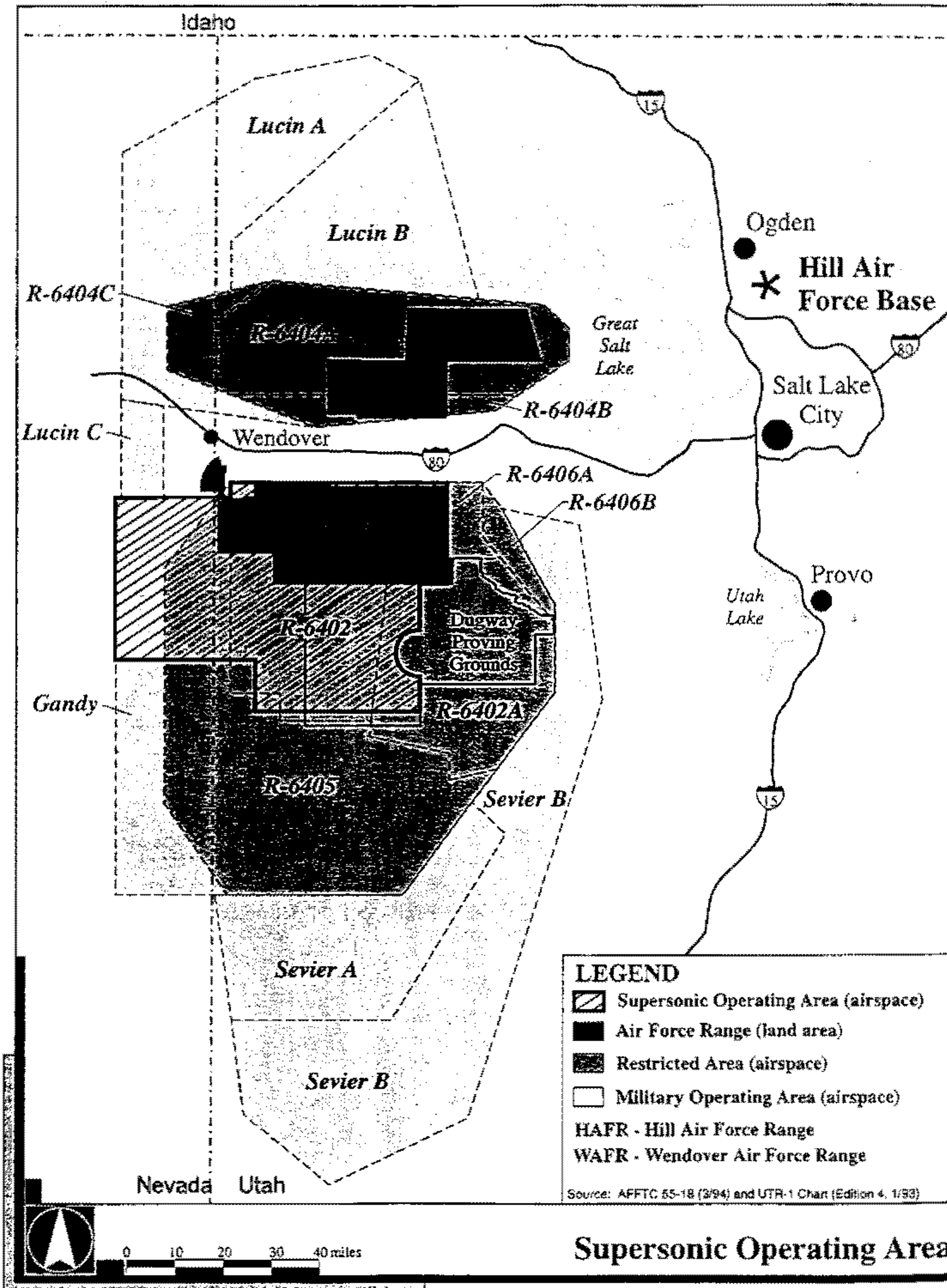
EPA (1974) has recommended the use of noise evaluation methods that could be employed for the protection of public health and welfare, with a reasonable margin of safety. The following two descriptors of the noise environment are used by the Air Force:

- The day/night average sound-level metric (L_{dn})
- The ROUTEMAP metric (L_{dnmr})

The L_{dn} is the energy-equivalent average dBA over a 24-hour day; a 10-dBA penalty is added to noise that occurs during nighttime hours (10:00 P.M. to 7:00 A.M. local time). It is used to assess nonimpulsive noise environments. An L_{dn} of 55 dBA is generally recognized by federal agencies as an outdoor goal for protecting public health and welfare in residential areas. A value of 65 dBA is considered to be of questionable acceptability near structures having average or below-average acoustic insulation. Levels above 75 dBA are considered unacceptable by the Department of Housing and Urban Development for noise-sensitive areas.

The L_{dnmr} is used to measure noise where low-level military training routes (MTRs) are located; these training routes involve highly sporadic flight operations with a rapid onset rate that can create a "startle" effect. The L_{dnmr} is a monthly average dBA, using the highest monthly sortie activity and a 10-dB penalty for nighttime. It also includes an additional penalty to account for the additional annoyance caused by the startle effect of a low-altitude flight.

Sonic boom environments are evaluated using the day/night C-weighted sound-pressure level (L_{cdn}). It is also a 24-hour average and a 10-dBA penalty is added to noise that occurs during nighttime hours.



Supersonic Operating Area

Figure 4.3-1

UTTR Implementation

The NCA exempts military weapons or equipment designed for combat use from environmental noise requirements. Thus, the ASNAA is not applicable at UTTR.

Noise models, such as ROUTEMAP, are used to assess the impact of noise generated on UTTR on human health and the environment. However, it should be noted that both L_{dn} and L_{dnmr} are daily and monthly averages, respectively, albeit with penalties. Thus, those values hide the range of noise variation that occurs during flyovers, for example, and do not reflect how loud airplane noise is in a quiet environment such as HAFR and WAFR provide. Because the loud noise lasts for such a short time it does not alter the average values to a degree commensurate with the disturbance it causes.

Modeling for noise exposure is based on data that describe the following:

- Runways and locations
- Flight tracks used for arrivals, departures, and closed-circuit (touch and go) patterns by the aircraft
- Altitudes, power settings, and flight speeds for each type of aircraft on each flight track
- Number of aircraft operations (e.g., a departure, arrival, or closed-pattern go-around) during a typical busy day
- Usage of ground facilities, including engine test facilities and aircraft pads employed for aircraft maintenance purposes

Modeling for sonic booms is based on the following:

- Geographic region within the Supersonic Operating Area (SOA) where supersonic flight occurs
- Distribution of flight paths used
- Height distribution of aircraft when operating supersonically
- Mach number (speed) distribution of supersonic flights
- Duration of supersonic flight
- Influence of Mach number cut-off on limiting sonic booms that actually reach ground level

During detonations at the TTU or at targets, the "Boom2" model is used to predict noise focusing by cloud cover or air layers of different temperatures. If the predicted focus of the sound is in a populated area, the detonation is postponed or canceled (Graziano 1994). Data on temperature and wind speed are collected from a weather balloon launched just before detonation and provide input to the model.

The existing noise environment on UTTR consists primarily of aircraft flight activity. This includes subsonic activity on low-level training flights and high-altitude missions and supersonic events in the SOA. Noise contours for low-level flight activity exist from previous noise modeling with ROUTEMAP (U.S. Department of the Air Force 1989) for aircraft that typically enter the airspace along the eastern edge of the Sevier B MOA, then divide and head north into the valleys (Figure 1.0-2). These data include metric values for ambient rural noise levels, baseline noise conditions, and average daily activity on each flight path used at least 260 days per year. Other subsonic flight activity that has been modeled includes random high-altitude flights that occur at altitudes above 9,000 feet MSL (mean sea level) in the Sevier A and Gandy MOAs and in restricted airspaces above UTTR. Noise impacts on DOD land, valleys, wilderness study areas, and communities have been evaluated in accordance with the above activities (U.S. Department of the Air Force 1989).

Supersonic flight is authorized only within the SOA above 5,000 feet AGL. The SOA is in SUTTR (the portion of the air space south of I-80) and covers all of WAFR and Dugway generally west of Granite Mountain, as well as extending west into Nevada (Figure 4.3-1). Sonic boom contours have been completed for these activities (U.S. Department of the Air Force 1989). Sonic booms generated outside the SOA and capable of generating overpressures between 1 and 4 pounds per square foot occur infrequently. These booms are due to unplanned maneuvers of fighter aircraft operating at high subsonic speeds and that inadvertently exceed Mach 1. Noise contours for exposure caused by the combination of both subsonic and supersonic flight activity in SUTTR have been derived as well (U.S. Department of the Air Force 1989). Table 4.3-4 provides a general summary of available sources of noise information and Table 4.3-5 provides a specific summary.

4.3.2.3 Natural Resources

Regulatory Overview

Natural resources on HAFR and WAFR are regulated primarily by NEPA and by various federal laws and executive orders that address specific environmental resources, including primarily wetlands, fish and wildlife, and endangered species, as well as other environmental resources less pertinent to HAFR and WAFR (e.g., floodplains, agricultural lands, coastal zones, and wild and scenic rivers). Cultural resources, which also fall under the purview of NEPA, but not as natural resources, are addressed in Section 4.3.2.4.

NEPA is implemented generally by the Council on Environmental Quality Regulations on Implementing National Environmental Policy Act Procedures (43 FR 55978), and specifically by the Department of the Air Force EIAP (32 CFR Part 989 and AFI 32-7061). NEPA's purpose and policy statement "...requires that federal agencies include in their decision-making processes appropriate and careful consideration of all environmental effects of proposed actions, analyze potential environmental effects of proposed actions and their alternatives for public understanding and scrutiny, avoid or minimize adverse effects of proposed actions, and restore and enhance environmental quality as much as possible." The EIAP provides a framework on how to comply with NEPA according to Air Force Policy Directive (AFPD) 32-70, Environmental Quality. These procedures provide guidance for the following evaluations:

- Categorical exclusions (CATEX) for those classes of actions that do not individually or cumulatively have a significant effect on the human environment and for which, therefore, neither an environmental assessment nor an environmental impact statement is required
- EIS evaluation of those actions with potential for significant degradation of environmental quality, significant threat or hazard to the public health or safety, public controversy concerning significance or nature of the biophysical environmental impact of an action, or significant impact on protected natural or historic resources
- EA evaluation of those actions not requiring an environmental impact statement and that are not categorically excluded. They specify a process of early planning, public involvement, and coordination with the requirements of other regulations protecting specific natural resources or requiring specific processes of evaluating impacts to natural resources.

Regulations protecting specific natural resources include especially the following:

- Executive Order 11990, Protection of Wetlands, which requires federal agencies conducting certain activities to avoid, to the extent possible, the adverse impacts associated with the destruction or loss of wetlands and to avoid support of new construction in wetlands if a practicable alternative exists.
- Section 404 of the Clean Water Act (CWA), which establishes a consistent approach to ensuring that all practicable measures have been taken to reduce potential adverse impacts associated with proposed projects in wetlands and other aquatic systems. It should be noted that there has been considerable, and as yet unresolved, controversy regarding the jurisdictional definition of wetlands and the U.S. Army Corps of Engineers' jurisdiction over them as implementers of the CWA Section 404 permitting process.
- Fish and Wildlife Coordination Act, which requires federal agencies involved in actions that will result in the control or structural modification of any natural stream or body of water for any purpose to take action to protect the fish and wildlife resources that may be affected by the action.
- Endangered Species Act, which prohibits federal agencies from jeopardizing threatened or endangered species or adversely modifying habitats essential to their survival.

UTTR Implementation

The Air Force EIAP vests authority for environmental matters in the Deputy for Environment and Safety (SAF/MIQ), who serves as the Air Force Secretariat point of contact for information about the Air Force EIAP or particular analyses. The Director of Engineering and Services (HQ USAF/LEE) has primary staff responsibility for coordinating and monitoring EIAP activities within the Air Force, with the Environmental Division (HQ USAF/LEEV) serving as the staff point of contact for environmental matters. The Environmental Division is supported by the Air Force Engineering and Services Center, Environmental Directorate (HQ AFESC/DEV) and the Air Force Regional civil engineers (AFRCE).

At the installation level, the base civil engineer (BCE) provides environmental planning functions. Therefore, on HAFR and WAFR the Ogden ALC coordinates all projects with NEPA requirements via the 75th RANS, which must pre-approve all construction in conjunction with the 75th CEG regardless of who initiates or does the construction, and ultimately via EMX (a division of the EM Directorate based at Hill AFB), which is responsible for the oversight of funds for environmental programs (except Defense Environmental Restoration Account [DERA] funds), the management of natural and cultural resources, and for NEPA compliance. Thus, EMX evaluates all new or modified current activities for compliance with NEPA, making a decision as to whether the action is appropriately covered by a CATEX, EA, or EIS and implementing that decision in accordance with the EIAP.

Section 3.4 describes the natural resources of UTTR in some detail. Of particular interest on HAFR and WAFR are the areas of ecological diversity provided by topographic variations in such physiographic features as the Lakeside Mountains, Kittycat Mountain, and Wildcat Mountain; and the aquatic habitats associated with the spring complexes in western WAFR and with the mud flats. The areas of topographic variability provide nesting sites for raptors and a diversity of supporting prey species. The springs are of particular importance to breeding and migrating waterfowl. The mud flats, which generally do not support vegetation because of their salt and alkali concentrations, qualify as both waters of the United States and a "special aquatic site", although they are not necessarily jurisdictional wetlands. They do not support breeding waterfowl, but are used by migrants. The impacts of proposed actions on these and other more widespread habitats are evaluated by EMX.

4.3.2.4 Cultural Resources

Regulatory Overview

NEPA establishes a federal policy of preserving not only the natural, but also the historical and cultural, aspects of our national heritage when undertakings regulated by the federal agencies are planned. In this context, the supporting cornerstone is the National Historic Preservation Act (NHPA) of 1966, as amended (80 Stat 915; 94 Stat. 2987; 16 USC 470 et.seq.). The NHPA defines historic properties as districts, sites, buildings, structures, or objects included in or eligible for inclusion in the NRHP and incorporates artifacts, records, and remains related to such properties.

Implementing regulations (40 CFR Part 1502.16[g]) issued by the Council on Environmental Quality stipulate that the consequences of federal undertakings on historic and cultural properties be analyzed. While the intent of the legislation is preservation of our heritage, it does not mandate that no significant impacts should occur. Instead, it requires that impacts be recognized and, if possible, minimized or mitigated. Section 110 of NHPA directs federal agencies to inventory cultural resources, nominate significant properties to the National Register, and work to protect and preserve important cultural resources.

Additional requirements for protecting historic properties are identified in the Antiquities Act of 1906; and the more stringent Archeological Resources Protection Act (ARPA) of 1979 (93 Stat. 721; 16 U.S.C. 470). ARPA strengthens protection of archaeological resources by increasing the penalties from the misdemeanors defined by the Antiquities Act to felonies. It also requires a permit application to be filed and Native American notification if sites important to these groups are to be harmed. Implementing regulations are codified by the DOD at 32 CFR part 229. In addition, the American Indian Religious Freedom Act (AIRFA) of 1978 (P.L. 95-431), for which no regulations have been developed, requires that all federal agencies take into account the effects of their actions on traditional Native American religious cultural values and practices. Also the Native American Graves Protection and Repatriation Act (NAGPRA) of 1990 expressly provides for the protection of Native American graves, funerary objects, sacred objects, and items of cultural patrimony, and gives Native American groups priority in ownership and control of those remains.

Regulations for Protection of Historic Properties (36 CFR Part 800), which primarily implement Section 106 of the NHPA, define the key regulatory requirements. These regulations define a process for consulting with State Historic Preservation Offices (SHPO), the federal Advisory Council on Historic Preservation (ACHP), and other interested parties to ensure that historic properties are duly considered as federal projects are planned and implemented.

The steps in the "Section 106 consultation" process involve:

- Identifying cultural resources that may be affected by a proposed undertaking
- Assessing the significance of these resources; i.e., determining whether or not they are eligible for listing on the NRHP
- Assessing the potential effects of the undertaking on significant properties

- Consulting with SHPOs and other interested parties to determine ways to avoid or reduce any adverse effects if such are identified
- Providing the ACHP a reasonable opportunity to comment on the proposed undertaking and effects on historic properties as necessary
- Proceeding with the undertaking under the terms of a memorandum of agreement or in consideration of ACHP comments if required

From the perspective of the NHPA, the term "historic properties" is used to refer specifically to cultural resources that are eligible for listing on the National Register. Thus, by definition, historic properties are "significant." "Cultural resources" is a more general term and is used here to refer both to historic properties and to other resources that may not have been formally evaluated as being eligible for listing on the NRHP. To be determined eligible for inclusion in the NRHP, properties must be important in American history, architecture, archeology, engineering, or culture. They also must possess integrity of location, design, setting, materials, workmanship, feeling and association, and must meet at least one of the four following criteria:

- Are associated with events that have made a significant contribution to the broad patterns of our history
- Are associated with the lives of persons significant in our past
- Embody the distinctive characteristics of a type, period, or method of construction; or that represent the work of a master; or that possess high artistic values; or that represent a significant distinguishable entity whose components may lack individual distinction
- Have yielded, or may be likely to yield, information important in prehistory or history (36 CFR Part 60.4)

Archeological sites, as opposed to standing structures, are generally eligible under the last criterion when valuable data can be recovered. In general, historic features are much more likely to be eligible under the first three criteria. However, the property must be "important" and must convey the "design, feeling, etc." of the associated event, person, or style.

UTTR Implementation

It is in response to the above regulatory drivers that pedestrian surveys of HAFR and WAFR are ongoing. By the end of 1995, pedestrian surveys had covered 18.8 percent of the ranges (27.1

percent of HAFR and 13.6 percent of WAFR) as shown in Figures 3.5-1 and 3.5-2. Data on the cultural resources identified at HAFR and WAFR to date by these surveys are on file at Hill AFB, but are available only on a "need to know" basis. Information on cultural resources is typically not made available to the general public to preserve the information available when they are in place and to protect them from potential "pot hunters."

4.3.2.5 Hazardous Materials

Regulatory Overview

Hazardous materials are regulated by a number of different agencies and a number of laws and regulations. Storage of hazardous materials is regulated under the Superfund Amendments and Reauthorization Act (SARA) Title III, which is discussed in Section 4.3.2.12. Hazardous materials are also regulated by OSHA as discussed in Section 4.3.3 and by the Department of Transportation as discussed in Section 4.3.2.

UTTR Implementation

The overall use of hazardous materials is controlled through a hazardous material management program that tracks the material from the purchase request stage through its end use or disposal. After a material arrives at Central Receiving at Hill AFB, information about the chemical is entered into a database. The information entered includes a hazardous classification as follows:

- A—not hazardous
- B—hazardous requiring tracking and inclusion in the Hazard Communication Program
- C—hazardous requiring Ogden ALC Form 493 authorization for use)

C-classified products have carcinogens or suspected carcinogens as ingredients or have special protective equipment requirements to prevent exposure. A license is required for C-classified materials. Central Receiving operates on a "pharmacy system" under which measured amounts of hazardous materials are dispensed. EM is working to establish a similar pharmacy at Oasis on HAFR.

Hazardous materials are used, stored, or present at the following locations:

- Water treatment plant—chlorine, antiscalant, and pH adjusting chemicals, sulfuric acid, potassium permanganate
- Lithium battery facility on HAFR—lithium; lithium batteries also contain sulfur, selenium, tellurium, and chlorine
- Target areas, the TTU, and testing facilities—ammonium perchlorate, nitroglycerin, diesel in munitions pits, and the herbicide Krovar for aerial spraying of targets
- Fueling and fuel storage areas—jet and vehicle fuels
- General HAFR areas—flammable/combustible storage rooms, hazardous material dispensing systems, compressed gases, maintenance shops, battery charging areas, cinetheodolite
- General WAFR areas—flammable/combustible storage rooms, hazardous material dispensing systems, compressed gases, maintenance shops, battery charging areas, cinetheodolite

Hazardous materials may be recycled or treated as hazardous solid waste and disposed.

4.3.2.6 Solid Waste and Recycling

Regulatory Overview

Solid waste generated at HAFR and WAFR is regulated under the Subtitle D regulations of RCRA and the Utah Solid Waste Management Act (Title 19, Chapter 6, U.C.A.) and Solid Waste Management Regulations (R315-301 U.A.C.). Nonhazardous solid waste refers to any physical forms of waste— solids, liquids, semisolids, or gases — that are not regulated as RCRA hazardous wastes. The Subtitle D regulations establish the minimum criteria and best practicable controls and monitoring requirements for solid waste disposal facilities. The Utah Solid Waste Management Act and Regulations control the collection, treatment, storage, and disposal of solid waste. These regulations include groundwater monitoring requirements.

UTTR Implementation

Currently, HAFR has one active solid waste landfill located near Oasis. In the past, there were two active landfills, one dry and one wet. Landfills are categorized into five classes that stipulate the source, amount, and type of waste they are permitted to receive. The more northerly dry landfill is a combination Class II and Class IV landfill. A Class II landfill can accept up to an average of 20 tons per day of municipal waste and properly prepared asbestos from the permitted municipal area; a Class IV landfill can accept only construction/demolition waste (except as fill), yard waste, inert waste, or dead animals. The more southerly wet landfill, also a Class II landfill, was used for food scraps and other wet nonhazardous waste, but is currently inactive and working toward closure. All Class II and Class IV solid nonhazardous wastes are now disposed at the more northerly dry landfill. This landfill is covered daily. The Air Force is working with the State to address solid waste issues such as the expansion of the Class IV permit at the northern dry landfill to include inert munitions (bombs, rockets, etc.) deemed nonhazardous and economically infeasible to recycle from the HAG and Wildcat Complex (Short 1996, Moroney 1996). The former Wendover Auxiliary Air Field has a landfill that is now closed.

Solid waste may be either hazardous or nonhazardous. Hazardous solid waste is to be disposed in a properly permitted RCRA facility. Nonhazardous solid waste may be either recycled or disposed in a general purpose landfill such as the dry landfill. Used targets and range residues to be recycled are brought out of the range by government transport or by contractor. The solid waste is then separated into hazardous waste, nonhazardous waste, and recyclable materials. The recyclable materials, such as waste oil, glass from targets, antifreeze, and scrap metal, can be reused. Residual and waste oil from HAFR and WAFR is transported to Hill AFB to be recycled for energy recovery, and antifreeze is recycled at the vehicle maintenance shop at Oasis. In the past, scrap metal was shipped off the range through the Defense Reutilization and Marketing Office (DRMO) and sold. However, Dodge (1994) indicates that DRMO has not accepted physical custody of range targets and range residues since an accident with live material occurred in 1993. The Services Group is overseeing scrap metal and tire recycling and either transports these materials directly to a recycler or oversees a contractor to do so. The Services Group is considering the purchase of a shredder, baler, and scale to do its own recycling.

4.3.2.7 Hazardous Waste

Regulatory Overview

Hazardous wastes that are generated on HAFR are managed in accordance with RCRA regulations and the Utah Solid and Hazardous Waste Act (Title 9, Chapter 6, U.C.A.) and Hazardous Waste Management Regulations (R315-1 U.C.A.). These regulations control hazardous waste from its origin to ultimate treatment, storage, or disposal. Some of the state regulations are more stringent than the corresponding federal requirements. For example, Utah regulations identify special hazardous wastes (F999 listed waste) from demilitarization activities, and testing of nerve, military, and chemical agents. The regulations require that the solid waste generator determine whether the waste they create is hazardous. The regulations also require that hazardous wastes be characterized, stored, labeled, transported, managed, treated, and disposed in accordance with regulations. All federal installations are responsible for complying with hazardous waste management regulations.

UTTR Implementation

Hazardous waste is generated or stored at the following locations:

- Oasis compound for wastes from OB/OD activities at target areas, the TTU and propagation testing
- 75th RANS supply satellite accumulation for batteries and hazardous chemical waste
- 90-day storage facility at Oasis
- Eagle Range Complex vehicle maintenance facility (1) for satellite accumulation
- Oasis vehicle maintenance and supply facilities (4) for satellite accumulation

HAFR is considered a small-quantity waste generator (Crow 1994). Hazardous waste is generated only on HAFR, which has an EPA identification number. Hazardous waste generated on HAFR includes ash residue from the TTU, ash residue from other OB/OD activities, and various wastes generated in the vehicle maintenance shops and battery storage facility. WAFR has no EPA identification number since hazardous waste is not generated there.

There are three RCRA-permitted activities at HAFR—the TTU, the closure of the hazardous waste landfill (Landfill No. 5), and the Lithium Battery Facility (research, development, and disposal). The TTU has a Part A RCRA permit for treatment that is still in interim status; the Part B RCRA permit application has been submitted to the State. As part of the Installation Restoration Program (IRP), RCRA preliminary assessment site investigations (PA/SIs) have been performed at Chemical Pit 4 and for the areas north and west of Landfill 5 (Hirschi 1994). Solid waste management units (SWMUs) are currently being identified on HAFR. Waste characterization at these SWMUs began in 1995 and includes primarily Chemical Pit 4 and the TTU disposal area. Targets are considered active use areas, and therefore have not been considered for RCRA Closure activities.

The hazardous waste generated, manifested, and shipped is reported biannually (Dodge 1994). The handling of these wastes and of potential detonation activity outside the TTU may be affected by yet-to-be released EPA regulations on disposal of military munitions.

The procedures followed at HAFR for hazardous waste are similar to those for used targets and range residues (Dodge 1994). Waste is brought out of the range by government transport. The ash and soil are separated from the scrap metal components and then sampled and analyzed by the Toxicity Characteristic Leaching Procedure (TCLP) to determine whether they are hazardous (Dodge 1994). Typically, approximately 93 drums out of 100 are determined to be nonhazardous (Dodge 1994). After the ash is characterized, it is manifested and transported to DRMO. Placarding of hazardous waste is performed for shipments that will travel on public roads. Hazardous waste at the 90-day storage facility at Oasis (or from satellite storage areas) is also manifested and transported to the DRMO. Soil samples are taken at the TTU following each operation and analyzed to determine whether there are any residual hazardous constituents of the operation at the site (Dodge 1996).

4.3.2.8 Other Regulated Materials

Regulatory Overview

Other materials are regulated under a number of federal and State of Utah laws and regulations. The Toxic Substances Control Act (TSCA) requires that EPA control harmful chemicals and toxic substances in commercial use to reduce reasonable risks from chemicals to human health and the environment. Specific chemicals used at HAFR and WAFR that are regulated under TSCA include polychlorinated biphenyls (PCBs) and asbestos.

TSCA regulates the use, management, storage, and disposal of PCBs at concentrations greater than 50 parts per million (ppm). TSCA also contains a spill cleanup policy that identifies requirements for cleaning small-volume PCB spills that occurred in recent years. Cleanup requirements for historical PCB spills are subject to discretionary authority of the regional EPA office. RCRA regulations and the corresponding state regulations contain land disposal restrictions for wastes with PCBs above regulated concentrations and provide a variance for treatment of PCB-contaminated soil and debris. The CWA establishes discharge limits for activities involving PCBs that affect surface water.

Asbestos emissions are governed primarily by the federal Clean Air Act (CAA), which is largely implemented through the Utah Air Conservation Act (Title 19, Chapter 2, U.C.A.) and Air Conservation Regulations (R307-1 U.A.C.). CAA NESHAP regulations control the emission of asbestos during construction and renovation of facilities, including any structure, installation, or building, or any component or part of a facility (e.g., piping or equipment). NESHAPs also regulate the disposal of asbestos and asbestos-containing material. Asbestos is further regulated under OSHA for protection of workers.

UTTR Implementation

PCBs have been identified on HAFR and WAFR (Wilson 1994) and an inventory of PCBs has been completed. PCB articles, containers, equipment, waste, and PCB-contaminated electrical equipment are disposed through DRMO to the Civil Engineering group, which has a TSCA-permitted storage facility.

Asbestos-containing material from targets and asbestos abatement of Minuteman II motors at the TTU is recovered, as required, by an asbestos team contractor managed by the 75th RANS/SUE (Short 1996, Moroney 1996). Asbestos material, properly prepared for disposal, will be placed in the (northern dry) State-permitted Class II landfill in Oasis (Short 1996, Moroney 1996). Until now, all waste has been shipped through DRMO to the Davis County Landfill (Dodge 1994). The landfill is permitted by the county health department. The Davis County landfill has applied for a State permit, which was expected to be issued by summer 1996; however, the current application does not cover asbestos waste.

4.3.2.9 Water Quality

Regulatory Overview

Control of water quality at HAFR and WAFR includes regulation of water discharges under the CWA and under the Utah Water Quality Act (Title 19, Chapter 5, U.C.A.), Utah Pollutant Discharge Elimination System Rules (R317-8 U.A.C.), and Utah Underground Injection Control Program Rules (R317-7 U.A.C.). The State of Utah has been delegated authority by the federal government to implement and enforce the CWA in Utah. The Utah Ground Water Quality Protection Rules (R317-6 U.A.C.) do not formally apply at HAFR and WAFR because the ground water there is classified as nonpotable brine. Nonetheless, HAFR and WAFR personnel do take steps to comply with the spirit of these rules and file "Nature of Groundwater Discharge Notification Forms when appropriate, as noted below in the discussion of UTTR Implementation of water quality regulations (Sullivan 1996b).

The CWA establishes rules, regulated through the National Pollutant Discharge Elimination System (NPDES), that govern the discharge of wastewater into waters of the United States. The State of Utah operates the Utah Pollutant Discharge Elimination System (UPDES) and issues permits to control water discharges from treatment facilities and stormwater discharges. Facilities that have the potential to discharge harmful quantities of oil into or on bodies of water are required by the CWA to prepare a SPCC plan. Spill response requirements are addressed in Section 4.3.2.11 and are therefore not covered here. In addition, onshore facilities that are nontransportation-related are required to prepare a facility response plan that includes an emergency response action plan. Discharges of stormwater to a water body or receiving stream are regulated under UPDES. A facility that is required to obtain a stormwater discharge permit is also required to prepare a stormwater management plan to identify possible pollutant sources to stormwater and identify best management practices that will reduce impacts on water quality.

UTTR Implementation

Water quality management is addressed at five areas on HAFR:

- The water treatment plant at Oasis
- A wastewater treatment system total containment evaporation pond
- An injection well at the Eagle Range Complex maintenance facility
- The missile motor dissection/cutting unit
- The missile motor static testing facility

There are no stormwater discharges on HAFR and WAFR; therefore a stormwater management Plan is not required (Wilson 1994). The reverse-osmosis water treatment plant on HAFR uses HTH chlorine (a high-test calcium hypochlorite product), antiscalant, and pH-adjusting chemicals such as sulfuric acid and potassium permanganate for treatment (Short 1994). The plant operates continuously and periodically discharges wastewater through a french drain system to a ditch that is approximately 300 yards east of the plant. A Nature of Groundwater Discharge Notification Form was submitted to the Utah Division of Water Quality (DWQ) on 26 January 1995 for *de minimus* (i.e., too small for regulation based on numerous situation-specific considerations) discharges from the treatment. The DWQ has not responded formally to this submittal but has indicated verbally that continued discharge is acceptable unless they send formal notification to the contrary (Sullivan 1996a).

The wastewater treatment system on HAFR consists of a total containment evaporation pond that is east of the drinking water treatment plant. There is an injection well at the Eagle Tower Range maintenance facility that was once considered a *de minimus* discharge facility. This discharge is no longer regulated and discharges into a drain field. The dissection/cutting unit on HAFR uses a water saw to cut open missiles to evaluate characteristics of aging (Short 1994). To date, three missiles have been cut open with a total of 27 incisions. In October 1994, approximately 100 gallons of wastewater were being held in a tank at the missile motor dissection unit. The water was analyzed, determined to be nonhazardous, and discharged to the wastewater treatment pond. It is standard procedure to test wastewater prior to discharge. If the water contains plastic Kevlar chips, it is considered nonhazardous and discharged to the wastewater treatment pond; if the water contains propellant, it is drummed and sent off site for disposal. In addition, the static testing facility uses cooling water during missile motor firing. The water is sprayed directly onto missile motors after firing and under the missile nozzle during the firing. All of the water discharges directly to the ground around the test pad (Sullivan 1994). A Nature of Groundwater Discharge Notification Form for this *de minimis* discharge was filed with the Utah Division of Water Quality on 26 January 1995.

The 75th RANS has been studying the possible modification of the two wastewater treatment lagoons. The preferred plan is to change the existing lagoons to run in series and add a small free-water-surface constructed lagoon for secondary treatment and to potentially provide subsurface irrigation water (Sullivan 1996a). Upgrading the HAFR drinking water treatment system in the near future has been considered for some time.

The recently allocated $8.9 million for the upgrading of facilities at Oasis includes funds to increase the treatment of salinity in drinking water, add a water storage tank and additional water distribution lines, and add several thousand feet of new sewer pipe and wastewater treatment lagoons with synthetic liners. There are also plans to use the treated wastewater for irrigation, groundwater recharge, and/or creation of a "subsurface wetland" (U.S. Department of the Air Force 1996a, Moroney 1996, Short 1996). These improvements will improve the water quality at Oasis.

4.3.2.10 Underground Storage Tanks

Regulatory Overview

Underground storage tanks (USTs) and their associated piping are regulated by the RCRA UST regulations. These regulations require states to develop programs covering UST design, construction, installation, operation release reporting, and corrective action. The Utah Underground Storage Tank Act and the Underground Storage Tank Rules (Title 311, Rules 200–212 U.A.C.) specify notification requirements for tanks and leaks from tanks, leak detection, spill and overfill protection, installation, removal, closure, and corrective action requirements. The Utah Department of Environmental Quality (DEQ) manages the UST compliance program, under which USTs that store hazardous chemicals or wastes are required to have secondary containment.

UTTR Implementation

There are two permitted USTs at HAFR: a 10,000-gallon aircraft fuel tank at the helipad, and a 560-gallon waste oil tank at vehicle maintenance (Johnson, S. 1994). Twenty-five USTs were removed in January 1994. Three additional tanks had been removed by April 1996. Table 4.3-6 lists all the active tanks remaining at UTTR, including the 2 regulated tanks and the 11 tanks that are not regulated (Johnson, S. 1996).

4.3.2.11 Spill Response

Regulatory Overview

CERCLA and its implementing regulations establish the currently operating system for tracking and reporting new releases of hazardous substances, hazardous wastes, hazardous materials, excess air emissions, and wastewater to waters of the United States and requires a responsible person to report releases of hazardous substances in excess of the reportable quantity identified in the regulations. These regulations contain a list of the hazardous substances and the designated reportable quantity. Notification requirements include calls to the National Response Center within 24 hours of the spill, the Local Emergency Planning Committee, and the State Emergency

Response Committee. Utah also requires that spills be reported to the Utah DEQ or the Utah Department of Natural Resources (DNR), depending on the type of spill.

Facilities that have the potential to discharge harmful quantities of oil into or on bodies of water are required by the Oil Pollution Act, which supersedes certain sections of the CWA, to prepare an SPCC plan. This plan must present a response to a worst-case discharge and to a substantial threat of such discharge of oil or hazardous substances. The SPCC plan should be consistent with the National Oil and Hazardous Substances Pollution Contingency Plan and submitted to EPA for their review and approval. In addition, onshore facilities that are nontransportation-related are required to prepare a facility response plan that includes an emergency response action plan.

UTTR Implementation

The final Hill AFB SPCC plan was combined with the facilities response plan (FRP) in a single document (U.S. Department of the Air Force 1996b). The SPCC/FRP details prevention and response measures to ensure that oil and hazardous material spills do not reach navigable waters (Ashbrenner 1994). The plan also provides the spill prevention training requirements and the responsibilities of the Hazardous Materials (HAZMAT) Team with regard to spills of hazardous materials. The Hill AFB Fire Department/Spill Coordinator has a listing of reported spills that have occurred at Hill AFB and UTTR.

Emergency response (ER) and the spill response plan mission on HAFR and WAFR are performed by the 75th RANS HAZMAT Team. This team, certified by the National Fire Protection Association, has specific operating instructions for ER activities. It is the only authorized and trained spill response team on the ranges.

4.3.2.12 Emergency Planning and Community Right-to-Know

Regulatory Overview

Enacted as a freestanding provision (Title III) of SARA, the Emergency Planning and Community Right-to-Know Act (EPCRA) is the result of a congressional effort to compel state and local governments to develop plans for responding to releases of hazardous chemicals. EPCRA is also intended to provide state and local authorities with local inventories of chemicals so that they can plan for potential emergencies. EPCRA requires the following three reports:

- A one-time report including a listing of hazardous materials in accordance with Section 311
- An annual report that details quantities and locations of chemicals in accordance with Section 312
- A report that provides data on annual emissions of chemicals to the environment in accordance with Section 313

In the past, federal facilities were not subject to the reporting requirements of EPCRA. However, in 1993, President Clinton signed Executive Order 12856, which requires federal facilities to comply with SARA Title III, Sections 311, 312, and 313, beginning in the 1994 reporting year. The first report from HAFR and WAFR and other federal facilities was due July 1, 1995. The report from Hill AFB was submitted by this date.

UTTR Implementation

The Air Force initiated compliance the SARA Title III requirements for HAFR and WAFR in 1994 (Ashbrenner 1994).

4.3.2.13 Transportation of Hazardous Materials

Regulatory Overview

Transportation of hazardous materials is regulated by the U.S. Department of Transportation (DOT) through the Hazardous Materials Transportation Act and the federal Motor Carrier Safety Regulations. DOT regulations specify requirements for shipping papers and marking, labeling, and placarding hazardous materials. Hazardous wastes are also regulated under DOT regulations. The DOT regulations apply if hazardous materials or wastes are shipped over public roads.

UTTR Implementation

As noted above, missiles that are shipped from the storage facility to the TTU are manifested for transportation, but placards are not required. Hazardous wastes that are shipped off site are handled in accordance with DOT requirements. The DOT regulations must be applied to transportation of hazardous materials and wastes on public roads, including those on HAFR.

4.3.2.14 Interface of Environmental Considerations with Range Uses

Environmental considerations (air quality, noise, natural resources, cultural resources, hazardous materials, solid waste and recycling, hazardous waste, other regulated materials, water quality, underground storage tanks, spill response, emergency planning and community right-to-know, and transportation of hazardous materials) in and around HAFR and WAFR may interface with both on-site and off-site activities. On-site activities at HAFR that may adversely affect environmental considerations include training activities such as those taking place at the HAG, the GAT, Craner's Target Complex, and the Eagle Range Complex, and testing activities such as missile motor dissection, static firing, and munitions disposal at the TTU. On-site activities at WAFR that may adversely affect environmental considerations include training activities, such as those taking place at Kittycat and Wildcat Mountains, and the Air-to-Air Gunnery Range, and testing activities, such as those at Sand Island. Private and public off-site activities that may also adversely affect environmental considerations include minerals extraction and processing, mining, landfills/waste incineration, and brine shrimp collection. These activities occur outside HAFR and WAFR but within UTTR.

Training

Training activities as described in Section 4.2.1.1 affect a broad range of environmental considerations. Air-to-ground and air-to-air training may affect air and noise quality; generate residue from bombs, bomb casings, chaff, and metal on the ground; and potentially involve spills of materials such as fuel from fueling planes and helicopters. Ground-to-ground assault and communications training may also impact air and noise quality; generate wastes such as spent targets and bombs; necessitate transportation of materials and wastes; impact management of recyclable materials; and influence the management of hazardous materials and emissions of regulated chemicals. When bombs or bomb residues, spilled materials, or other wastes from training activities are periodically cleaned up on HAFR and WAFR by EOD personnel, they are evaluated. Any residues, materials, or wastes that are hazardous are appropriately characterized, stored, labeled, transported, managed, treated, and disposed. Meanwhile, the training areas on HAFR and WAFR are considered active use areas.

Certainly the most apparent of the environmental considerations from use of UTTR for training is noise. The detrimental effects of loud noise and its associated startle effect on wildlife, especially during critical reproductive periods, have already been noted. These detrimental effects are particularly true of inadvertent supersonic noise outside the SOA and at low altitudes. Probably the second most apparent of the environmental considerations from use of UTTR for training is the startle effect of the sudden appearance of low flying planes, missiles, or other UAVs that are flying close to the ground as part of a CFT. Again, such effects are most harmful during critical reproductive periods. There is the potential for residual chemicals or other debris to remain on targets, but it is assumed that the EOD Division's cleanup is effective and that such residual materials are seldom left behind. The potential for direct physical effects on natural and cultural resources is minimized to the extent that live sorties, which drop munitions, are avoided and electronic scoring is used instead.

Testing

Testing activities as identified in Section 4.2.1.2 affect environmental considerations in ways that are similar to training impacts. Ground and air testing may affect air and noise quality, natural resources, and cultural resources and munitions testing could generate wastes, reportable emissions, or result in spills of regulated materials. For example, the Project Alpha Testing at Sand Island has the potential for leaving small pieces of scrap metal residue. Chemical tests of residues from similar tests show primarily chromium, barium, and 2-butanone (Hayden 1994). Although cleanup crews typically try to retrieve all the vehicle parts listed on the hazardous materials, including the bomblets and the 4 to 5 gallons of JP4 or JP10 fuel left in the UAV, the remainder are buried in place after reasonable retrieval efforts are made. The retrieved parts are kept a specified period of time, destroyed beyond recognition, and buried in the Dugway Clean Landfill.

The disposal of excess/unserviceable munitions, disposal of large rocket motors, munitions testing, clearance and disposal of dud munitions, and CALCM development and live warhead demonstrations, as well as the Project Alpha Testing, all have the potential for leaving craters, scrap metal, and some residual chemicals in the ground, including small amounts of propellant in some cases (Blake 1994b). UAVs also might release some ammonia gas during cooling system operations, their recovery crews might walk around a bit on the target, or the recovery helicopter downwash might blow dust around (Rydman 1994b). Similarly, during the surface-to-surface missile launcher tests, booster combustion products, dust, and spent canisters might extend about 1 mile downrange, and ground vehicle residues (petroleum, oils, lubricants) might be left behind by the diesel/turbine launch equipment.

In all of these cases, there is some disturbance of soil and vegetation from direct impact and from tilling and other cleanup operations at the target, compaction of soil, and at least a temporary displacement of wildlife. Some of the larger propagation tests at CBU Valley or the aircraft hangar door testing (which used 2,000-pound bombs) could have introduced contaminants into groundwater, although these tests have not been conducted since the early to mid-1970s (Fudge 1995).

The noise levels, often accompanied by shock or blast waves, have been noted previously for most of these tests. Some of these noise levels were estimated to be quite high, ranging from a conversational level (70 dB) up to about the level produced by a 12-inch cannon at 12 feet in front of and below the listener (225 dB). These higher levels would result in a marked startle effect on unsuspecting animals, especially given the typical backdrop of quiet solitude.

When spilled materials or other wastes from testing activities are periodically cleaned up on HAFR and WAFR by LM, the 75th RANS, or the EOD Division, they are evaluated. Any materials, or wastes that are hazardous are appropriately characterized, stored, labeled, transported, managed, treated, and disposed. Any residue from U.S. Department of Energy (DOE) payload development/sustainment certification testing, including depleted uranium (U_2) and other substances, are sealed in drums and shipped back to DOE as part of the test payload analysis process (Rydman 1994b). Meanwhile, the testing areas on HAFR and WAFR are considered active-use areas. The multiple use of many of these targets and the need to refurbish a target rapidly for the next user have resulted in more thorough and rapid target cleanup (Blake 1994b, Rydman 1994b).

Services

Services supporting HAFR and WAFR uses also interface with a broad range of environmental considerations. Those interfacing services involve construction of targets and other facilities and range cleanup activities including EOD and target maintenance and cleanup. Construction of targets and other facilities may affect air quality, water quality, noise, natural resources, and cultural resources, through the use and transportation of hazardous materials, creation of solid waste, recycling, and spills of hazardous chemicals. Range cleanup activities such as EOD and target maintenance cleanup may affect air quality, noise, water quality, natural resources, and cultural resources through the use or creation of hazardous materials, hazardous wastes, or regulated materials (e.g., asbestos and PCBs), and creation of hazardous chemical spills.

Past actions during cleanup activities on the ranges, particularly in western WAFR between Wendover and Blue Lake, have involved some disposal practices from which residual material may still be present. For example, it was common practice to use contaminated aircraft fuel for mosquito abatement by using it to cover ditches, including the ditch that runs parallel to the old railroad grade from the Wendover Air Field to Blue Lake (Craner 1992). Aircraft fuel was also used at the targets to color them and keep the vegetation down; occasionally, excess fuel was dumped in a gravel pit near Wendover Air Field. Minuteman motors and other munitions were also detonated and buried in the mud near the old railroad grade mentioned above; about six to eight craters about 18 to 20 feet across and 40 feet deep are located along this grade. Also in the past, EOD operations occurred only once every year or two and cleared munitions were hauled to existing craters, detonated (mostly) and then the crater was covered over. There are also pits at both ranges where ordnance was simply buried without first being detonated. The more recent ordnance disposal areas have been catalogued and are on file at Hill AFB. The older disposal areas are unknown because no one knew there was any risk associated with using them for disposal (Craner 1992).

4.3.3 Health/Safety Considerations

Health and safety considerations associated with training, testing, and support activities are described in this section, which first presents the driving regulations and a discussion of their implementation on HAFR and WAFR and then presents the interface of health and safety considerations with range uses.

4.3.3.1 Health/Safety Regulations and Their UTTR Implementation

Regulatory Overview

The Air Force requires that Hill AFB and UTTR comply with requirements of OSHA, which are detailed in 29 CFR 1910 and 1926. UTTR is also required to comply with Air Force Occupational Safety and Health (AFOSH) Standards, which contain requirements based on OSHA, the American National Standards Institute (ANSI), and other consensus standards. Additional regulations generated by Ogden ALC describe health and safety programs (such as a respiratory protection program) applicable to the Ogden ALC, Hill AFB, UTTR, and Little Mountain (Fisher 1994).

UTTR Implementation

In addition to OSHA, AFOSH, and Ogden ALC regulations, UTTR complies with requirements of the AFOSH 127 series; Naval Sea Systems Command Operations regulations (NAVSEA OP-5); Ammunitions and Explosives Ashore Safety Regulations for Handling, Storage, Renovation, and

Shipping; the Air Force Explosives Safety Manual; and UTTR-specific explosives operations and instructions (EOI). An EOI is completed for specific types of operations. An appendix addressing safety issues, including the requirement for a safety briefing, is completed for all EOIs. Job hazard analyses are also completed as appropriate for certain activities or operations. Accident investigations are performed in accordance with Air Force regulations. Test directives, which are step-by-step procedures for testing activities, are reviewed by the Ogden ALC SE staff assigned to the 75th RANS.

Engineering controls, administrative controls, or PPE may be required for C-classified hazardous materials (see Section 4.3.3.3 above). The hazardous material management program system places individuals in zones, defined as a person or group of people that, as a result of their work, share a common set of potential or actual exposures to workplace hazards. The Bioenvironmental Group evaluates exposures and controls (engineering, administrative, or PPE) in these zones.

The management of safety on UTTR for activities that occur in the airspace is provided by the Safety Office, a part of the 545th TESTG. Safety oversight for activities at Oasis and the TTU (and other activities that function under the Ogden ALC) is provided by the 75th RANS. In addition, SE has overall review, coordination, and oversight responsibility for UTTR safety procedures. These safety staffs are responsible for the full range of safety issues at UTTR, including visitor briefing, test and training planning, mission assistance, post-mission follow-up, and post-incident investigations. Because there is a high potential for dangerous situations should a mishap occur, safety representatives are involved in all aspects of a mission.

4.3.3.2 Interface of Health/Safety Considerations with Range Uses

Training

Potential health and safety hazards associated with both air-to-ground and air-to-air training activities include the following (SAIC and Wyle 1989):

- Radio frequency (RF)
- Emissions

- Inadvertent ignition of electro-explosive devices (EEDs)
- RF interference
- Lasers
- Aircraft accidents
- Accidental releases of ordnance (bombs or missiles)
- Flares
- Chaff

Military flying activities that have the greatest hazard potential, such as ordnance releases, occur in restricted airspace over unoccupied DOD land. Table 4.3-7 summarizes potential health and safety hazards for air-to-ground, air-to-air, and ground troop training.

Testing

Testing activities with the potential for health and safety hazards include all the above training hazards and also rocket/missile motor testing, study, and analysis; weapons systems tests; HE tests; munitions (including rocket/missile motor) disposal; aircraft testing (manned and unmanned); and munitions testing. The hazards are from unexploded ordnance, components of missiles, RF, lasers, and other sources. Health and safety at the TTU is governed by the EOI created for each activity/detonation at the TTU. The EOD Division is responsible for the EOI and any necessary training for TTU activities. Table 4.3-8 summarizes potential health and safety hazards for both air and ground tests of rocket/missile motors, weapons systems, HE, munitions disposal, aircraft, and munitions.

Services Supporting Range Uses

Potential health and safety hazards associated with support services, such as communications, target and other facility construction, and range cleanup (including EOD and target renovation) are somewhat unique to UTTR. Table 4.3-9 summarizes potential health and safety hazards for communications, construction of targets and other facilities, EOD, and target renovation.

4.4 RANGE BUDGET

UTTR is in transition toward becoming an ACC-operated range with an approved up-front training budget of $5 million per year and an estimated additional $9 million per year of testing that will be paid for by the user. For the 75th RANS, the estimated budget has ranged between $2,800,130 and $2,905,261 between FY91 and FY95, with a 10 percent increase per year anticipated into the future, where the work load is expected to continue to increase. The development of sophisticated tracking and communications systems for both air and ground training and testing has been well supported in the past, with $8 million being spent in FY93 and $11 million spent in FY94 to continue to improve range support facilities (Hebden 1994). Continued support is also expected for the sophisticated electronic systems associated with UTTR.

4.5 RANGE USE ISSUES

Range use issues may be divided into two categories for purposes of discussion: issues arising from and affecting interactions among range users and issues arising from and affecting interactions between range users and the environment. These categories of range use issues will be discussed separately below and will be used as the basis for developing a process to resolve range use issues and evaluate new range uses (see Section 5.2).

4.5.1 Issues Among Range Users

4.5.1.1 Issues Among Present Range Users

There appear to be three primary types of issues between present range users: those affecting range uses, those affecting range responsibilities, and those affecting range management.

Range Use Issues

The range use issues revolve primarily around scheduling and communication. Scheduling the use of UTTR for training or testing must be finalized a minimum of 12 days prior to the week of the requested mission. Scheduling can be a complex process, particularly for those activities that are weather dependent or that involve a number of players from different locations. Testing activities may be affected by weather because of the need to control as many variables in a test operation as possible to minimize the uncertainty surrounding interpretation of results. Thus, a single test that may require a day to complete may schedule the range for several days to ensure that the environmental conditions specified in the test parameters can be met. Under such circumstances, or when priority training activities have been scheduled, subordinate training activities can be scheduled under a backup status. However, when cruise missiles are scheduled to use the MOAs, no other activity is allowed to schedule the same air space. Further, some uses, such as those at the Sand Island Complex, involve classified systems and activities about which information is distributed only on a "need-to-know" basis. If so, there is likely a minimum of communication between a priority user and a user that may have been bumped from the schedule, which may result in ill feelings.

Beyond the more generic aspects of range use are conflicts between specific missions for scheduling, resources (e.g., specific targets or other lands, airspace, support services for earth moving, security, fire protection, and medical support), funding, and use of staff resources. Each individual situation requires compromise. Given the current tightening of budgets, and the need for all users, not just those with larger budgets, to have access to UTTR, such compromises may become more difficult to achieve.

Range Responsibilities Issues

The range responsibility issues result primarily because there are a number of groups providing support services whose areas of expertise overlap and the situations or locations in which this expertise is to be applied are sometimes not clearly demarcated. For example, overall safety on UTTR is under the responsibility of Ogden ALC through the 75th RANS and AFMC (SE) as "owners" of the range. SE in particular provides review, coordination, and oversight of safety procedures for all operations at UTTR (Moroney 1996). Yet the 545th TESTG/SE, a "tenant," is responsible for establishing and managing, except at the TTU and Oasis, the overall range safety program at UTTR (AFFTC Regulation 55-18) (Webster 1995). Further, the 545th TESTG may delegate safety responsibility to specific user groups for their particular mission. In addition, the safety of airborne aircraft is ensured through the air traffic control activities of the 299th RANS, an ANG unit. It is not surprising that there may be areas of overlap regarding responsibility for UTTR safety.

Another area of overlap concerns the engineering responsibility for range construction, cleanup, and maintenance, with the 545th TESTG being responsible for target construction, maintenance, and access, while the 75th RANS is responsible for established infrastructure outside of targets. Yet the EOD Division, a component of Ogden ALC together with the 75th RANS, works hand in hand with the 545th TESTG in target cleanup. The boundary between target access and established infrastructure may be unclear during these operations. Again, it is not surprising that there may be areas of overlap regarding engineering responsibility for various activities on HAFR and WAFR.

On a broader scale, the incorporation into UTTR of both Army and Air Force lands, lands administered by other federal agencies, and lands owned by private citizens, as well as air space above these lands, also contributes to misunderstandings regarding responsibilities. These uncertainties, which could in large part be reasonably resolved through improved and increased communication and resultant coordination or through consolidation of responsibility, are somewhat exacerbated by an owner/tenant mentality among some personnel that seems to result in a tension between controlling forces rather than a team approach.

Range Management Issues

The range management issues result in part from the owner/tenant mentality noted above, but also from the mix of civilian and military personnel that are responsible for activities on UTTR. The 1990 ratio of military to civilian personnel at Hill AFB was 5,000 to 14,000. The civilian management style tends toward decentralized decision making and empowerment at lower levels of organization, while the military management style tends toward centralized decision making and control. When such different styles are present in two cooperating groups, misunderstandings and perceived slights tend to occur. It may be equally confusing when a given group is reassigned under a different management style and must change its internal management structure.

Thus, issues surrounding current range uses focus on the topics of scheduling, communication, responsibilities, and management. Such issues are typical of the operation of any large, complex endeavor having many players with diverse goals. Probably the most effective contributions toward resolution of these specific issues are improved communication, coordination, and an increased sense of teamwork and equal status among all players. Further, consolidation of real property and of target maintenance personnel and requirements would also reduce duplication of equipment, facilities, and skills; be more cost effective; and further facilitate communication, coordination, and teamwork.

4.5.1.2 Issues Between Present and Future Range Uses

Future range uses are generally anticipated to be similar to present range uses. UTTR is expected to continue to be used for testing of manned and unmanned air vehicles and training of their operators as well as for testing and disposal of munitions. Thus, present UTTR uses are expected to merge into future uses without abrupt change or specific conflict. There may be conflict regarding allocation of more tightly controlled funding, i.e., whether to allocate it toward long-range improvement of electronic sophistication or toward short-term training and testing missions. The trend will be toward increasing electronic sophistication of both training and testing missions, but this will never entirely replace training with "live" munitions, as pilots need to have first-hand experience in specific aspects of weapons delivery and successful egress in order to function effectively in a real adversarial situation. Similarly, there will continue to be tension between the use of manned and unmanned air vehicles, with unmanned vehicles unlikely to ever entirely replace the hands-on aspects of real conflict from either a personal perspective of individual involvement or an ethical perspective of depersonalized conflict.

4.5.1.3 Restrictions On Future Uses

The restrictions on future uses are likely to revolve around funding. Such restrictions will exacerbate ongoing conflicts between well-funded users and those with smaller budgets, types of training or testing, training vs. testing, electronic vs. live missions, and use of manned vs.

unmanned air vehicles. It will also increase the pressure to resolve range use issues such as scheduling, communication, responsibility, and management styles.

4.5.2 Issues Between Range Uses and Environmental Resources

Issues between range users and environmental resources may reflect impacts of range uses on environmental resources or limitations of environmental resource laws and regulations on range uses. These will be discussed in turn below.

4.5.2.1 Impacts of Range Uses on Environmental Resources

Impacts of range uses on environmental resources may be categorized into air impacts, ground-surface impacts, and below-ground impacts. These are discussed below and summarized on Tables 4.5-1 and 4.5-2.

Air Impacts

Air impacts include degradation of ambient air quality, increased noise levels, or intrusion into visual resources. Degradation of ambient air quality may be the result of emissions from air vehicles or munition detonation during either training or testing. Range maintenance and cleanup may also result in degradation of ambient air quality from detonation of unexploded munitions or the release of particulates into the air during the operation of heavy equipment.

Noise impacts may result from munitions detonation and operation of aircraft, particularly when airplanes attain supersonic speeds either in the SOA or, inadvertently, in other operating areas. The amount and dispersal of noise are highly variable and depend on temperature and cloud cover, which affect air density and the presence of reflective surfaces in the air. Other factors include the attitude of the airplane relative to reflective surfaces when the sonic boom is created since noise reflected off the fuselage may be greater than noise reflected off the wings of an airplane. Plotkin et al. (1992) analyzed flight operations and sonic boom propagation from 285 missions (1,196 sorties) that resulted in ACMI tapes between September 1989 and June 1990. Their data showed that 97 percent of the 1,196 sorties were flown by aircraft capable of supersonic flight (virtually all F-16s and a few F-4s) and that 72 percent of the sorties included supersonic flight. Of the 285 missions, 52 percent were predominantly east-west oriented, 34 percent were predominantly north-south oriented and 14 percent were a mixture of these two orientations. Supersonic flight occurred an average of three times per sortie at an average altitude of 20,600 feet and lasted for an average of 31 seconds at an average supersonic mach number of 1.04. By using these data in "BoomMap 3" software, the authors were able to predict the pressure footprint on the ground in the form of L_{cdn} contours. They found that the highest predicted L_{cdn} value, in the center of R-6406A, is slightly above 55 dB and that predicted L_{cdn} was in all cases below 61 dB, which is considered to be the threshold of significant adverse impact (Plotkin et al. 1992).

Since the degree of noise impact is in part dependent on how it is perceived by receptors (people and wildlife), the altitude and location of the noise are also factors influencing noise impacts. Airplane noise over wilderness areas, wildlife refuges, or homes has a greater perceived impact than noise over industrial areas. Similarly, airplane noise over nesting or other birthing areas for wildlife is more detrimental than noise in open foraging areas. It should also be noted that there is a difference of opinion regarding the legality of low-level (100 feet AGL) flights above wilderness areas. Further, there is disagreement as to whether the USFWS and FAA agreement regarding how low aircraft may fly above wildlife refuges applies to military flights. This disagreement is one reason that complaints are frequently received from Fish Springs National Wildlife Refuge regarding low-flying aircraft as noted below.

For use in registering noise complaints, a toll-free number for the 299th RCS has been distributed to area residents. When noise on UTTR is perceived by humans as an impact, the following five-step procedure is used to address complaints:

1. A range complaint form is completed and sent to the appropriate flying unit requesting investigation.
2. Results of the investigation by the flying unit are sent to the public affairs environmental coordinator (Ogden ALC/PAE).

3. Responses to the complaint are reviewed by the 501st RANS Commander and the Director of Airspace and Government Affairs.
4. A letter is sent to the caller explaining what occurred and describing the corrective actions taken.
5. A file of citizen complaints is maintained by the Director of Airspace and Government Affairs.

The environmental complaints filed as a result of this process seem to increase during the summer and decrease during the winter. A great majority of the complaints are from the vicinity of Hill AFB and may or may not be associated with flights on UTTR. Of the complaints received from UTTR, most involve low-flying aircraft, especially over Fish Springs National Wildlife Refuge, and low-flying aircraft and sonic booms, especially in the vicinity of the settlements such as Gold Hill, Callao, Trout Creek, and Partoun that are in the southwest quadrant of UTTR.

Impacts to visual resources are also in part dependent on how they are perceived by receptors. Impacts to visual resources include exhaust plumes from air craft, smoke plumes from detonated munitions, and even the presence of aircraft in otherwise isolated, natural areas. Such observations tend to be perceived negatively when they occur in locations such as wilderness areas where the observer is immersed in experiencing the natural environment. The same observations might be viewed by at least some travelers along I-80 as a welcome interruption of the monotony of the drive.

Air impacts (air quality, noise, visual resources) tend to be transitory. These impacts may have slightly altered human-use patterns in UTTR, or slightly altered biota species composition, population numbers, or the use patterns of sensitive individuals.

Ground-Surface Impacts

Ground surface impacts may affect the largely transitory surface water (flow and quality), the wetlands, soil, vegetation and wildlife (including threatened and endangered species), cultural resources (including paleontological, archeological and historical resources), and visual resources.

In addition, they may result in the presence of hazardous waste or other spills or residues. Such impacts primarily result from either training or testing missions that release munitions with spotting charges, full weight inert loads, or live munitions. The degree to which the ground surface and the natural resources present on it are disrupted depends on the size of the charges and the weight of the bomb. In addition to resources disturbed by direct impact, tremors from such direct impacts may startle wildlife or may affect cultural resources (e.g., a tremor may cause sloughing of cave walls containing petroglyphs).

Physical or chemical debris remaining after a munition has detonated is periodically removed during target maintenance and cleanup, categorized, and disposed. Probably the most potential for negative impact from such debris would be from any unexploded munitions of a type that can be detonated by slight movement. The siting and construction of targets may also cause disturbance to the ground or natural resources from clearing an area for a target and bringing a target in. Such disturbance may also result when wheeled vehicles perform ground training and munitions recovery. Finally, disturbance of the ground surface may result from installation of support facilities, such as fiber optic cables and cinetheodolites.

Below-Ground Impacts

The causes and more specific types of below-ground impacts are very similar to those of ground surface impacts except that they may affect rock formations and mineral resources as well as deeper soils and groundwater rather than surface water. Below-ground impacts may affect the geology of an area, mineral resources, groundwater, soil, paleontological or archeological resources, as well as result in the contamination of natural resources by generating hazardous wastes or other spills or residues.

4.5.2.2 Limitations of Environmental Resource Laws and Regulations on Range Uses

Environmental resource laws and regulations may affect the locations of range uses and their scheduling. Changes in existing range uses (i.e., changes in the area, type, or intensity of use) as well as new uses must be evaluated through the NEPA process (and its incorporation of associated resource-specific regulations), which may delay implementation of a desired mission if NEPA compliance has not been factored into the early planning phases of the mission. The results of the NEPA evaluation may constrain the location or season in which the mission may occur, may restrict the type or intensity of use, may require specific mitigation measures for impacts identified, or may disallow the mission altogether. The interaction between the NEPA process and range use is explored more fully in Section 5.0.

Table 4.1-1 Hill Air Force Base Payroll[1]

Year	Total Payroll ($)[2]	Change from Preceding Year ($)	Percent Change
1981	420,793,000		
1982	464,230,000	43,437,000	+ 10.3
1983	494,651,000	30,421,000	+ 6.6
1984	534,335,000	39,684,000	+ 8.0
1985	565,155,000	30,820,000	+ 5.8
1986	593,302,000	28,147,000	- 5.0
1987	586,206,000	- 7,096,000	- 1.2
1988	573,814,000	- 12,392,000	- 2.1
1989	590,113,804	16,299,804	+ 2.8
1990	602,149,511	12,035,707	+ 2.0

1 Cost and Information Team 1991
2 Total payroll for civilian and military personnel, FY81–FY90

Table 4.2-1 User Hours by Type of Activity—FY92[1,2]

	Test		Training		Other	
User	Scheduled	Used	Scheduled	Used	Scheduled	Used
Air Combat Command	5,353	1,332	16,628	16,628	291	171
Air Force Material Command	8,567	4,422	1,636	1,315	27,557	24,923
Dugway Proving Ground	5,085	3,645	1,111	957	280	195
Navy	0	0	895	478	2	0
Others	496	410	1,228	1,119	2,723	1,691
Total	19,501	9,809	21,612	20,497	30,853	26,980

1 SAIC 1993b

2 Based on individual sector hours; concurrent use of multiple sectors is not accounted for.

Table 4.2-2 Monthly Hours by Type of Activity—FY92[1,2]

	Test		Training		Other	
Sector	Scheduled	Used	Scheduled	Used	Scheduled	Used
October	2,441	1,240	1,522	1,527*	2,153	1,960
November	1,471	943	1,370	1,374*	2,054	1,843
December	1,517	537	1,161	1,179*	1,672	1,526
January	1,029	653	1,436	1,218	2,170	1,862
February	1,157	652	1,897	1,723	1,428	1,157
March	1,292	538	2,975	2,706	1,950	1,621
April	1,812	905	2,963	2,836	2,195	2,029
May	1,055	658	1,442	1,554*	2,717	2,365
June	2,022	948	2,448	2,113	3,723	3,056
July	2,110	1,020	1,154	1,056	3,671	2,982
August	2,034	1,194	1,679	1,774*	3,488	3,326
September	1,559	519	1,563	1,435	3,631	3,250
Total	19,501	9,809	21,612	20,497	30,853	26,980

1 SAIC 1993b

2 Based on individual sector hours; concurrent use of multiple sectors is not accounted for.

* Instances in which the training hours used exceed the hours scheduled for unknown reasons; hours are presented as provided in SAIC 1993.

Table 4.2-3 Sector Hours by Type of Activity—FY92[1,2] Page 1 of 1

	Test		Training		Other	
Sector	Scheduled	Used	Scheduled	Used	Scheduled	Used
NUTTR						
3	142	42	191	171	34	30
4	393	179	704	725*	792	412
C	262	121	70	55	30	33*
E	837	499	1,093	1,368*	1,096	878
F	366	182	184	187*	854	463
G	23	6	76	76	170	118
H	112	61	858	849	1,831	1,787
K	332	173	757	1,075*	429	279
N	2,136	1,896	597	538	4,912	4,754
Q	29	20	35	31	10	10
S	1,301	387	1,228	1,321*	1,926	1,158
SUTTR						
2	6,001	3,904	2,298	1,851	7,298	6,790
5	880	222	1,817	1,540	160	137
6	1,065	245	2,544	2,339	206	131
7	1,439	502	2,296	2,071	16	3
B	1,434	591	1,554	1,406	2,588	2,210
L	967	211	1,803	1,767	333	229
M	890	350	996	774	422	260
W	865	182	2,416	2,240	7,650	7,260

1 SAIC 1993b
2 Based on individual sector hours: concurrent use of multiple sectors is not accounted for.
* Instances in which the training hours used exceed the hours scheduled for unknown reasons; hours are presented as provided in SAIC 1993.

Activity/Geographic Area	Description/Use
TRAINING	
Entire UTTR	
	Air-to-air training
HAFR	
Coffin Live Drop Area	Over land (versus over water) operational weapons training
Craner's Target Complex	At the south end of the Newfoundland Mountains; Unmanned tactical range for inert bombs, chaff, and self-protection flares; nonscorable but TOSS planned Air-to-ground weapon delivery training for combat air crews
Drop/Landing Zones	Associated with TS-22 Used for exercises into the GAT
Eagle Range Complex	A manned, scoreable air-to-ground gunnery range near the northwest corner of the Grassy Mountains for inert bombs, inert 2.75" TP rockets, strafing, chaff, and flares Air-to-ground weapon delivery training for combat air crews
Ground Assault Target (GAT)	Directly north of and bordering the HAG Ground troop training
Helicopter Air-to-Ground Complex (HAG)	Unmanned tactical range for inert and live munitions, strafing, and illumination flares HE drop zone Inert training ordnance drop zone Air-to-ground weapon delivery training for combat air crews
Laser Tunnel	Bomber enhanced training Laser-guided inert bombs, and burst chaff
West, South-West of Eagle Range	Over land (versus over water) operational weapons training
Western Half of HAFR	Air-to-air training

Activity/Geographic Area	Description/Use
WAFR	
Air-to-Air Gunnery Range	Practice against towed targets
Kittycat	Authorized for conventional live munitions, rockets, HE strafe munitions, chaff, and flares against tactical targets, including simulated transportation infrastructure (rail yards, road bridges), airfields, convoys, and artillery Air-to-ground weapon delivery training for combat aircrews Delivery of HE ordnance
South-Central Airspace	Over land (versus over water) operational weapons training range
Western Half of Airspace	Air-to-air combat training for fighter aircrews Dart training
Wildcat	Unmanned, scorable tactical range for inert bombs and rockets, strafing, chaff, and flares against tactical targets, including simulated transportation infrastructure (rail yards, road bridges), airfields, convoys, and artillery Air-to-ground weapon delivery training for combat aircrews
Army Ground	
Sand Island Target Complex (TS-1, TS-2, TS-2A, TS-4)	TS-2 and TS-4 are primary targets. TS-2–impact target area (video, communication, and power support); TS-4 impact target area with 20 target pads, underground bunkers, vaults for power supply, interconnecting roads and fiberoptic links (video, communication, cinetheodolites, security cameras, and power support).
Baker Strongpoint	Unmanned tactical range for inert bombs, chaff, and self-protection flares; nonscorable but TOSS planned
W-166	Mountain target area directly north of Michaels Army Airfield
Other Army Ground	Over land (versus over water) operational weapons training Electronic warfare combat crew training

Activity/Geographic Area	Description/Use
TESTING	
HAFR	
TS-1	Cruise test target
TS-2	Laser, test target
TS-2A	Test target
T-3	A triangle WSEP (Weapon System Effectiveness Program) test target Live heavy-case impact fuses Conventional munitions sustainment/life-cycle testing for Ogden ALC Shelf-life testing
T-3W	Concentric circles (maximum 150-foot radius) Live heavy-case impact fuses
T-4	Includes threat pads, impact areas, remote control facility, and fiber optic links Conventional munitions sustainment/life-cycle testing for Ogden ALC Shelf-life testing
T-5	Shelf-life testing
T-11	Shelf-life testing
T-13	1,500-foot-diameter circle All types of inert munitions Shelf-life testing Disposal of dud munitions
T-14	Concentric circles (maximum 150-foot radius) Conventional munitions sustainment/life-cycle testing for Ogden ALC Shelf-life testing

Activity/Geographic Area	Description/Use
T-15	Nonscorable conventional targets for inert munitions, rockets, and strafing Conventional munitions sustainment/life-cycle testing for Ogden ALC Clearance of dud munitions Disposal of dud munitions
T-16	Nonscorable conventional targets for inert munitions, rockets, and strafing Conventional munitions sustainment/life-cycle testing for Ogden ALC
T-17	Nonscorable conventional targets for inert munitions, rockets, and strafing Conventional munitions sustainment/life-cycle testing for Ogden ALC
T-18	Conventional munitions sustainment/life-cycle testing for Ogden ALC Nonscorable conventional targets for inert munitions, rockets, and strafing
T-21	One hardened pad and three semihardened pads Live, time-delay CBU Conventional munitions sustainment/life-cycle testing for Ogden ALC Shelf-life testing Munitions testing Disposal of dud munitions
T-22	1,000- by 2,000-foot pad All types of inert and live flares
T-23	1,500- by 4,500-foot pad Live CBU munitions Shelf-life testing
T-24	Four semihardened 3,000- by 1,500-foot pads CBU munitions Shelf-life testing Munitions testing
T-26	Two pylons separated by one quarter mile Live, heavy-case impact or time-delay fusing Conventional munitions sustainment/life-cycle testing for Ogden ALC Shelf-life testing

Activity/Geographic Area	Description/Use
T-82	100-foot-diameter circle BLU-82 (15,000 pounds in weight) Munitions testing
Big Papa	HE ground test capability Propagation testing Munitions testing
CBU (Cluster Bomb Unit) Valley	Test range for live CBUs with impact fusing HE ground test capability Conventional munitions sustainment/life-cycle testing for Ogden ALC Propagation testing Munitions testing
Coffin Live Drop Area	Clearance of dud munitions Disposal of dud munitions
Craner's Target Complex	Clearance of dud munitions Disposal of dud munitions
GAU Test Area Ground Assault Target	Clearance of dud munitions Disposal of dud munitions
Halfway Between Big Papa and CBU Valley	Shelf life testing of various weapons
Helicopter Air-to-Ground Complex	Clearance of dud munitions Disposal of dud munitions
Homestead Knoll	2.75" TP rocket testing
Laser Tunnel	500-foot-long tunnel that leads to a 100-foot-diameter target Shelf-life testing Targets for laser-guided inert ordnance

Activity/Geographic Area	Description/Use
Missile Dissection Lab and Missile Motor Pads Testing Area North of Oasis	Dissection and testing of missile motors Intercontinental ballistic missile motor firings, tests, demilitarization/destruction
Thermal Treatment Unit	Disposal of excess/unserviceable munitions Disposal of large rocket motors
West of Homestead Knoll	Aircraft hangar door testing
West of Oasis	Intercontinental ballistic missile rocket motor storage
<u>WAFR</u>	
TS-3	Air-to-ground precision guided munitions test capability Active Target PGM/UAV test capability
TS-4	Active Target PGM/UAV test capability Weapon systems effectiveness program (air-to-ground weapons) Target seeking/radiation homing missile target complex Project Alpha testing (may be south of boundary and on Dugway)
South-Central Airspace	Unmanned air vehicles flight test and evaluation (including target drones) Unmanned air vehicle launch and recovery systems test and evaluation Cruise missiles flight test and evaluation Over land (versus over water) developmental weapon test
Wildcat	Unitary warhead weapon target complex
<u>Army Ground</u>	
TS-2	Submunition weapon test target complex
TS-2A	Project Alpha testing (may be north of boundary and on WAFR)

Activity/Geographic Area	Description/Use
Other Army Ground	Theater missile defense program—Target launch/booster impact Precision-guided weapon target complex Surface-to-surface missile launcher test and evaluation Unitary warhead weapon target complex Over land (versus over water) developmental weapon test range Department of Energy payload development/sustainment certification testing Unmanned air vehicles flight test and evaluation (including target drones) Conventional air launch cruise missile development and live warhead demonstrations Unitary warhead weapon target complex Surface-to-surface missile launcher test and evaluation
SUPPORT EQUIPMENT--HAFR & WAFR	
TOSS sites	
Cinetheodolite sites - special tracking cameras	
Telemetry sites (on and off range)	
Roads, rail, and other ground transportation facilities	
Helipads, runways, and other air facilities	

Table 4.2-5 Definitions of Aircraft Training Activities[1]

Activity	Description
STRIKE	These training sorties are for aircraft (typically 4 or more) to navigate, using aircraft navigation systems and visual terrain references, to a designated target, and simulate or actually employ air-to-surface ordnance on that target. Target area ingress/egress may occur at 500 ft agl to 29,000 ft msl, depending on simulated threat scenarios and target tactics. As these strikers navigate to their targets, they must use the escort aircraft assigned to them to defeat attacks on them or defend themselves against attacks on their force. Strikers maneuvers are limited by, either the heavy nature of their ordnance load, or by the altitude they choose for the ingress/egress.
INTERCEPT Training	Maneuvering by an average of six aircraft (could be from two to eight), using ground-controlled radar (GCR), aircraft radar, navigation and warning systems, and pilot visual dead reckoning to position aircraft into an offensive position near the opponent's aircraft that will enable employment of weapons systems. Aircraft on opposite sides of an intercept are required to maintain a minimum of 1,000 ft of altitude between opposing players.
LOWAT Training	Maneuvering as for intercept training, except there are also requirements to remain above 500 ft AGL at all times, and maneuvering is limited to no more than a single 180 degree turn when maneuvering is initiated below 5,000 ft AGL.
ACT/DACT	Air Combat Training (ACT) or Dissimilar ACT ([DACT] between different types of aircraft such as F-16s versus F-15s) are maneuvering by from 4 to __+ aircraft using a wide range of altitudes and lateral airspace. These aircraft will use GCI, aircraft radar, navigation and warning systems, and pilot visual dead reckoning to position aircraft on their side into offensive positions on aircraft of the opposite side, while not allowing aircraft from the opposite side to reach offensive positions of employ weapon systems against members of their side. Each side must maximize offensive opportunities and minimize defensive maneuvering to win the simulated battle. Unlimited maneuvering is authorized above 5,000 ft AGL, but limited maneuvering can be accomplished below 5,000 ft AGL.
CFT	Composite Force Training is maneuvering of large numbers of aircraft (typically 12+) simultaneously in the STRIKE, ACT/DACT, and LOWAT environments. A typical scenario includes STRIKE aircraft performing low altitude navigation to a designated target, while ESCORT aircraft engage bandits in the ACT/DACT role to keep the bandits from performing LOWAT attacks on the strikers.

1 Maquet 1995.

Table 4.2-6 Areas Where Explosive Ordnance Disposal Occurs on HAFR and WAFR[1]

Area	Disposal	Clearance
The HAG	X	X
The Coffin Live Drop area	X	X
The GAT	X	X
Craner's Complex	X	X
Eagle Range	X	X
Target TS-3	X	
Target TS-13	X	
Target TS-21	X	
Target TS-23	X	
Target TS-24		

1 Blake 1994.

Table 4.3-1 Summary of Memoranda of Understanding and Memoranda of Agreement Particularly Pertinent to the Interaction Between Natural Resources and Range Uses[1]

Agreement	Summary of Agreement
Memorandum of Understanding with UDWR for management of fish and wildlife	This Memorandum of Understanding establishes an agreement that UDWR will provide the Air Force with technical information necessary to coordinate actions pertaining to the operation, development, management, and protection of endangered species and other wildlife and fish at HAFR and WAFR.
Memorandum of Understanding with UDWR for Blue Lake	The Memorandum of Understanding makes UDWR responsible for the management of the wetlands, wildlife, and wildlife-related activities around Blue Lake Waterfowl Management Area.
Memorandum of Understanding with DNR for outdoor recreation	This Memorandum of Understanding establishes an agreement that UDWR will provide technical information pertaining to the operation, development, management, and protection of outdoor recreation resources on Air Force lands in Utah.
Memorandum of Understanding with USNPS for outdoor recreation	This Memorandum of Understanding establishes an agreement that USFWS will provide technical information necessary to coordinate actions pertaining to the operation, development, management, and protection of outdoor recreation resources on Air Force lands in Utah.
Memorandum of Understanding with USFWS for management of fish and wildlife resources	This Memorandum of Understanding establishes that USFWS will provide technical information necessary to coordinate actions pertaining to the operation, development, management, and protection of wildlife and fisheries resources, threatened and endangered species, and other natural resources on Air Force lands in Utah.
Memorandum of Understanding with FAA DOD for airspace	This Memorandum of Understanding establishes procedures to promote early coordination between FAA and DOD during the environmental review process associated with the establishment, designation, and modification of special use airspace proposed by DOD. The Memorandum of Understanding permits application of procedures to conduct environmental assessments, environmental impact statements, and findings of no significant impact.
Memorandum of Agreement with BLM for management of natural resources	This cooperative agreement establishes an agreement that BLM will provide technical information necessary to coordinate actions pertaining to the operation, development, management, and protection of natural resources on Air Force lands as outlined in the Fish and Wildlife Management Plan (U.S. Department of the Air Force, nd-a).

1 Copies of these agreements are available in Workman (1992c).

Table 4.3-2 General Summary of Air Quality Information

Author and Year	Subject	Summary
Unknown 1991a	PM-10	PM-10 concentrations in the Wasatch Front (AQCR), in micrograms per cubic meter, which include observations at Stations in Davis, Salt Lake, and Weber counties, have the following ranges: Annual arithmetic mean: 30–56 Highest 24-hour measurement: 94–177 Second highest 24-hour measurement: 80–176
Engineering Science, Inc. 1994	Nonattainment Areas	The closest nonattainment area (for sulfur oxides) is the Kennecott Copper Company stack, approximately 100 miles east of Gold Hill
Wasatch Front Regional Council 1980	Great Salt Lake Basin Wind	The Wasatch Front Region is an air basin where the local wind circulation (LWC) blows from the mountains during the night, and from the Great Salt Lake during the day. Winds probably carry some pollutants from one locality to another. The build-up of pollutants varies with the time of day and season. Dispersion is best on spring and summer days during upslope wind flow. Inversions occur on 245 days per year. Some pollutants, such as CO and ozone, may reach high levels in locations considerably removed from the original sources, due to the LWC. The use, storage, and transportation of toxic chemicals and biological or radiological substances should be carefully reviewed. The LWC could potentially distribute such materials throughout the air basin. Radioactive uranium mill tailings at the Vitro site in Salt Lake County are being slowly spread on a north-south axis by the LWC.
U.S. Department of the Air Force 1993b	Test Target Emissions	Current operations at test targets are estimated to generate approximately 44,000 pounds of SO_2, 99,000 pounds of CO, 781 pounds of nitrous oxides, and 14,000 pounds of TSP annually.

Author and Year	Subject	Summary
Unknown 1991a	EA for handling and storage of missile motors from the Minuteman II missiles planned for deactivation	Air quality will not be significantly affected by handling or storage of booster motors under normal operations. If disposal of a motor by open burning were required at the TTU, emissions of AL_2O_3, HCl, CO, and NO would occur, but would be well below their respective criteria concentrations and no impact on health or safety would occur.
James M. Montgomery Consulting Engineers, Inc. 1990	Air pathway modeling from the TTU at the UTTR	No standards were found for several major contaminants released by OB/OD operations, including chlorine, hydrogen chloride, nitric oxide and potassium hydroxide. "Reference values" for chlorine, hydrogen chloride, and nitric oxide were developed. Predicted ground-level concentrations indicate that all of the regulatory standards for airborne contaminants from the TTU will be met regardless of the direction that the wind may be blowing at the time of operation and of the downwind distance that a receptor may be from the TTU. Conservative estimates indicate that care should be taken when wind is blowing towards Oasis and the railroad camp at Lakeside, Utah, and the western part of the Great Salt Lake. Exposure to individuals on the lake may result in short-term, but reversible effects such as eye irritation.
U.S. Department of the Air Force 1991	EA for posting hazard warnings and installing safety fencing around the HAFR	Project could cause localized, short-term, and temporary degradation in air quality in the immediate vicinity of the post and fence installation, with rapid dissipation to nondetectable levels. Emissions from mobile sources would be a minor component. Control of fugitive dust would aid in mitigating any dust problems. The project will not significantly degrade air quality.
Unknown 1993	Open burning of Titan solid rocket motor forward segment at the UTTR	Primary pollutants of concern generated by the combustion of a Titan IV (SRMU) forward segment include CO, nitrogen oxides, and PM-10 particulate matter consisting of aluminum oxide and hydrogen chloride. The concentration of PM-10 produced under stability Class D and a low wind speed of 1 meter per second would exceed the applicable NAAQS. Under the same conditions, the DAQ guideline for the noncriteria pollutant HCl would be exceeded. All other modeled conditions would not result in any exceedance of standards or guidelines.

Author and Year	Subject	Summary
Unknown 1991b	Risk assessment for the TTU at the UTTR	Contaminants of potential concern were those compounds for which a NAAQS standard existed, i.e., NO_2, O_3, PM-10. O_3 was excluded because a trivial amount would be generated during operations. Compounds without NAAQS standards, defined as those for which short-term exposure limits and ceiling values of the American Conference of Governmental Hygienists and the Occupational Health and Safety Administration existed, were selected using an indexing methodology. Chlorine and hydrogen chloride were selected. Free radicals, unstable in the atmosphere, were also evaluated. Chlorine radicals, which would form chlorine gas, were selected.
Unknown No date	EIS for establishment of the gandy range extension and adjacent restricted airspace as an area for supersonic flight training	The proposed activity meets operational requirements and does not present a significantly different environmental impact from alternative sites. The resulting quantity of particulate matter, hydrocarbons, CO and oxides of sulfur and nitrogen is not expected to change ambient air quality in the area.
U.S. Department of the Air Force 1993b	Low-level supersonic operating area for test programs in the UTTR	The emissions associated with the proposed SOA would represent between 0.006 percent increase in emissions of TSP to a 0.37 percent increase in emissions of nitrous oxides. SO_2 would be increased by 0.05 percent. This impact is considered insignificant. Cumulative impacts were also evaluated. Concentrations of emissions are only a small fraction of the applicable NAAQS for CO, HCl, NOX, SO_2, and TSP.

Table 4.3-4 General Summary of Noise Information

Reference	Subject	Summary
A-50	EA for handling and storage of missile motors from the minuteman AA missiles planned for deactivation	No perceptible changes in noise levels at the UTTR is anticipated for handling and storage of missile motors from the minuteman II missiles. There may be a slight initial increase in air, truck, and rail traffic attributable to the deactivation program depending on the rate of deactivation. This will be followed by a cessation in vehicles transporting Minuteman II boosters for disassembly and storage. Any open burning of motors will result in an initial loud noise followed by a lower sound for several minutes as the motor burns. The remote location of the TTU on the UTTR is several miles distance form the nearest noise-sensitive receptor. No significant noise impacts are anticipated.
B-34	Gold Hill Noise	Gold Hill and its surroundings are rural areas with low background noise levels, but with existing conditions of sporadic overflight by low-level military aircraft.
B-17	Noise issues associated with wind	The diurnal LWC affects the public impact of roadway noise, since sound travels downwind.
B-24	Low-level supersonic operating area for test programs in the UTTR	ROUTEMAP analysis showed an expected L_{dnmr} value of 62 dB. The nearest community is about 45 miles from the area. The complex has no history of noise complaints although it receives an estimated 1300 sorties per year. Worse case scenarios for sonic booms showed the footprint overlain on each of target. All other cases would be encompassed within the footprints created by the worse case scenarios.

Author and Year	Subject	Summary
Utah State University Foundation 1992	Sonic Booms, aircraft noise, and supersonic flight operations at Wendover Air Force Range (SUTTR)	Sonic booms and noise associated with UTTR flight operations were monitored. Sonic booms and non-specific subsonic noise data were identified. Cumulative noise exposure results demonstrated insignificant subsonic noise events, more sonic booms inside the supersonic area than outside the supersonic area, and L_{cdn} values substantially below the threshold of 61 dB at which significant adverse impact would occur.
U.S. Department of the Air Force 1987	Noise assessment for military aircraft training routes, SAC low-level routes	Noise measurements performed under a low-altitude training route used by SAC aircraft showed maximum A-weighted sound levels and sound exposure levels for B-1 and B-52 aircraft. These data correlate with predicted values from the Air Force's existing data base.
U.S. Department of the Air Force 1991	Posting hazard warnings and installing safety fencing around HAFR	The project will not result in any degradation of public health or welfare conditions, nor significantly impact the natural and cultural resources adjacent to the project site.
Unknown 1993	Open burning of Titan IV Solid Rocket Motor Forward Segment at the UTTR.	This open burning will result in temporary increases in ambient noise levels due to vehicles transporting the forward segment to the TTU, and within the TTU itself for approximately 12 minutes. No noise-sensitive receptors are located near the TTU.
Unknown No date	EIS for establishment of the gandy range extension and adjacent restricted airspace as an area for supersonic flight training	Noise will result from two sources, the aircraft itself and sonic booms. There is an estimated probability of 35 percent that one or more booms will be heard per day, a 7 percent chance that two or more booms will be heard per day, and a 1 percent chance that three or more booms will be heard per day.

Table 4.3-6 Active Underground Storage Tanks at HAFR and WAFR (4/16/96)[1,2]

Tank No.	Tank Size (gallons)	Tank Use	Product	Installed	Regulated
20201.2	1000	heating	diesel	1/1/84	N
30209.1	1000	heating	diesel	Unknown	N
30210.1	1000	heating	diesel	Unknown	N
30220.1	1000	heating	diesel	1/1/64	N
30220.2	4000	battery	process	Unknown	N
30220.3	4000	battery	process	Unknown	N
30220.4	4000	battery	process	Unknown	N
30240.1	1000	heating	diesel	Unknown	N
40032.0	1000	heating	diesel	Unknown	N
40065.2	560	used oil	used oil	3/15/94	Y
50009.1	10000	aircraft	JP-4	3/15/94	Y
60000.0	30000	water	water	1/1/72	N
60015.0	10000	water	water	1/1/64	N

1 Johnson, S. 1996.

2 All tanks have been removed from WAFR.

Table 4.3-7 Potential Health and Safety Hazards Associated with Training Activities

Applicable Training Activities	Hazard	Potential Effects
Air to Ground Air to Air Ground Troop	Radio frequency	Heating of tissue, audible clicks in pulsed RF fields, possible biological effects
Air to Air Air to Ground	Inadvertent ignition of poorly shielded and grounded EED by RF emitters	Injuries or fatalities
Air to Air Air to Ground	RF Interference	Possible malfunction of instrumentation
Air to Air Air to Ground	Lasers	Permanent scarring, partial loss of sight, clouding of the cornea
Air to Air Air to Ground	Aircraft accidents	Injuries or fatalities
Air to Air Air to Ground	Accidental release of ordnance	Injuries or fatalities
Ground Troops	Flares	Ground fires
Air to Air Air to Ground Ground Troops	Aircraft and vehicle fuel	Injuries or death from explosion or fire, exposure to airborne gases and vapors
Air to Air Air to Ground Ground Troops	Unexploded ordnance	Injury or death

Table 4.3-8 Potential Health and Safety Hazards Associated with Testing Activities

Applicable Testing Activities	Hazard	Potential Effects
Ground Testing Air Testing	Radio frequency	Heating of tissue, audible clicks in pulsed RF fields, possible biological effects
Ground Testing Air Testing	Unexploded Ordnance	Injuries or fatalities
Ground Testing Air Testing	Missile Components	Exposure to hazardous chemicals, injuries or death due to firing
Ground Testing Air Testing	Lasers	Permanent scarring, partial loss of sight, clouding of the cornea
Ground Testing Air Testing	High Explosives	Exposure to hazardous chemicals, injuries or fatalities

Table 4.3-9 Potential Health and Safety Hazards Associated with Support Services Activities

Applicable Support Services Activities	Hazard	Potential Effects
Construction of Targets and other Facilities; Target Maintenance and Cleanup	Asbestos	Inhalation of fibers resulting in asbestos-related diseases
	PCBs	Contact may cause acne
	Construction safety hazards (e.g., slips, trips, and falls; exposure to dusts, mists, vapors, and gases from construction materials, and heavy equipment; pinch hazards)	Injuries or fatalities, exposure to hazardous materials
	Flammable/Combustible storage rooms hazards	Explosion, fire or exposure to flammable or combustible materials
Construction of Targets and other Facilities; Target Maintenance and Cleanup; Range Cleanup	Lead	Ingestion and inhalation of dust resulting in lead poisoning
	Unexploded ordnance	Injuries or fatalities
	Heat and cold stress	Heat exhaustion or heat stroke, hypothermia
Explosive Ordnance Disposal	Depleted uranium (suspected but not verified)	Internal radiation exposure hazard due to inhalation of oxide dust
Construction of Targets and other Facilities; Target Maintenance and Cleanup; Explosive Ordnance Disposal	Maintenance shop hazards (e.g., antifreeze, fuel oils, asbestos, heavy equipment, and pinch hazards)	Injuries or fatalities, exposure to hazardous materials
	Compressed gases	Injuries or fatalities due to explosion, fire, exposure to hazardous materials
	Battery charging storage areas	Injuries or fatalities due to explosion or fire, exposure to hydrogen gas, exposure and burns from sulfuric acid
	Aircraft and vehicle fuel storage and dispensing areas, including underground storage tanks	Injuries or fatalities due to explosion or fire, exposure to vapors and gases
	Unexploded Ordnance	Injuries or fatalities
	Pesticides	Exposure to pesticides such as Krovar

Table 4.3-9 Potential Health and Safety Hazards Associated with Support Services Activities

Applicable Support Services Activities	Hazard	Potential Effects
Target Maintenance and Cleanup; Explosive Ordnance Disposal	Lithium batteries	Damage to central nervous system, exposure to other hazardous materials associated with lithium batteries, explosion potential
	Missile Components	Exposure to hazardous chemicals, injuries or death due to firing
	High Explosives	Exposure to hazardous chemicals, injuries or fatalities
Communications; Target Maintenance and Cleanup; Explosive Ordnance Disposal	Microwaves	Eye cataracts and damage to gonads

Table 4.5-1 Types of Range Uses and Their Associated Environmental Disturbances

Range Uses	Air	Ground Surface	Ground Subsurface	Debris[2] (Chemical, Metal, and Other)
Training				
Air to Ground				
Strike[1]	Aircraft exhaust	Bomb impact	Bomb impact	Bombs
CFT[1]	Bombing dust	Strafing munitions impact	Strafing munitions impact	Bomb debris
	Strafing dust			Strafing munition debris
Air to Air				
Intercept[1]	Aircraft exhaust			
Lowat[1] Act/Dact[1]				
Ground Troops	Ground vehicle exhaust	Off-road vehicle (ORV) use		POL leaks
	Target maintenance dust			
Testing	Aircraft exhaust	Bomb impact	Bomb impact	Bombs
	Ground vehicle exhaust	Strafing munitions impact	Strafing munitions impact	Bomb debris
	Bombing dust	ORV use		Strafing munition debris
	Strafing dust			POL leaks
	Target maintenance dust			
Support Services	Ground vehicle exhaust	Earth moving	Earth moving	POL leaks
	ORV dust			

1 See Table 4.2-5 for definitions of these aircraft training activities.
2 Chemical, metal, or other debris may be left on or below the ground surface.

Table 4.5-2 Specific Environmental Resource Associated with Type of Environmental Disturbance

Specific Environmental Resource	Air	Ground Surface	Ground Subsurface	Debris[1]
Climatology	-	-	-	-
Geomorphology (caves)		X	X	
Mineral Resources		X	X	
Soils	X[2]	X	X	X
Surface Water		X		X
Ground Water			X	X
Aquatic Flora		X		X
Wetlands		X		X
Terrestrial Flora	X	X		X
Terrestrial Fauna	X	X		X
Threatened and Endangered Species	X	X		X
Archeological/Paleontological Resources	X	X	X	
Historical Resources	X	X		X
Visual Resources	X	X		X
Air Quality	X	X		
Noise	X	X	X	

1 Chemical, metal, or other debris may be left on or below the ground surface.
2 Acid fallout.

5.0 RANGE USE UNDER THE ACTION ALTERNATIVE

Because the UTTR Statement of Mission and Planning Objectives (Section 1.1) indicates that continuation of current activities is intended and because current activities are largely responsive to the needs of various customers using the range, the definition of specific alternative future-use scenarios was not possible. Rather, the action alternative assumes ongoing support to customer activities that are not specifically predictable. Therefore, several management options were developed for the action alternative that serve to guide NEPA compliance of different activities. Option 1 is a restricted version of the status quo, Option 2 is the status quo, and Option 3 is an expansion of the status quo. The Option 1 restrictions are based on information contained in Sections 3 and 4 with the intent of minimizing impacts to various resources (e.g., restrict the timing of some uses to minimize impacts to nesting raptors). Option 2 is the status quo in terms of areas of use, types of use, and intensity of use. Neither Option 1 nor Option 2 requires NEPA compliance activities beyond what has already been done. Option 3 encompasses those activities that would involve a change in the areas of use, the types of use, or the intensity of use. Option 3 requires further NEPA evaluation using the criteria established for UTTR. A more specific discussion of the management-option components of the action alternative follows (Section 5.1). The overall process for resolving range use issues and evaluating new range uses (Section 5.2) shows how these management options fit the overall evaluation of range use relative to NEPA.

5.1 MANAGEMENT OPTIONS FOR THE ACTION ALTERNATIVE

Options 1, 2, and 3 focus the management of UTTR under the action alternative with a site-specific evaluation process. This process takes into account specific information about UTTR.

Option 1 uses the information presented in Sections 3 and 4 to identify impacts that might be minimized. Because the ongoing operations at UTTR have already been approved under the NEPA process, Option 1 is not mandated by NEPA. However, its implementation is in compliance with the spirit of NEPA regarding the minimization of impacts. A number of suggestions are given below regarding the type of changes in range use that might minimize impacts:

- The scheduling of range uses producing emissions on days when weather conditions are likely to rapidly disperse those emissions is already a goal on UTTR and should be continued and maximized. Such emissions can be minimized by using electronics rather than inert live munitions to simulate warfare whenever possible and by eliminating spills that occur during mid-air refueling. The avoidance of ground disturbing activities associated with construction and maintenance on windy days will minimize degradation of air quality by particulates.

- The scheduling of range uses producing noise on days when there is no cloud cover and no temperature inversions that might reflect this noise toward the ground is already a goal on UTTR and should be continued and maximized. The scheduling of activities that produce loud noises during the winter when they are near human settlements would minimize their impact. The avoidance during late winter and spring of all low-altitude activities producing noise in areas where raptors are nesting or where large mammals congregate would minimize impacts on their reproduction. It has already been noted that the startle effect of sudden, loud, and nearby noise may cause peregrine and prairie falcons (which incubate with their feet beneath their eggs) to damage their eggs. Similarly, stress from loud noise and, perhaps, associated escape behavior may cause miscarriages among large mammals, especially when they are already stressed from a long winter.

- The scheduling of munition detonation on days when weather patterns will rapidly disperse any smoke plumes would minimize degradation of visual resources. Such conditions would also tend to disrupt temperature inversions and cloud cover that might reflect associated noise vibrations toward the ground.

- Impacts of range use on surface water and groundwater are for the most part minimal. Areas of concentrated runoff or high water table should be avoided by any activities that leave substantive amounts of physical or chemical residues on or below the ground. Similarly, impacts of range use on geological and mineral resources and on soils are for the most part minimal. The primary areas of attention regarding impact minimization for these physical resources would be avoidance of damage to caves, which should be monitored periodically, and strict appreciation of waste minimization procedures and rapid cleanup procedures.

- Impacts to biological resources may be more substantive, depending on when and where they occur. Direct impacts may be physical (e.g., from the direct impact of a bomb) or chemical (e.g., from fuel spills or bomb components). In addition, impacts to animals may occur as indirect impacts to their habitat or because they, like humans, may suffer physiological and psychological impacts. Disturbance of wetlands, particularly of wetlands with well-developed plant (and therefore animal) communities, should be avoided whenever possible. The two primary concerns regarding impacts to plants and animals are threatened and endangered species, and populations, particularly of upper trophic level species, which are present in fewer numbers, have longer reproductive cycles, and are therefore more susceptible to disturbances. Impacts to areas that provide potential habitat for threatened and endangered species, even if surveys have not detected any individuals of the species, should be avoided. Obviously if individuals of a threatened or endangered species are detected or the locale is determined to provide critical habitat for such species, they are legally protected and must not be adversely affected. Impacts to populations can be minimized by avoiding disturbances during breeding (including gestation, incubation, and brooding periods) and disturbances to isolated areas of uncommon habitats. Hence, the recommendation to avoid noises as well as other startle effects that would impact breeding raptors or cause excessive avoidance behavior by doe antelope while they are carrying fawns. Impacts to any areas on HAFR, WAFR, and Dugway that are determined to have unique communities (as are found on Floating Island, for example), should also be avoided.

- Cultural resources (paleontological, archeological, and historical) are susceptible to direct physical or chemical impacts, and also susceptible to being physically damaged indirectly by excessive vibrations. Therefore, the ongoing pedestrian surveys of areas likely to contain cultural resources are important and should be completed as soon as possible. Until such surveys are completed, all potential impacts, including indirect impacts from vibrations, should be avoided in areas likely to contain cultural resources.

In employing Option 1, a thorough review of all ongoing UTTR operations with an eye toward minimizing impacts might reveal other minor changes that would reduce impacts of range use on environmental resources. These suggestions might in part be implemented through environmental guidelines, but a program of ongoing education to keep users of the range attuned to minimization of impacts would also be effective.

Option 2 represents the status quo. Therefore, under this option, no changes in range use are envisioned and range use is as described in Section 4.

Option 3 encompasses those activities that would involve a change in the areas of use, the types of use, or the intensity of use. It thus requires further NEPA evaluation and implementation of a process described below in Section 5.2. Option 3 involves the following:

- Early integration of NEPA resource evaluations into the planning process by initiative of the group planning the new or changed activity, which should proactively involve EMX
- Use of the geographic information system (GIS) on Hill AFB to determine whether the location potentially affected by the new or changed activity has been surveyed for natural or cultural resources
- A preliminary "walk through" of the decision-tree process (Tables 5.2-1 and 5.2-2; Figure 5.2-1) by the group planning the new or changed activity and EMX to identify resources that may be affected, with particular attention given to those that may require field study

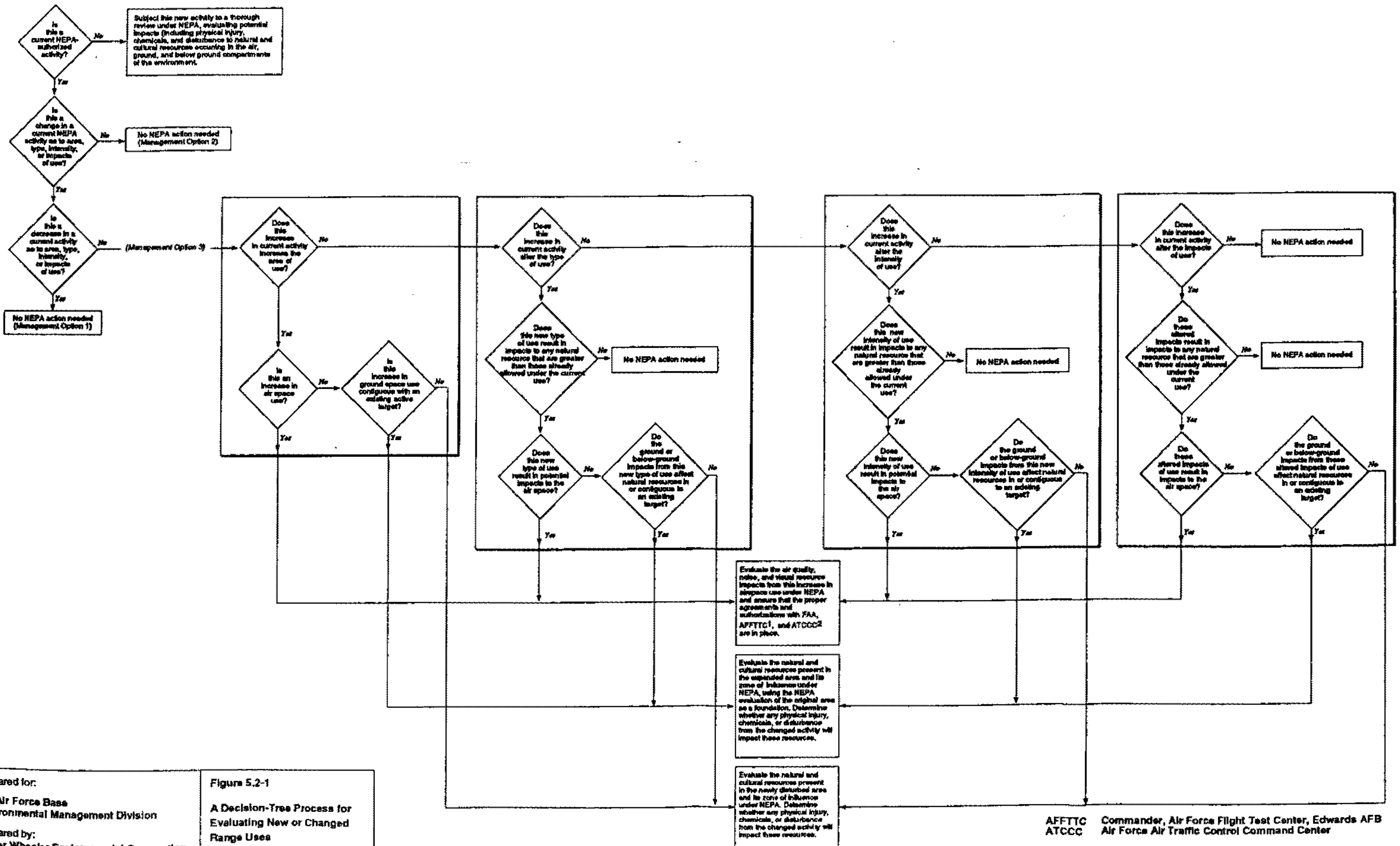
- A review of what site-specific data are available from the ongoing BLM/Utah State University (USU) study and the GIS database
- Planning of any needed field studies and their implementation during the appropriate season(s)
- Compilation and evaluation of additional information from the BLM/USU studies, the GIS database, and other pertinent resources
- A thorough application of the decision-tree process cooperatively by the group planning the new or changed activity and EMX
- Completion of the NEPA process by EMX

Thus, the primary focus of Option 3 is the early integration of NEPA process by the groups planning new or changed activities on UTTR. While official authority for implementing NEPA rests with EMX, EMX should not be placed in a position of "catching" planned activities that should involve NEPA. Rather, every group planning a new or changed activity on UTTR should proactively consider NEPA requirements when they are initiating their planning process and selecting the location and way in which their plan might be implemented. They should then proactively involve EMX in their more detailed planning.

An example of proactive consideration of NEPA requirements by groups directly supporting range uses might be the clustering of new or changed uses within a specific geographic area large enough to encompass all anticipated changes. Obtaining NEPA clearance for all anticipated changes would benefit range users by allowing freedom of action, within the bounds of specified mitigation, throughout the cleared area. Thus, within this geographic area the target complex could be modified, individual targets reconfigured, and new targets similar to the existing ones added, all within the definition of changes considered and approved under NEPA.

5.2 A PROCESS TO EVALUATE NEW OR CHANGED RANGE USES

A process for evaluating new or changed range uses relative to their environmental impacts and NEPA requirements is presented in Tables 5.2-1 and 5.2-2; it is charted in Figure 5.2-1. This process identifies the questions that need to be asked under Option 3, and how to proceed, based on



Prepared for:
Hill Air Force Base
Environmental Management Division

Prepared by:
Foster Wheeler Environmental Corporation

Figure 5.2-1

A Decision-Tree Process for Evaluating New or Changed Range Uses

AFFTTC Commander, Air Force Flight Test Center, Edwards AFB
ATCCC Air Force Air Traffic Control Command Center

positive or negative responses. If a particular response is not clear, the more conservative response relative to environmental protection should always be assumed and followed.

The careful sequencing and scheduling of this process to evaluate new or changed range uses are particularly important to its smooth implementation and to avoid impeding UTTR missions. Critical actions regarding sequencing and scheduling include the following:

- Integrate this process into the initial planning for a new or changed range use—it may need to be done again later when details are better known, but major "red flags" should be identified early in the planning and will not be dependent on details
- Remember that some information needed to follow the evaluation process must be collected from the field—this can take additional time to plan, schedule, collect, and analyze, particularly if there are seasonal or weather constraints
- Schedule any needed field investigation of biological organisms during periods when they are most readily observed—thus, evaluate threatened and endangered plants when they are blooming
- Schedule any needed field investigation of biological organisms during seasons that are critical to their use of UTTR—thus, evaluate birds and mammals during their breeding season on the lands to be affected by this use of UTTR; also perform a winter survey of any birds and mammals that use these lands during critical wintering periods.
- Schedule any needed field investigation of cultural resources during late spring to late fall when careful field work is possible, and resources will not be obscured by snow or ice.

Table 5.2-1 A Decision Tree Process for Evaluating New or Changed Range Uses[1]

1. Is this a current NEPA authorized activity
NO 22
YES 2

2. Is this a change in a current NEPA activity as to area, type, intensity, or impacts of use?
NO No NEPA Action Needed (Management Option 2)
YES 3

3. Is this a decrease in a current activity as to area, type, intensity, or impacts of use?
NO 4 (Management Option 3)
YES No NEPA Action Needed (Management Option 1)

4. Does this increase in current activity increase the area of use?
NO 10
YES 5

5. Is this an increase in airspace?
NO 7
YES 6

6. Evaluate the air quality, noise, and visual resource impacts from this increase in airspace use under NEPA and ensure that the proper agreements and authorizations with FAA, AFFTC (Commander, Air Force Flight Test Center, Edwards AFB), and ATCCC (Air Force Air Traffic Control Command Center) are in place.

7. Is this increase in ground space contiguous with an existing active target?
NO 9
YES 8

8. Evaluate the natural and cultural resources present in the expanded area and its zone of influence under NEPA, using the NEPA evaluation of the original area as a foundation. Determine whether any physical injury, chemicals, or disturbance from the changed activity will impact these resources.

9. Evaluate the natural and cultural resources present in the newly disturbed area and its zone of influence under NEPA. Determine whether any physical injury, chemicals, or disturbance from the changed activity will impact these resources.

10. Does this increase in current activity alter the type of use?
NO 14
YES 11

11. Does this new type of use result in impacts to any natural resource that are greater than those already allowed under the current use?
NO No NEPA Action Needed
YES 12

12. Does this new type of use result in potential impacts to the air space?
NO 13
YES 6

13. Do the ground or below-ground impacts from this new type of use affect natural resources in or contiguous to an existing target?
NO 9
YES 8

14. Does this increase in current activity alter the intensity of use?
NO 18
YES 15

15. Does this new intensity of use result in impacts to any natural resource that are greater than those already allowed under the current use?
NO No NEPA Action Needed
YES 16

16. Does this new intensity of use result in potential impacts to the air space?
NO 17
YES 6

17. Do the ground or below ground impacts from this new intensity of use affect natural resources in or contiguous to an existing target?
NO 9
YES 8

18. Does this increase in current activity alter the impacts of use in any way?
NO No NEPA Action Needed
YES 19

19. Do these altered impacts result in impacts to any natural resource that are greater than those already allowed under the current use?
NO No NEPA Action Needed
YES 20

20. Do these altered impacts of use result in impacts to the air space?
NO 21
YES 6

21. Do the ground or below ground impacts from these altered impacts of use affect natural resources in or contiguous to an existing target?
NO 9
YES 8

22. Subject this new activity to a thorough review under NEPA, evaluating potential impacts (including physical injury, chemicals, and disturbance) to natural and cultural resources occurring in the air, ground, and below ground elements of the environment.

1 Shaded rows indicate alternative actions; bolded rows denote further action

A. Air Quality Checklist

1. Will the new or changed activity result in any emissions?
NO No further consideration of air quality impacts needed.
YES 2

2. Are any of these emissions regulated substances (chemicals or particulates) under the Clean Air Act?
NO No further consideration of air quality impacts needed.
YES Model the quantities of these emissions and develop a mitigation plan to bring them into compliance with regulatory concentrations if they are not already in compliance.

B. Noise Checklist

1. Will the new or changed activity result in unusually loud or sudden noises?
NO No further consideration of noise impacts needed.
YES 2

2. Will the new or changed activity occur in areas that are used for raptor breeding, critical wintering or birthing or other sensitive uses by wildlife or in areas inhabited by people or used by people for a wilderness experience?
NO 3
YES 4

3. Will the new or changed activity occur in areas where cultural resources might be damaged by noise induced vibrations?
NO No further consideration of noise impacts needed.
YES 4

4. Does the new or changed activity include plans for supersonic sound?
NO Develop a mitigation plan to adequately minimize impacts of this noise to receptors.
YES Avoid this activity during sensitive seasons of the year and develop a mitigation plan to adequately minimize impacts of this noise to receptors at other times of the year.

C. Visual Resource Checklist

1. Will this new or changed activity result in any permanent change in the visual resources of the area?
NO No further consideration of visual resource impacts needed unless temporary impacts are in immediate vicinity of a wilderness area. In this case, a mitigation plan to consider ways to minimize perceptual impacts might avoid subsequent complaints.
YES Develop a mitigation plan to adequately minimize impacts of these visual resource impacts.

D. Surface Water Checklist

1. Will this new or changed activity impact surface water?
NO No further consideration of surface water impacts needed.
YES 2

2. Will this new or changed activity impact surface water flow?
NO 3
YES Develop a mitigation plan to adequately minimize the impacts to surface water flow.

3. Will this new or changed activity impact surface water quality?
NO No further consideration of surface water impacts needed.
YES Model the extent of water quality degradation and develop a mitigation plan to bring anticipated concentrations into compliance with regulatory concentrations if they are not already in compliance.

E. Ground Water Checklist

1. Will this new or changed activity impact ground water?
NO No further consideration of ground water impacts needed.
YES 2

2. Will this new or changed activity impact ground water flow?
NO 3
YES Develop a mitigation plan to adequately minimize the impacts to ground water flow.

3. Will this new or changed activity impact ground water quality?
NO No further consideration of ground water impacts needed.
YES Model the extent of water quality degradation and develop a mitigation plan to bring anticipated concentrations into compliance with regulatory concentrations if they are not already in compliance.

F. Geology Checklist

1. Will this new or changed activity impact geological resources?
NO No further consideration of geological resource impacts needed.
YES 2

2. Will this new or changed activity directly (or indirectly from vibration) impact caves?
NO No further consideration of geological resource impacts needed.
YES Determine whether there are cultural or other resources of worth in the caves that might be damaged by these impacts. If so, develop a mitigation plan to adequately minimize impacts to these resources.

G. Mineral Resource Checklist

1. Will this new or changed activity impact economically important mineral resources?
NO No further consideration of mineral resource impacts needed.
YES Remove the mineral resources prior to initiation of the activity, or develop a mitigation plan to adequately minimize impacts to these resources.

H. Soil Checklist

1. Will this new or changed activity impact soils in any way that damages wetlands, vegetation, or economically important mineral resources?
NO No further consideration of soil impacts needed.
YES Evaluate impacts to wetlands, vegetation, or mineral resources.

I. Wetland Checklist

1. Will this new or changed activity impact wetlands in any way?
NO No further consideration of wetland impacts needed.
YES 2

2. Will this new or changed activity alter the water supply supporting the wetland?
NO 3
YES Avoid impacts to the wetland water supply or develop a mitigation plan that will adequately mitigate these impacts.

3. Will this new or changed activity alter the quality of the water supporting the wetland?
NO 4
YES Model the extent of water quality degradation and develop a mitigation plan to bring anticipated concentrations into compliance with regulatory concentrations if they are not already in compliance.

4. Will this new or changed activity physically damage the wetland itself?
NO No further consideration of wetland impacts needed.
YES Avoid physical impacts to the wetland or develop a mitigation plan that will adequately mitigate these impacts.

J. Vegetation Checklist

1. Have the plant communities in this area been surveyed and mapped?
NO Schedule a pedestrian survey of the plant communities to determine whether any unusual or less common plant communities or communities that might provide critical habitat for threatened and endangered species are present.
YES 2

2. Are any unusual or less common plant communities or communities that might provide critical habitat for threatened and endangered species present?.
NO No further consideration of plant community impacts needed.
YES Map the plant communities and either avoid affecting the plant communities of interest or develop a mitigation plan that will adequately mitigate impacts to those communities.

K. Wildlife Checklist

1. Have the wildlife species and populations in this area been surveyed?
NO 2
YES 3

2. Perform a pedestrian survey of the area to be disturbed as well as its environs. Include small mammal trapping as well as observations of other species. 3

3. Are the plant communities or other aspects of the ecological setting such that they are likely to support unusual assemblages of wildlife or nesting or denning areas for upper trophic level species?
NO No further consideration of wildlife impacts needed.
YES Avoid affecting the area completely or develop a mitigation plan that will adequately mitigate impacts to wildlife, including avoidance of the area during the breeding season.

L. Threatened and Endangered Species Checklist

1. Has this area been surveyed for threatened and endangered species
NO 2
YES 4

2. Is this area a likely location for threatened and endangered species to occur?
NO 3
YES Schedule a pedestrian survey for threatened and endangered species as soon as possible to avoid impeding approval of new or changed use.

3. Confirm the low likelihood that threatened and endangered species might occur in this area with a regional expert and obtain USFWS clearance for this new or changed use.

4. Were threatened and endangered species found?
NO Obtain threatened and endangered species clearance for this new or changed use.
YES 5

5. Is there a reasonable alternative location for this new or changed use?
NO 6
YES 1

6. Can the impact on threatened and endangered species be adequately mitigated?
NO Abandon the new or changed use
YES 7

7. Does this new or changed use warrant mitigation for the threatened and endangered species present at the proposed location?
NO Abandon the new or changed use
YES Develop and implement a mitigation plan for the threatened and endangered species

M. <u>Paleontological Resource Checklist</u>

1. Has this area been surveyed for paleontological resources?
NO 2
YES 4

2. Is this area a likely location for paleontological resources to occur?
NO 3
YES Schedule a pedestrian survey for paleontological resources as soon as possible to avoid impeding approval of new or changed use.

3. Confirm the low likelihood that paleontological resources might occur in this area with a regional expert and obtain paleontological clearance for this new or changed use.

4. Were paleontological resources found?
NO Obtain paleontological clearance for this new or changed use.
YES 5

5. Is there a reasonable alternative location for this new or changed use?
NO 6
YES 1

6. Are the paleontological resources present at the proposed location of sufficient value to warrant mitigation?
NO Obtain paleontological clearance for this new or changed use.
YES 7

7. Can the paleontological resources be adequately mitigated?
NO Abandon the new or changed use
YES 8

8. Does this new or changed use warrant mitigation for the paleontological resources present at the proposed location?
NO Abandon the new or changed use
YES Develop and implement a mitigation plan for the paleontological resources

N. <u>Archeological Resource Checklist</u>

1. Has this area been surveyed for archeological resources
NO 2
YES 4

2. Is this area a likely location for archeological resources to occur?
NO 3
YES Schedule a pedestrian survey for archeological resources as soon as possible to avoid impeding approval of new or changed use.

3. Confirm the low likelihood that archeological resources might occur in this area with a regional expert and obtain archeological clearance for this new or changed use.

4. Were archeological resources found?
NO Obtain archeological clearance for this new or changed use.
YES 5

5. Is there a reasonable alternative location for this new or changed use?
NO 6
YES 1

6. Are the archeological resources present at the proposed location of sufficient value to warrant mitigation?
NO Obtain archeological clearance for this new or changed use.
YES 7

7. Can the archeological resources be adequately mitigated?
NO Abandon the new or changed use
YES 8

8. Does this new or changed use warrant mitigation for the archeological resources present at the proposed location?
NO Abandon the new or changed use
YES Develop and implement a mitigation plan for the archeological resources

O. <u>Historical Resource Checklist</u>

1. Has this area been surveyed for historical resources
NO 2
YES 4

2. Is this area a likely location for historical resources to occur?
NO 3
YES Schedule a pedestrian survey for historical resources as soon as possible to avoid impeding approval of new or changed use.

3. Confirm the low likelihood that historical resources might occur in this area with a regional expert and obtain historical clearance for this new or changed use.

4. Were historical resources found?
NO Obtain historical clearance for this new or changed use.
YES 5

5. Is there a reasonable alternative location for this new or changed use?
NO 6
YES 1

6. Are the historical resources present at the proposed location of sufficient value to warrant mitigation?
NO Obtain historical clearance for this new or changed use.
YES 7

7. Can the historical resources be adequately mitigated?
NO Abandon the new or changed use
YES 8

8. Does this new or changed use warrant mitigation for the historical resources present at the proposed location?
NO Abandon the new or changed use
YES Develop and implement a mitigation plan for the historical resources

1 Shaded rows indicate alternative actions; bolded rows denote further action.

6.0 ENVIRONMENTAL CONSEQUENCES OF THE ALTERNATIVES

The two alternatives considered in this RMP\EA are no action and the proposed action. The no action alternative would reject this document and continue operating on the basis of the 1975 RMP. The action alternative would implement this RMP\EA, thereby incorporating current information on the environmental resources of the UTTR, providing information on current range uses, and implementing a stepwise and focused process for early considerations of NEPA precepts by users of UTTR.

The basis for evaluating these two alternatives is provided in detailed discussions of the following:

- Extensive environmental considerations whose regulatory basis and UTTR implementation are provided in Sections 4.3.2.1 through 4.3.2.13 as an integral part of ongoing range use
- The interface of environmental considerations with range uses in Section 4.3.2.14
- Health/safety considerations and their interface with range uses in Section 4.3.3
- Range use issues among range users and between range uses and environmental resources in Section 4.5

All of these discussions are an integral part of the Section 4 description of past, present, and future range uses. As such, they also provide a detailed consideration of the environmental consequences of the proposed action.

The no action alternative would bypass the new information on the affected environment and the up-to-date description of range uses. It would also forego the analysis of environmental and health/safety considerations and their interface with UTTR activities. Finally, it would fail to benefit from the suggestions for minimizing impacts from range uses and maximizing the efficiency of NEPA compliance, but its early incorporation into the thought process of those planning new or changed range uses.

Therefore, there are numerous benefits from acceptance of the proposed action and parallel detriments from its rejection in favor of the no action alternative. No benefits have been identified from rejection of the proposed action. Therefore, the proposed action is also the preferred action.

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1988a. Fourth Annual Report, Jly.1, 1988, A Study of the Flora and Fauna of Hill Air Force Base and the Utah Test and Training Range with Special Emphasis on Avoidance of Bird Strike by Aircraft, and Wildlife and Habitat Inventories for Management Plans. Prepared for Environmental Management Directorate, U.S. Air Force, Hill Air Force Base, Utah under Contract F42650-84-C-3559, Mod.P00001 by Utah State Univ. Foundation, Cooperative Extension Service, Dept.of Fisheries and Wildlife, Utah State Univ.

1988b. Second Quarterly Report, Jan.1, 1988, A Study of the Flora and Fauna of Hill Air Force Base and the Utah Test and Training Range with Special Emphasis on Avoidance of Bird Strike by Aircraft, and Wildlife and Habitat Inventories for Management Plans. Prepared for Environmental Management Directorate, U.S. Air Force, Hill Air Force Base, Utah under Contract F42650-84-C-3559, Mod.P00001 by Utah State Univ. Foundation, Cooperative Extension Service, Dept.of Fisheries and Wildlife, Utah State Univ.

1988c. Second Quarterly Report, Sonic Boom Study on the Wildlife in Gandy Range Extension. Prepared for the Department of the Air Force, Air Force Materiel Command, Hill Air Force Base under Contract No. F42650-87-C-0349 by Utah State University Foundation.

1988d. Third Quarterly Report, Apr.1, 1988, A Study of the Flora and Fauna of Hill Air Force Base and the Utah Test and Training Range with Special Emphasis on Avoidance of Bird Strike by Aircraft, and Wildlife and Habitat Inventories for Management Plans. Prepared for Environmental Management Directorate, U.S. Air Force, Hill Air Force Base, Utah under Contract F42650-84-C-3559, Mod.P00001 by Utah State Univ. Foundation, Cooperative Extension Service, Dept.of Fisheries and Wildlife, Utah State Univ.

1989a. First Quarterly Report, Jan.1, 1989, Sonic Boom Study on the Wildlife in Gandy Range Extension. Prepared for the Department of the Air Force, Air Force Materiel

Command, Hill Air Force Base under Contract No. F42650-87-C-0349 by Utah State University Foundation

1989b. Second Quarterly Report, Jan.1, 1989, A Study of the Flora and Fauna of Hill Air Force Base and the Utah Test and Training Range with Special Emphasis on Avoidance of Bird Strike by Aircraft, and Wildlife and Habitat Inventories for Management Plans. Prepared for Environmental Management Directorate, U.S. Air Force, Hill Air Force Base, Utah under Contract F42650-84-C-3559, Mod.P00001 by Utah State Univ. Foundation, Cooperative Extension Service, Dept.of Fisheries and Wildlife, Utah State Univ.

Workman, G. and A. Flannery

1989. A General Survey of the Geology, Minerals and Hydrology of Northwestern Utah. A special report prepared for the U.S. Air Force by Utah State University, Logan, Utah.

Workman, G.W., and D.L. Peterson

1989. Raptor Nesting and Habitat Parameters on U.S. Air Force Lands in Northwestern Utah; a Special Report. Prepared for the U.S. Air Force under Contract No. F4650-84-C-3537, Mod. P00001 by the Cooperative Extension Service, Department of Fisheries and Wildlife, Utah State University

Workman, G. W. with:

Arkush, Brooke S., William B. Fawcett, and La Dawn Neilson

1992a. A 1991 Archaeological Assessment of U.S. Air Force Designated Lands in Utah. Report on file Ogden Air Logistics Center, Office of History, Hill Air Force Base, Utah.

Bunch, T.D., L.S. Neilson, E.M. Rawlings, J.W. Call, R.C. Evans, N.R. Lundberg, W.T. Maughan, and J.E. Braithwaite.

1992b. Sonic Boom/Animal Disturbance Studies on Pronghorn Antelope, Rocky Mountain Elk, and Bighorn Sheep. Prepared for the Dept. of the Air Force, Air Force Materiel Command, Hill Air Force Base under Contract No. F42650-87-C-0349 by Utah State University Foundation, Dept. of Fisheries & Wildlife, Dept. of Animal Dairy and Veterinary Sciences

Maughan, W.T., L.S. Neilson, T.R. Hougaard, and E.M. Rawlings

1992c. Composite Natural Resource Management Plan for the Hill Air Force Range, Wendover Air Force Range, and Little Mountain Test Facility, Utah.

Nielson, L.S., K.J. Plotkin, and C.L. Moulton,

1992d. Measurements of Sonic Booms and Aircraft Noise and Analysis of Supersonic Flight Operations in the Aircraft Military Operating Areas Associated with the Wendover Air Force Range, Utah. Prepared by Utah State University Foundation, for Hill Air Force Base, Utah,

Arkush, Brooke S., William B. Fawcett, and La Dawn Neilson
1993a. Second Annual Report - An Archaeological Assessment of U.S. Air Force Utah Test and Training Range: The 1992 Field Season. Report on file Ogden Air Logistics Center, Office of History, Hill Air Force Base, Utah.

Demars, L.C., and L.S. Neilson
1993b. A general Survey of the Geology, Minerals and Hydrology of northwestern Utah, Volume II, A special report. Prepared for the U.S. Air Force by the Utah State University Foundation, Department of Fisheries and Wildlife, Utah State University, Logan, Utah.

Demars, L.C., and L.S. Neilson
1993c. Third Annual Report - An Archaeological Assessment of U.S. Air Force Utah Test and Training Range: The 1993 Field Season. Report on file Ogden Air Logistics Center, Office of History, Hill Air Force Base, Utah.

Demars, L.C., and L.S. Neilson
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Zier, Christian J.
1984. A Class II Cultural Resource Inventory of the U.S. Army Dugway Proving Ground, West-Central Utah. MS on file, Antiquities Section, Utah Division of State History, Salt Lake City.

8.0 CONSULTATION AND COORDINATION

The information used in this RMP/EA was obtained from existing documents and file information available through EMX and EME at Hill AFB, from documents and file information obtained by visiting federal and State resource agency offices in Salt Lake City, by interviewing EMX and EME resource personnel at Hill AFB, by interviewing federal and State resource personnel, by interviewing representatives of numerous user groups from UTTR, by distributing questionnaires to a number of user group personnel (some of which were fully or partially completed and returned), and through critique of a 50 percent draft of this document that contained requests for additional information on specific topics. Specific information received from documents, file information, or personnel interviews is cited in the text and in Section 7. Documentation regarding interviews and questionnaires can be found in Appendix A.

9.0 LIST OF PREPARERS

Name	Responsibility Regarding Document
Hill AFB, Ogden ALC/EMX	
Kay Winn	Project Management
Numerous Hill AFB/UTTR Personnel and Users	As noted in References Cited
Dames and Moore, Salt Lake City	
Greg Gault	Project Management
Everett Bassett	Preparation of Section 3.5
Foster Wheeler Environmental, Denver	
D. Jean Tate	Technical Oversight and Integration Preparation of Sections 1, 2, 3.4, 4, 5, 6, 7, 8
Dina Sassone	Preparation of Sections 3.1, 4.3.2, 4.3.3
Terry Sindelar	Preparation of Sections 3.2, 3.3
Barbara Walz	Preparation of Sections 4.3.1, 4.3.2
Foster Wheeler Environmemtal, Bellevue	
Dennis Burns	Preparation of Sections 3.6, 4.1, 4.2.1
Betsy Minden	Preparation of Section 3.6
Enviro-Support, Incorporated	
D. Jean Tate	Technical Oversight Revisions Responding to Comments on 90 Percent Draft Draft FONSI Preparation

APPENDIX A.1

QUESTIONNAIRES

Summary Table of Questionnaires Sent and Received

Sample Questionnaire

Summary of Questionnaires Sent and Received

GROUP	REPRESENTATIVE	DATE QUESTIONNAIRE SENT	DATE OF MEETING ON QUESTIONNAIRE	DATE QUESTIONNAIRE RETURNED
75th Air Base Group				
	Captain John Hennessey	10-Nov	none	
Civil Engineering				
	Mr. Ron Short	10-Nov	15-Nov	
Explosive Ordnance Disposal				
	Sgt. Lyn Llewellyn		none	
	Staff Sgt. Dan Blake	16-Nov	16-Nov	2 Dec.94
Other Base Support Facilities				
	Mr. Terry Olson	10-Nov	15-Nov	
649th Squadron (Munitions)				
	Captain Dave Bartkowiak	10-Nov	16-Nov	
388th Wing				
	Mr. Jet Trainor	10-Nov	16-Nov	
729 Communications Squadron				
	Ryk Peterson	10-Nov	none	
419 Wing				
	Major Mike Maquet	10-Nov	16-Nov	
545th Test Group				
	Mr. Al Rydman	10-Nov	16-Nov	~20 Nov.94 + 14 Dec.94
	Mr. Barry Webster	10-Nov	none	
501st Range Squadron				
	TE			
	Mr. Boe Hadley	10-Nov	phone message	
	Mr. Bob Bowker	10-Nov	phone message	
	TF			
	Capt. Steve Hayden	passed on to	none	2 Dec.94
	TR			
	Mr. Tom Nass	10-Nov	none	15 Nov.94--Bract + Trn.Pamp.
	Mr. Duane Dickman	10-Nov	15-Nov	
	Range Operations			
	Mr. Carmie Zaccardi	10-Nov	15-Nov	
	Mr. Roy Fudge	10-Nov	15-Nov	17 Jan.95
	Greg Cicconi	14-Nov	15-Nov	
	KR			
	Mr. Tice Ashurst	10-Nov	none	
501st Range Control Squadron				
	Mr. Todd Trinnaman	10-Nov	15-Nov	
	Mr. Ray Smith	10-Nov	16-Nov	
514 Flight Test Squadron				
	Mr. Gary Potter	10-Nov	16-Nov	
299th Range Control Squadron				
	Major Mike Nice	29-Nov	none	
XR Division (Plans, Programs, and Resources)				
	Mr. John Raccasi	10-Nov	none	
	Lt. Col. Rick Huddleston	10-Nov	none	
	XRP			
	Mr. Bill Van Wagenen	10-Nov	16-Nov	14 Dec.94

Summary of Questionnaires Sent and Received

GROUP	REPRESENTATIVE	DATE QUESTIONNAIRE SENT	DATE OF MEETING ON QUESTIONNAIRE	DATE QUESTIONNAIRE RETURNED
	Ms. Diena Dalebout	10-Nov	none	
	Mr. Mike Dalton	10 Nov + 2 Dec	none	
EN Division (Engineering)				
	Mr. Dean Bergevan	10-Nov	none	
	Test Engineering Branch			
	ENA (?Acquisition Branch)			
	Mr. Bill Frost	10-Nov	-	
	Mr. Bob Gubler	16-Nov	16-Nov	
	Mr. Dave Gange	-	16-Nov	
TF Directorate (Test Forces)				
	Dave Robertson	10-Nov	16-Nov	
	Capt. Steve Hayden	~10 Nov	2-Dec	
SE Office (Safety)				
	Jim Banas	10-Nov	16-Nov	
LI (landing gear)				
	K.S. Hansen	10-Nov	16-Nov	
	Tech Sgt. Fowler	-	none	
	Tech Sgt. Gibbons	-		
LM (missles, motor dissection)				
	Clint Hansen	10-Nov	none	
	Rick Atkinson	10-Nov	none	
Retirees:				
	Mr. Gene Craner	na	11-Nov	17 Jan.95 Copy of interview with Radian received, no questionnaire
	Mr. Bob Arnold	29-Nov	none	17 Jan.95
	Mr. Andy Clark	29-Nov	none	
	Mr. Jess Brown	29-Nov	none	
	Mr. Ted Vaughn		none	
	Mr. Glen Davis		none	
Supplemental Recipients				
	John Grosnickle	29-Nov	phone, Dec 5	
LI/LM?	Trish Hladsky	?	15-Nov	
	Ray Tidwell	29-Nov	phone, 20-21 Nov	
	Bob LeRoy	?	15-Nov	
EME	Dennis Weder	~Dec 13		
EMX	Murray Sant	~Dec 13		
	Reed Ostlund	14-Dec		

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS OGDEN AIR LOGISTICS CENTER (AFMC)
HILL AIR FORCE BASE, UTAH

8 November 1994

MEMORANDUM FOR SEE DISTRIBUTION

FROM: OO-ALC/EME
7274 WARDLEIGH ROAD
HILL AFB UTAH 84056-5137

SUBJECT: Questionnaire on Utah Test and Training Range

The Directorate of Environmental Management has contracted for the updating of the Range Management Plan (RMP) for the Hill Air Force Range (North) and the Wendover Range (South). The contractor is preparing a baseline document and an Environmental Assessment (EA) of the RMP. An important part of this project is documentation of the past, present (1990-1994), and the future uses of the north and south ranges.

Since you are responsible for an important aspect of the range use or are highly familiar with use of the range, we are requesting your help in obtaining this information. Attached are questions for which we need your answers. Please follow the instructions and provide as much detail as possible for each activity you know about. Please complete a separate Part II and Part III for each activity you identify and mark on the map in part I. Extra copies of the questionnaire are available upon request.

Please complete all your questionnaires and return to OO-ALC/EM attention Kay Winn or Mike Petersen. Our consultants, Jean Tate and Dennis Burns will meet with you on 14 or 15 November to answer questions. They plan to spend one day at Hill and one day at Oasis. Please have draft questionnaires completed by that time so that you can ask specific questions that are not clear.

Lynn S. Hill

LYNN S. HILL
Chief Environmental Compliance Division

Attachments
1. Questionnaire
2. Distribution

November 8, 1994

Dear ________

As you may know, the Environmental Management Division and the 545th Test Group are currently updating the Range Management Plan (RMP) for the Utah Test and Training Range (UTTR)-North (Hill Range) and UTTR-South (Wendover Range). We are also preparing an Environmental Assessment (EA) to address implementation of the new plan. An important part of this process is the documentation of past, present (1990 to 1994), and future uses of UTTR-North and UTTR-South. Since the last RMP was prepared in 1975, we are particularly interested in the past between 1976 and 1989.

Because you are responsible for an important aspect of range use or are highly familiar with range use, we are requesting your help in obtaining information. Attached are questions for which we need your answers. Please follow the instructions and provide us with as much detail and numerical information as you can for each range use that you know about. You should complete a separate Part II and Part III for each of the range uses you identify and mark on the map in Part I. I have extra copies of the questionnaire if you need them.

Please complete all your questionnaires and return them to Kay Winn by November 21. She will express them to our consultants, Jean Tate and Dennis Burns (whom some of you met in early October) by November 23. Jean and Dennis will meet with you on 14 or 15 November to answer any questions you may have. They plan to spend one day (November 14) at Hill Air Force Base (Building 5, 2nd floor Conference Room) and one day (November 15) at Oasis (EME Office). Please have draft questionnaires complete by that time so that you can ask about specific questions that are not clear.

Please call Jean Tate (303-980-3564) or Dennis Burns (206-451-4675) to let them know what time you can meet and if you have questions. Your point of contact at Hill Air Force Base is either Kay Winn (7-7651) or Mike Petersen (7-1449). The attached distribution list shows the names of all who have been sent the questionnaire. If you believe we have left someone off the list who would be especially knowledgeable and helpful, please let one of the above people know.

Sincerely,

Distribution:

<u>75th Air Base Group</u>
Captain John Hennessey
Civil Engineering
Mr. Ron Short
Explosive Ordnance Disposal
____
Other Base Support Facilities
Mr. Terry Olson
649th Squadron (Munitions)
Captain Dave Bartkowiak
<u>388th Wing</u>
Mr. Jet Trainor
729 Communications Squadron
Ryk Peterson 7-0674
<u>419 Wing</u>
Major Mike Maquet
____
<u>545th Test Group</u>
Mr. Al Rydman
Mr. Barry Webster
501st Range Squadron
TE
Mr. Boe Hadley
Mr. Bob Bowker
TR
Mr. Tom Nass
Mr. Duane Dickman
Range Operations
Mr. Carmie Zaccardi
Roy Fudge
KR
Mr. Tice Ashurst
514 Flight Test Squadron
Mr. Gary Potter
299th Range Control Squadron
Todd ____________
Mr. Ray Smith
XR Division (Plans, Programs, and Resources)
Mr. John Raccasi
Lt. Col. Rick Huddleston
XRP
Mr. Bill Van Waggonnen
Ms. Diena Dalebout
Mr. Mike Dalton

EN Division (Engineering)
Mr. Dean Bergevan
Test Engineering Branch

____

ENA (?Acquisition Branch)
Mr. Bill Frost

TF Directorate (Test Forces)

____

SE Office (Safety)

____

LI (landing gear)
K.S. Hansen

LM (missles, motor dissection)
Clint Hansen
Rick Atkinson

Retirees:
Mr. Gene Craner
Mr. Bob Arnold
Mr. Andy Clark
Mr. Jess Brown
Mr. Ted Vaughn
Mr. Glen Davis

Your Name: ______________________

UTTR - North and South Ranges
Past, Present, and Future Range Use Inventory/Description

General Instructions: Over the years the ranges have been used for many different purposes. Some of the missions have been well documented, but many have not. Your knowledge about the uses (past, present, and future) of the range is needed in order to prepare a current management plan for UTTR. The following questions and enclosed maps are designed to help you think about the kinds of information that are needed. Please study these materials closely and identify in Part I below all uses of the range that you are aware of. Please mark on the map, using the "use code letter", all the places where you know this range use occurred. Two maps are included so you can make extra copies if your first map starts to become cluttered.

In Part II below, please describe each present and past use, using the questions provided for guidance. More detail is preferable for any of the uses, but if you only know a little about a specific use, please tell us what you know, and include any contacts or other sources of information (including reports or other publications) that may contain additional information. You should complete a separate set of Part II questions for each use you identified in Part I. Part III addresses future uses. **Please answer all questions that are pertinent. Use as many copies of the answer sheet as you need. Remember to be specific, detailed, and use numbers whenever you can. If your numbers are estimates, please tell us.**

Part I. Present and Past Uses of UTTR
Please list all present and past uses of the range which you are aware of and check the appropriate time frame. Be as specific as you can. Put the use code letter on the map in all the places you know the use occurred. If the use was contained within the areas marked on the map (Ex. HAG, TTU), just put the letter on the map. If the use area was different than the area drawn, please draw the correct area boundary on the map. If the use occurred outside the defined areas, please draw in where it did occur. Please avoid abbreviations - explanations should be for lay persons.

Some examples may include the following:
- (A) destruction of munitions
- (B) destruction of rocket engines
- (C) testing munitions shelf life
- (D) bomber enhanced training

Use Code Letter:	*Use:*	*Use Time Frame*
A.		pre-1976__, 1976-1989__, 1990-1994__
B.		pre-1976__, 1976-1989__, 1990-1994__
C.		pre-1976__, 1976-1989__, 1990-1994__

(If additional space is required, please use spaces continued on the next page

Part I (continued) *Your Name:* ______________________

Use Code Letter	*Use*	*Use Time Frame*
D.		pre-1976__, 1976-1989__, 1990-1994__
E.		pre-1976__, 1976-1989__, 1990-1994__
F.		pre-1976__, 1976-1989__, 1990-1994__
G.		pre-1976__, 1976-1989__, 1990-1994__
H.		pre-1976__, 1976-1989__, 1990-1994__
I		pre-1976__, 1976-1989__, 1990-1994__
J.		pre-1976__, 1976-1989__, 1990-1994__
K.		pre-1976__, 1976-1989__, 1990-1994__
L.		pre-1976__, 1976-1989__, 1990-1994__
M.		pre-1976__, 1976-1989__, 1990-1994__
N.		pre-1976__, 1976-1989__, 1990-1994__
O.		pre-1976__, 1976-1989__, 1990-1994__
P.		pre-1976__, 1976-1989__, 1990-1994__
Q.		pre-1976__, 1976-1989__, 1990-1994__
R.		pre-1976__, 1976-1989__, 1990-1994__
S.		pre-1976__, 1976-1989__, 1990-1994__
T.		pre-1976__, 1976-1989__, 1990-1994__
U.		pre-1976__, 1976-1989__, 1990-1994__
V.		pre-1976__, 1976-1989__, 1990-1994__
W.		pre-1976__, 1976-1989__, 1990-1994__

Part II. Description of Each UTTR Use

Your Name: ______________________

1. Identify the use that is discussed on this page and the letter used to mark it on the map.

2. List the places where this use occurred. Use official names and include local names when appropriate.

3. How often does this use occur? How often did this use occur in the past? (Note frequency of use, monthly maximum, minimum, and averages, annual use for last 5 years, historic use [since 1976 and prior to 1976]. Note any sources for this information, including publications, files, databases, personal knowledge, etc.)

4. Describe the timing of this use. Was it done exclusively during daylight hours, mostly during daylight, or both day and night? Is it done only in certain seasons, or year round? Percentages of use during these time periods would be helpful. Please note sources.

5. Are there other uses that occur in the same area or at the same time as this use? Do they conflict with this use? Are there ways you might recommend to minimize this conflict?

6. What kind of support functions are required for your specified use? Some examples might be cameras, radar/telemetry, fueling depots, roads, and runways.

7. Who provides these support functions?

8. What type of aircraft or other vehicle is associated with this use? Does it release spent fuel vapors or other emissions? Please note on the following scale where the noise level falls when you are on the ground just beneath the aircraft at its lowest point, or when you are 0.5, 1.0, or 2.0 miles from the spot beneath the aircraft at its lowest point.
   - 30 decibels (very soft whisper)
   - 70 dB (conversational level)
   - 90 dB (shouting voice)
   - 120 dB (large chipping hammer)
   - 130 dB (pipe organ)
   - 145 dB (4-propeller airliner)
   - 160 dB (turbo-jet engine)
   - 165 dB (turbo-jet engine with afterburner)
   - 195 dB (Saturn rocket)
   - 225 dB (12" cannon at 12 ft. in front and below)

9. What live munitions, inert munitions, or other releases are associated with this use? What are these devices made of and what are they filled with? For example, what kind of propellant do they contain and do they carry chemicals such as agent simulants? What electronic devices or other monitoring instruments are associated with this use?

Your Name: ______________________

10. What residue is left in the area after your indicated use is completed? Some examples might be inert ordnance, live unexploded ordnance, spent shell casings, partially demolished targets, scrap metal, unburned propellant, spilled fuel residue, chemicals, etc.) Be as specific as you can, giving amount of each residue type and the area it typically covers.

11. Over how large an area is the residue left in the area spread? Is there a potential for this residue to be outside this typical area? If so, how far outside it?

12 What is done after the indicated use to collect, eliminate, or dispose of this residue? Who is involved in this process? How have these cleanup measures changed through the following time periods: pre-1976, 1976-89, 1990-94?

13. For this indicated use, was any additional airspace used beyond that immediately above the UTTR North and South Ranges? If so, what is the extent of the airspace used? Is this additional airspace required for the indicated use, desirable but not required, or optional?

14. As best you can identify, what are the effects on the surface of the land due to this indicated use? Examples could include craters, residual chemicals, loss of vegetation, risk of fire, displacement of wildlife, surface water contamination, etc. Be as specific as you can.

15. As best as you can identify, what are the subsurface effects on the land due to this indicated use? Examples could include groundwater contamination, craters, shock waves, etc. Be as specific as you can.

16. What other effects are expected due to this indicated use? Examples could include air quality deterioration, increased dust, noise from supersonic or subsonic flights, etc.

17. Is this use likely to continue in the near future? In the long term? Will there likely be more uses of this type scheduled for the UTTR? Will there likely be increased future conflicts with other uses because of this use?

18. Is there anything additional you would like to add about this type of use?

Part III. Future Uses of UTTR

Your Name: ______________________

What will UTTR look like and what kind of activities and missions will be conducted on the ranges in the year 2000? Will the needs of the various users be different from what it is today? What about in the year 2020? Please think about future use based on what you know about present and past use and using any information about the future you may have heard.

1. Over the next 5 years - In general terms, do you think that the UTTR will serve functions that are similar to or different from current and past functions?

very similar	somewhat similar	don't know	somewhat different	very different

2. Over the nest 5 years - In general terms, what do you think the demand for future UTTR functions will be?

much less	a little less	about the same	a little more	much more

3. Over the next 25 years - In general terms, do you think that UTTR will serve functions that are similar to or different from current and past functions?

very similar	somewhat similar	don't know	somewhat different	very different

4. Over the next 25 years - In general terms, what do you think the demand for future UTTR functions will be?

much less	a little less	about the same	a little more	much more

5. Think for just a moment about UTTR uses between the years 1976 and 1989. Compare the uses of the range during that period to pre-1976 uses and to UTTR uses in the 1990's. Do you think the range uses in those periods were different or similar. Describe the differences or similarities.

6. What do these differences or similarities in use between the present and various periods in the past imply for the future?

7. For the present or past range uses you expect to continue into the future, describe how you would expect them to change. Examples may include modifications in equipment, procedure, the balance between testing and training functions, the mix between electronic and "live" targets, and the kind of munitions to be tested.

Part III (continud)

Your Name: ______________________

8. Describe new uses you expect to occur in the future.

9. If you anticipate the frequency of use or demand for UTTR resources to change in the future, describe the kind of changes you would foresee. Examples may include increased need for night or limited visibility training, more destruction of missile motors expected, less demand for "live" targets such as trucks and tanks, etc.

10. What range use changes would you recommend to make your (or your successor's) job more effective or easier? Think about both current uses and functions of the range, and possible future functions, up to 20 or 25 years from now. Also think about operational issues (location and convenient access to support facilities and targets, scheduling, etc.) as well as environmental issues (permits, regulations, area permitted, etc.). What kinds of problems have you experienced or do you anticipate that could be improved by planning? Give specific planning recommendations.

11. Describe the annual planning process for UTTR use. How are plans made for how many support people and how much support equipment will be needed for the next year? How are appropriated funds distributed among these resources?

12. What type of base level of UTTR use is projected by the 501st Range Squadron, the 514th Test Squadron, the 388th Wing and 419th Wing.? Are there other regular users of the ranges? How much advance notice of UTTR use is received from outside users such as the 366th Wing, the marines, the Washington National Guard, etc.

13. What is the 1995 fiscal year budget for use and use support on the UTTR ranges? What is the budget for the next 5 years of UTTR use?

14. Please add any other comments you would like to make about UTTR use, the planning process, existing or future uses of the range, sources of information available, etc.

Answer Sheet *Your Name:* ____________________

Use Code Letter: ____ *Use:* ________________________________

Part ________ *Question Number* ________ *Sheet* ___ *of* ___

(make as many copies of this page as you need)

APPENDIX A.2

INTERVIEWS

Summary Table of Interview Documentation

Interview Documentation: Contacts and Information Resources

Person Initiating Contact	Subject	Information Resource Organization/Phone No.	Contact Date and Comments (Topic)
Barbara Walz	UST	Sam Johnson, EMR, (801) 777-8790	October 13 or 14, 1994 - List of Underground Storage Tanks
Barbara Walz	UST	Cpt. Dave Crow, EME Hazardous Waste Permitting/Compliance, (801) 777-0288	October 14, 1994 - RCRA permitted UTTR activities on the north range
Barbara Walz	Spill Plan	Lisa Aschbrenner, EMP, (801) 777-1897	October 13 or 14, 1994 - Spill plan for north and south ranges
Barbara Walz	Water	Pat Sullivan, EME, (801) 777-1449	October 13 or 14, 1994 - Water issues, drinking and wastewater
Barbara Walz	PCBs	Walter Wilson, EME, (801) 777-0288	October 13 or 14, 1994 - PCB management
Barbara Walz	Solid Waste Landfill	Jeff Nusser/Lisa Powell, EME/EMP, (801) 777-0359	October 13 or 14, 1994 - Solid Waste Landfill permitting
Barbara Walz	Air Quality	Mike Graziano, EME, (801) 777-0359	October 13 or 14, 1994 - Air quality and monitoring/permitting
Barbara Walz	TTU	Steve Dodge, EMH, (801) 777-3215	October 13 or 14, 1994 - Thermal treatment unit (TTU) hazardous waste generation/treatment
Barbara Walz	Noise	D.H. Beecher, Box Elder County Zoning Department, Brigham City	March 12, 1996 - Letter regarding county noise standards
Barbara Walz	Health and Safety	Carrie Fisher, Range Safety Officer, (801) 777-1053	October 13 or 14 - Health and Safety (industrial hygiene) standards used at HAFB
Barbara Walz	IRP	Shane Hirschi, EMR/IRP, (801) 777-8790	October 13 or 14, 1995 - IRP sites, and corresponding reports and permits
Barbara Walz		Loni Johnson, Hill AFB Real Estate, (801) 777-2500	January 4 and 9, 1995 - Telephone and telefax communication regarding ingrants and outgrants
Dennis Burns	Flight Missions	Maj. Mike Maquet, 419th Wing, AFRES, (801) 777-3505	November 16, 1994 - Air-to-Air and Air-to-Land flight missions
Dennis Burns	Air Space	Ray Smith, 501 RCS, Gary Potter 514 Flight Test Squadron,545 TESTG; Capt. Dave Bartkowiak, 649th Squadron Munitions 75th ABW	November 16, 1994 - UTTR Airspace tracking
Dennis Burns	Ordnance Clean-up	SSgt. Daniel Blake, EOD, 75th ABW	November 16, 1994 - Explosive ordnance clearance and disposal
Dennis Burns	Land Use	Jim Banas, Al Rydman, 545th TESTG, (801) 777-7852	November 16, 1994 - List of land uses at UTTR
Dennis Burns	Flight Missions	Bill Van Wagenen, XR Div., 545th Test Group, (801) 777-7852; Jet Trainor, 388th Wing, 75th ABW, (801) 777-6926 or (801) 540-1064	November 16, 1994 - Flight mission drop and survival exercises
Dennis Burns	Shooting Area Map	Kay Hansen, LI, (801) 777-5642	November 16, 1994 - Discusses map of areas where munitions are shot with tracers
Dennis Burns	Land Uses	Trish Hladsky, Bob Leroy, LI/LM, Todd Trianamon, Range Control, Duane Dickman 545th Test Group, Ron Short, 75th ABW, (801) 777-1547 or 1545	November 15, 1994 - List of land uses, air space activities
Dennis Burns	Dugway Activity	Greg Cicconi, Camlie Zacchardi, Roy Fudge, 501st RANS,545th TESTG, (801) 777-5343	November 15, 1994 – Activities conducted at Dugway Proving Ground
Dennis Burns	Land Use	Terry Olsen, Base Support (Safety), 75th Air Base Group	November, 15, 1994 - Lists of land uses and EOD records
Dennis Burns	Land Use	Shane Hirschi, EMR, Lisa Aschbrenner, EM-EMP, (801) 777-1897	October 13 or 14, 1994 - Land use implications
Dennis Burns	Landfills	Jeff Nusser, EME, Lisa Powell, EMP, (801) 777-1359	October 14, 1994 - Landfill designations

Interview Documentation: Contacts and Information Resources

Person Initiating Contact	Subject	Information Resource Organization/Phone No.	Contact Date and Comments (Topic)
Dennis Burns	Permitting	Cpl. Dave Crow, EME Hazardous Waste Permitting/Compliance, (801) 777-0288	October 14, 1994 - Permitting the TTU and UTTR
Dennis Burns	Land Use and Permitting	Mike Graziano, EME, (801) 777-0359	October 13 or 14, 1994 - TTU usage and permitting
Dennis Burns	Land Use	Walter Wilson, Pat Sullivan, EME, (801) 777-1449	October 13 or 14, 1994 - Land use at TTU and lithium battery storage and disposal
Dennis Burns	Fire Dept./EOD	Bob Arnold (retired) (801) 865-0314	November 21, 22, 1994 - Mentions records kept by the Fire Dept. and EOD
Dennis Burns	Personnel	Associate of John Grossnickle, CE, 75th Air Base Group	ND - Outlined specific job activities
Dennis Burns	Squadron descriptions	Maj. Mike Nice, 299th Range Control Div., 545th Test Group (801) 777-9415	November 22, 1994 - General description of duties of the 299th and 501st Range Control Squadrons
Dennis Burns	Squadron functions	Todd Trinnamon, Ray Smith, 501st Range Control, 545th Test Group (801) 777-1519	November 22, 1994 - General description of 501st Range Control
Dennis Burns	BRAC	Mike Dalton, XR Div. 545th TESTG, (801) 777-7852	November 22, 1994 - Obtaining BRAC materials
Dennis Burns	Unsuccessful interview	Gene Craner (retired)	Several attempts were made to reach Mr. Craner, all of them unsuccessful
Dennis Burns	UTTR	Maj. Andy Clark, (retired) (801) 484-0631	November 23, 1994 - Maj. Clark recommends contacting Mr. Craner for UTTR history
Dennis Burns	UTTR	Ron Davis, Booz, Allen and Hamilton, (703) 902-4960	December 6, 13, 1994 - Mr. Davis offers several contacts for obtaining information on UTTR issues He has been involved with UTTR for several years.
Dennis Burns	EOD definitions	Sr. Airman Newcomer, 649th EOD, 75th Air Base Group	December 20, 1994 - Clarification between two EOD references (clearance vs. disposal)
Dennis Burns	RMP	Ron Short, 75th Air Base Group/Civil Engineering, (801) 777-1546,1547	November 8, 1994 - 501st, 514th, and 545th functions, testing functions, and necessity of RMP for UTTR
Dennis Burns	Squadron functions	Doug Hebden, Engineering Div., 545th Test Group	November 16 and December 20, 1994 - Functions of 545th Test Group, Engineering Div. vs. those of 75th Air Base Group, Civil Engineering Testing on HAFR and WAFR (lot testing, munitions, etc.)
Dennis Burns	Land Use	Rick Wilcox, Utah State Lands Division, Salt Lake City, UT	November 14, 1994 - State land-holdings within UTTR boundaries
Dennis Burns	Questionnaire	Various HAFB user group representatives.	Various dates - Phone calls were made regarding the questionnaire.
Dennis Burns	Questionnaire	Capt. John Hennessey, 75th RANS, (801) 777-1578	November 2, 1994 - Level of information for questionnaires
Dennis Burns	Land Use	Brad Barber, Utah Office of Planning & Budget, Demographics & Economics (801) 538-1036	January 11, 1995 - Legislation regarding land use and wilderness designations
Dennis Burns	Population Census	Karen McInnis, Utah Office of Planning & Budget, Demographics & Economics, (801) 538-1550	January 11, 1995 - Census information for Wendover, West Wendover, Gold Hill
Dennis Burns	Questionnaire	Paul Bugg, U.S. Office of Management & Budget, (202) 395-3080	October 18, 1994 - Federal restrictions/requirements for distributing questionnaire

Interview Documentation: Contacts and Information Resources

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Dennis Burns	RMP	Al Rydman, 545th TESTG (801) 777-7852	January 5, 1995 - Combining "list of uses" from 1975 RMP with those from Mr. Rydman's list
Dennis Burns	EOD	Sr. Airman Newcomer, 649th EOD 75th Air Base Group	January 10, 1995 - Types of vehicles/transportation used in EOD; designation of EOD (i.e., squadron, under 75th Air Base Group)
Dennis Burns	Squadron functions	Barry Webster, 545th TESTG, (801) 777-9557	January 11, 1995 - Functions and designation of several squadrons, wings, and groups
Dennis Burns	Squadron functions	Ron Short, 75th Air Base Group/Civil Engineering (801) 777-1546	January 12, 1995 - Organization of squadrons
Dennis Burns	Organization	Kay Winn, EMX, (801) 777-7651	January 12, 1995 - Organization and functions of EMX, EMR, 649th,75th CEG, RANS, etc.
Dennis Burns	EOD	Steve Dodge, EMH (801) 777-3215	October 13 or 14, 1994 - EOD shipping, disposal, reporting, and other functions at UTTR
Everett Bassett	UTTR Archived Info.	Dr. Klinko, Base Historian, (801)777-4002	November 30, 1994 - Discusses status and location of archival materials with regard to UTTR.
Everett Bassett	UTTR Archived Info.	Lt. Bronson, Inquiries Branch, Air Force Archives, Maxwell AFB, Montgomery, AL, (205) 953-5723	December 1, 1994 - Discusses status and location of archival materials with regard to UTTR
Everett Bassett	Paleontology on UTTR	Dr. David Gillette, Utah Geological Survey, (801) 467-7970	October 20 and December 1, 1994 - Discussed the nature and significance of paleontological resources on HAFR and WAFR.
Everett Bassett	Paleontology on UTTR	Dr. David Madsen, Utah Geological Survey, (801) 467-7970	October 18 and 19, November 30, and December 5 and 19, 1994 -Discussed the Legacy program and paleoenvironmental research in the Lakeside Mtns.
Everett Bassett	Paleontology on UTTR	David Schmitt, Utah State Historical Society (801) 533-3500	October 18 and 20, December 2 and 19, 1994 - Discussed the Legacy program and excavations at Homestead Knoll Cave
Everett Bassett	Paleontology	Dennis Weder, EME, (801) 777-0288	October 13, 1994 - Discussed various landforms and features and the potential for cultural resources in the area
Everett Bassett	UTTR history/ archival mat'l	David Kendziora, HAFB (801) 777-7651	December 1, 1994 - Discussed history of UTTR and status of archival material for UTTR
Everett Bassett	Site Archaeology	Debbie Hall, EMX (801) 777-7651	November 31, 1994 - Site archaeological files being characterized as "guarded", therefore we could not access them
Everett Bassett	Site Archaeology	Debbie Hall, EMX, (801) 777-7651	November 31, 1994 - Second contact Site archaeological reports are provided, but not site records Discusses availability of resources in the future
Everett Bassett	Site Archaeology	Dr. Brooke Arkush, Weber State University, (801) 575-4344	December 10 and 27, 1994 - Discussed archaeological surveys around UTTR and potential for cultural resources
Everett Bassett	Site Archaeology	Jim Dykman, Utah State Historical Society, (801) 533-3500	December 2, 1994 - Discussed compliance issues and potential resources for history of the area
D. Jean Tate	Permitting and Compliance	Capt. Dave Crow, EME, Hazardous Waste Permitting/Compliance, (801) 777-0288	October 14, 1994 - Discussed RCRA permitting and compliance and SWMU identification

Interview Documentation: Contacts and Information Resources

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D. Jean Tate	Biota	Marcus Blood, EMX (801) 777-4618	October 13, 1994 - Natural resource data, wetlands, fish and wildlife biology data, and lists of resources for the above are discussed
D. Jean Tate	Field Notes	Dennis Weder and Mike Peterson, EME, (801) 777-0288, or -1449	October 11 and 12, 1994 - General information regarding HAFR and WAFR obtained during tours and helicopter survey of the ranges
D. Jean Tate	Field Notes	Field Notes	October 11 land 12, 1994 - Field notes transcribed from tape recorder during field visits to HAFR and WAFR
D. Jean Tate	Field Notes	Field Notes	October 15, 1994 - Transcribed field notes (from tape recorder) and photo documentation from Dugway site visit
D. Jean Tate	Field Notes	Field Notes	November 15, 1994 - Field notes and photo documentation
D. Jean Tate	TTU	Lt. Tracey Barnes, EME, (801) 777-0288	April 15, 1996 - Potential future transfer of Tooele OB/OD activities to TTU.
D. Jean Tate	Ordnance Clean-up	SSgt. Daniel Blake, EOD, 75th Air Base Group	November 16, 1994 - Explosive ordnance clearance and disposal
D. Jean Tate	TTU	Steve Dodge, EMH, (801) 777-3215	April 17, 1996 - Soil sampling frequency at the TTU
D. Jean Tate	Budget	Douglas Hebden, Engineering Div., 545th Test Group	November 16, 1994 - Discussions regarding range use and budget
D. Jean Tate	Outgrants	Loni Johnson, Hill AFB Real Estate Office, (801) 777-2500	April 18, 1996 - Telephone communication regarding status of outgrant completion
D Jean Tate	WSAs	Margaret Kelsey, Salt Lake District Office, Bureau of Land Management	March 15, 1996 - Telephone discussion regarding current status of Wilderness Study Areas in the vicinity of UTTR
D. Jean Tate	Flight Missions	Lt. Col. Mike Maquet, 419th Wing, AFRES	November 16, 1994 - Air-to-Air and Air-to-Land flight missions
D. Jean Tate	Flight Missions	Lt. Col. Mike Maquet, 419th Wing, AFRES	June 26 to 28, 1995 - Telephone and telefaxed information on types of training exercises on UTTR
D. Jean Tate	UTTR Uses	Jim Banas, Al Rydman, 545th Test Group	November 16 1994 - List of land uses at UTTR
D. Jean Tate	Land Uses	Trish Hladsky, Bob Leroy, LI/LM, Todd Trianamon, Range Control, Duane Dickman 545th Test Group, Ron Short, 75th Air Base Group	November 15, 1994 - List of land uses, air space activities
D. Jean Tate	Active Tanks	Sam Johnson, EMR, (801) 777-8790	April 15 and 16, 1996 - Telephone and telefaxed information regarding the current status of tanks on UTTR
D. Jean Tate		Pat Sullivan, EME, (801) 777-1339 or 0288	April 17, 1996 - Discussion of plans to upgrade sewage treatment lagoons
D. Jean Tate	Grazing	Kay Winn, EMX, (801)-777-7651	November 15, 1994 - Discussion regarding the use of HAFR for grazing by allottees in transit along county road
D. Jean Tate	Miscellaneous	Dennis Weder, EME, (801) 777-0288	April 16, 1996 - Telephone discussions to clarify various details on uses of UTTR
D. Jean Tate	Miscellaneous	Barry Webster, 545th TESTG, (801) 777-9557	June 21 and 22, 1995 - Discussion of UTTR uses for training and testing
D. Jean Tate	Miscellaneous	Barry Webster, 545th TESTG, (801) 777-9557	April 15 and 17, 1996 - Telephone discussions to clarify various details on uses of UTTR
D. Jean Tate	SPCC Plan	Lisa Aschbrenner, EMP, (801) 777-1897	April 17, 1996 - Discussion of status of SPCC plan and EPCRA reporting
D. Jean Tate	IADs	Boe Hadley, 501st RANS, (801) 777-9019	April 17, 1996 - Discussion of status in CONUS of an integrated air defense system

Interview Documentation: Contacts and Information Resources

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D. Jean Tate		Bob Gubler, 545th TESTG, (801) 777-6032	June 21, 1995 - Discussion of mission coordination, UTTR management, and future
Dina Sassone	IRP	Shane Hirschi, EMR/IRP, (801) 777-8790	October 13 or 14, 1995 - IRP sites, and corresponding reports and permits
Dina Sassone	Emergency/Spill Response	Lisa Aschbrenner, EMP (801)777-1897	October 13 or 14, 1994 - UTTR Emergency and Spill Response management, reporting and documentation
Dina Sassone	Solid Waste Landfill	Jeff Nusser/Lisa Powell, EME/EMP, (801) 777-0359	October 13, 1994 - Landfill permitting, material recycling, and waste characterization
Dina Sassone	RCRA Permitting	Cpl. Dave Crow, EME Hazardous Waste Permitting/Compliance, (801) 777-0288	October 13, 1994 Permitting at UTTR including TTU and USTs
Dina Sassone	Air Quality/Noise	Mike Graziano, EME, Air Quality/Noise Compliance (801) 777-0359	October 13 or 14, 1994 - Experimental detonations at the TTU and associated air and noise modeling
Dina Sassone	Meteorology/Air Quality	Mike Graziano, EME Air Quality/Noise compliance (801) 777-0359	March 28, 1996 - Telephone conversation on Title V permit data and meteorological data, Mailed meteorological data on wind and temperature
Dina Sassone	PCBs	Pat Sullivan, Walter Wilson, EME, (801) 777-1339 or 0288	October 13 or 14, 1994 - PCB Program at UTTR
Dina Sassone	Hazardous Materials	Ron Short, 75th Air Base Group/Civil Engineering, (801) 777-1546	October 13, 1994 - Hazardous materials at the water treatment plant and lithium battery facility
Dina Sassone	EOD	Steve Dodge, EMH, (801) 777-3215	October 13 or 14, 1994 - EOD shipping, disposal, reporting, health and safety at UTTR
Dina Sassone	UST	Sam Johnson, EMR, (801) 777-8790	October 13 or 14, 1994 - Permitted USTs and investigations
Dina Sassone	Hazardous Materials	Bob Christensen, EMP (801) 777-1896	October 13, 1994 - Hazardous materials management; reporting and compliance
Dina Sassone	Health and Safety	Terry Olson, UTTR-North Range Safety Officer	October 10, 1994 - Safety regulations for various processes and operations at UTTR
Dina Sassone	Health and Safety	Carrie Fisher, Range Safety Officer, (801) 777-1053	October 13 or 14 December 10, 1994 - Health and Safety (industrial hygiene) standards used at HAFB
Betsy Minden	Visual Resources	Greg Hill, Recreation Planner, Salt Lake District Office, Bureau of Land Management	February 23, 1996 - Available visual resource studies in UTTR vicinity
Betsy Minden	Visual Resources	Lou Kirkman, Recreation Planner Salt Lake District Office, Bureau of Land Management	March 8 1996 - Status of the north Stansbury Mountain and the Deep Creek Mountain WSAs
Barbara Walz	Water	Patrick Sullivan, EME, (801) 777-1449	August 15, 1996 - Applicability and implementation of State of Utah Ground Water Quality Protection Rules at UTTR
D. Jean Tate	Test Sites	Tom Nass, 501st RANS/TF, (801) 777-9025	August 12, 1996 - Interaction of 545th TESTG/EN and 75th RANS/SUE with the EOD Division during test preparation and cleanup
D. Jean Tate	Historic Facilities	Dennis Weder, EME, (801) 777-0288	August 2, 1996 - Number of mine adits and acetylene beacons associated with UTTR
D. Jean Tate	Safety	Patrick Moroney, 75th RANS, (801) 777-1578	August 14, 1996 - Function of AFMC/SE at UTTR
D. Jean Tate	Organization	Barry Webster	August 19 and 20, 1996 - August 1996 interrelationships of UTTR range users

Interview Documentation: Contacts and Information Resources

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D. Jean Tate	Organization	Mark Inguaggiato	August 22, 1996 - August 1996 interrelationships of UTTR range users
D. Jean Tate	Natural Resources	Marcus Blood, EMX (801) 777-4618	August 19, 1996 - New data on wetlands, mudflats, and threatened/endangered species