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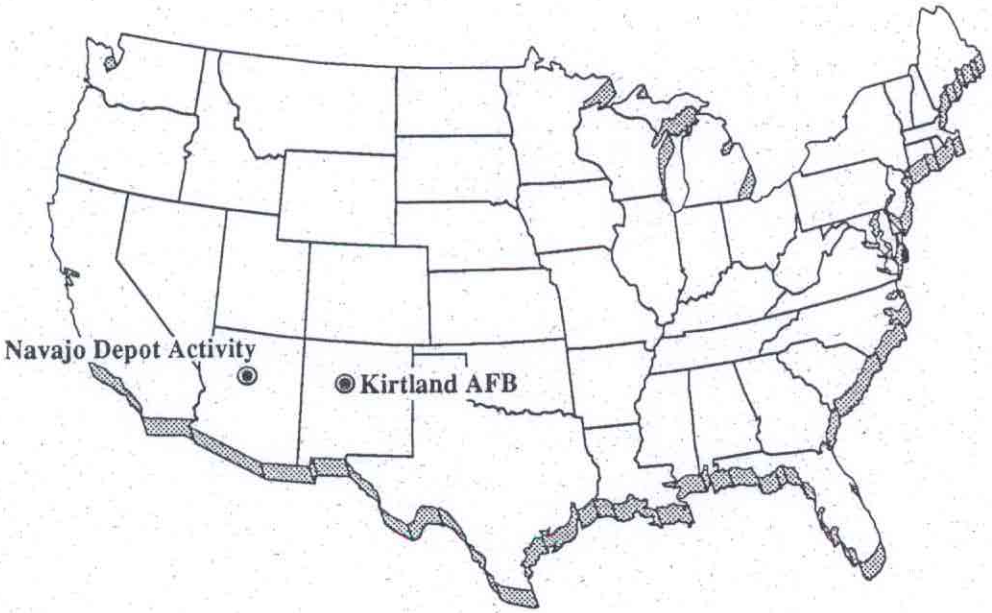
ENVIRONMENTAL ASSESSMENT
December 1992



TRANSPORTATION OF MINUTEMAN II SOLID ROCKET MOTORS TO NAVAJO DEPOT ACTIVITY, ARIZONA AND KIRTLAND AIR FORCE BASE, NEW MEXICO

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ACRONYMS/ABBREVIATIONS

ACC	Air Combat Command
AFB	Air Force Base
AFR	Air Force Regulation
AQCR	Air Quality Control Region
BMO	Ballistic Missile Organization
CATEX	Categorical Exclusion
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
dBa	A-weighted decibels
DOD	Department of Defense
DOT	Department of Transportation
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
FY	Fiscal Year
HCl	hydrogen chloride
ICBM	Intercontinental Ballistic Missile
$\mu g/m^3$	micrograms per cubic meter
MM II	Minuteman II
MPHN	Missile Potential Hazard Network
NAAQS	National Ambient Air Quality Standard
NADA	Navajo Depot Activity
NEPA	National Environmental Policy Act
OO-ALC	Ogden Air Logistics Center
PUDA	Pueblo Depot Activity
SSCBM	Shipping/Storage Container, Ballistic Missile
USFWS	U.S. Fish and Wildlife Service
UTTR	Utah Test and Training Range

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1.0 PURPOSE OF AND NEED FOR THE ACTION

The President's Council on Environmental Quality (CEQ) regulations govern the environmental impact analysis process (40 Code of Federal Regulations [CFR] Parts 1500-1508). The regulations are based on the National Environmental Policy Act (NEPA) and Executive Orders 11514 and 11991, which provide presidential direction to federal agencies to implement NEPA requirements. The CEQ regulations direct federal agencies to prepare an Environmental Assessment (EA) when it is unclear whether an Environmental Impact Statement (EIS) is required. A federal agency then uses the EA to determine whether an EIS is necessary, or whether a Finding of No Significant Impact should be prepared.

1.1 BACKGROUND

1.1.1 Deactivation Requirement

The U.S. Air Force is deactivating the Minuteman II (MM II) missile system (Department of Defense, 1991). The deactivation of the MM II missile system involves the removal of the warhead/reentry vehicle and the guidance systems and then the removal of the boosters (i.e., missiles without guidance systems) from silos at three operational bases. The boosters are then turned over to Ogden Air Logistics Center (OO-ALC) and transported to Hill Air Force Base (AFB) via established transportation routes used during the MM II Depot Maintenance Program. At Hill AFB the boosters are disassembled and the individual motors prepared for storage.

1.1.2 Storage Locations

The decisions to deactivate the Minuteman II missile system and to store component motors have already been made and are now being implemented by applicable Air Combat Command (ACC) installations and Hill AFB. A decision of where to store the MM II motors has also been made. A study entitled "RSLP Solid Propellant Rocket Motor Asset Storage Investigation", was conducted for The Ballistic Missile Organization (BMO) by TRW, Ogden Engineering Organization, Ogden, Utah (U.S. Air Force, 1991b). This study evaluated 20 potential storage sites for MM II motors. After an analysis of several factors, Navajo Depot Activity (NADA) emerged as a location satisfying all of the requirements set forth in the screening criteria (U.S. Air Force, 1991b). A subsequent storage location assessment performed by BMO revealed that Kirtland AFB would also be a suitable storage location for MM II motors, due to a previously unforeseen abandonment of existing storage facilities at the base. In the interim, motors are being temporarily stored in existing facilities at Hill AFB, Utah Test and Training Range (UTTR), and Pueblo Depot Activity (PUDA). The storage of the motors at NADA is covered in an EA that the Air Force Regional Civil Engineers - Ballistic Missile

Support accomplished for BMO (U.S. Air Force, 1992a). The storage of motors at Kirtland AFB is covered in an EA which is being prepared by BMO.

The transportation of MM II boosters from operational bases to Hill AFB has been addressed in a transportation EA prepared by Hill AFB. Similarly, Hill AFB completed an EA covering the transportation of MM II rocket motors to PUDA. The storage of the motors at PUDA has been assessed and given a Categorical Exclusion (CATEX) by BMO, Norton AFB, California, with the concurrence of PUDA personnel.

1.2 PURPOSE OF THE ACTION

The purpose of the Proposed Action is to ensure a sound method, both practically and environmentally, of transporting MM II motors to Kirtland AFB and NADA from Hill AFB, UTTR, and PUDA. This also includes the transportation of motors from Kirtland AFB and NADA back to Hill AFB.

1.3 NEED FOR THE ACTION

The urgent and compelling need of the Proposed Action and alternatives is to facilitate the deactivation of the MM II missile system by providing safe carriage of rocket motors to storage facilities.

Motors temporarily stored at Hill AFB, UTTR, and PUDA must be moved to new storage locations. Motors stored at Hill AFB and UTTR are occupying space needed for missile maintenance activities. PUDA is scheduled for closure in the near future pursuant to the Defense Base Closure and Realignment Act of 1990.

1.4 SCOPE OF THE ENVIRONMENTAL REVIEW

This EA reviews the environmental consequences of the proposed transport of MM II rocket motors to Kirtland AFB, Albuquerque, New Mexico, and to NADA, Bellemont, Arizona, via the public road system, from the following locations: Hill AFB, Utah; UTTR; and the PUDA, Pueblo, Colorado (Figure 1.1-1). The Proposed Action also includes the subsequent transportation of MM II motors from Kirtland AFB and NADA back to Hill AFB for reassembly into booster systems.

The Proposed Action suggests the use of the public highway as the only reasonable mode of transportation. Both air and rail have been eliminated as alternate modes of transportation because the specialized MM II motor shipping carriages, used to ship MM II motors, are not certified to travel by air or rail.

Consistent with Air Force Regulation (AFR) 19-2 and the CEQ regulations, the scope of the analysis in this EA will be defined by the potential range of

Proposed Activity Locations

Figure 1.1-1

environmental impacts that would result from implementation of the Proposed Action. The resources analyzed in this assessment are: air quality, water resources, biological resources, safety considerations, soils, and noise. The following environmental resources will not be covered in detail because they will not be impacted by the Proposed Action or alternatives: cultural resources, hazardous materials/hazardous waste, infrastructure, land use, physical resources, and socioeconomics. Each of these resources is summarized below.

Cultural Resources. Transportation activities would take place on existing roads and highways; consequently, no disturbance of existing or potentially present cultural or historical resources would occur.

Hazardous Materials/Hazardous Waste. Neither the Proposed Action nor the alternatives would produce significant amounts of hazardous waste. Used oil and related vehicle maintenance waste would be produced only in negligible amounts, and would be disposed of in accordance with standard procedures.

Infrastructure and Land Use. Infrastructure is not an applicable issue relative to the proposed transportation activities. In addition, no land use impacts are anticipated because no changes to the existing land uses are required.

Physical Resources. No impacts on physical resources are anticipated.

Socioeconomics. No impacts on socioeconomic conditions are anticipated from the relatively small increase in truck traffic between the various locations or from the effect of truck driver employment.

1.5 APPLICABLE REGULATORY REQUIREMENTS AND COORDINATION

Federal, state, and regional agencies were contacted regarding regulatory compliance and coordination for transport of MM II solid rocket motors to Kirtland AFB and NADA.

1.5.1 Air Quality

State and local environmental health departments were contacted for air quality attainment data for counties located along proposed transportation routes.

1.5.2 Biological Resources

The federal Threatened and Endangered Species Act extends legal protection to plants and animals listed as threatened or endangered by the U.S. Fish and Wildlife Service (USFWS). The Act authorizes these agencies

to review proposed federal actions to assess potential impacts to listed species. Section 7 of the Act requires that a proposed major federal action be evaluated by the USFWS for its potential to affect listed species or their critical habitat.

Candidate species for listing as threatened or endangered are not afforded protection under the Act, but are considered in the planning process of a major federal action. Because threatened and endangered species may be affected by the Proposed Action, the USFWS was contacted for coordination and/or mitigations for potential impacts to threatened and/or endangered species.

1.5.3 Transportation

State transportation departments were contacted to ascertain which roads could be used to transport the MM II motors to Kirtland AFB and NADA. In addition, the contracted transporters will have to apply for permits to transport motors (hazardous materials), where applicable.

1.6 DECISION TO BE MADE

The decision maker must decide whether to transport MM II rocket motors from Hill AFB, UTTR, and PUDA to Kirtland AFB and NADA. This EA provides the requisite environmental information needed by the decision maker to make an informed decision on the Proposed Action.

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2.0 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

2.1 PROPOSED ACTION

The Proposed Action is the transport of MM II rocket motors to Kirtland AFB, Albuquerque, New Mexico, and to NADA, Bellemont, Arizona, via public roadways from Hill AFB, Utah; UTTR; and the PUDA, Pueblo, Colorado. This would facilitate the deactivation and storage of the MM II missile system. A schedule of proposed motor shipments is provided in Table 2.1-1. Further, the Proposed Action anticipates the subsequent transportation of MM II motors from Kirtland AFB and NADA back to Hill AFB for reassembly into booster systems.

The MM II is a three-stage solid propellant device. Its overall length is about 56 feet and its weight is approximately 73,000 pounds. Table 2.1-2 summarizes the characteristics of the missile and its individual stages, and lists the various propellant compositions. Stages 1 and 2 of the missile contain a propellant designated as class 1.3, while stage 3 contains two different types of class 1.1 propellants.

All transportation, handling, and storage would be accomplished in accordance with long-standing technical orders and procedures to ensure that the propellant is not subjected to conditions that could result in a fire or other mishap (U.S. Air Force, 1992e).

2.1.1 Loading Motors for Transport

Rocket motors in temporary storage at Hill AFB, UTTR, and PUDA will be loaded for transport to Kirtland AFB and NADA. Prior to actual removal, rocket motors will be inspected for leakage and other irregularities. During rainstorms, motors would be covered with moisture-resistant covers while being loaded (U.S. Air Force, 1992b). All MM II motors will be transported using a climate controlled tandem or triple axle tractor trailer (Figure 2.1-1). The tractor trailer can transport one stage 1 motor; two stage 2 motors; three stage 3 motors; or a combination of one stage 2 motor and one stage 3 motor (see Figure 2.1-2). A summary of site-specific loading procedures is described below.

2.1.1.1 Hill AFB and UTTR. Stage 1, 2, and 3 MM II motors are stored at Hill AFB and UTTR in large, climate-controlled, temporary storage facilities. These motors are stored in either shipping carriages or storage cradles. Special vehicles are available to transport motors from storage buildings to the "Roll Transfer Building". This building has the capability to transfer motors from storage cradles to shipping carriages for transport, or from shipping carriages to cradles for storage. Figures 2.1-3 through 2.1-5 illustrate the shipping carriages that are currently being used for storage and

Table 2.1-1. Schedule for Minuteman II Stage Shipment (by Fiscal Year [FY] Quarters)

	FY 93				FY 94				FY 95				Totals	
	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	Stages	Shipments
Stage 1s[1]	54	40	48	48	48	48	48	48	37				419	
Shipments[2]	54	40	48	48	48	48	48	48	37					419
Stage 2s[1]	45	40	48	48	48	48	48	46	21				392	
Shipments[2]	23	20	24	24	24	24	24	23	11					197
Stage 3s[1]	30	40	48	48	48	48	48	48	48	48	48	13	515	
Shipments[2]	10	14	16	16	16	16	16	16	16	17	16	5		174
												Total Stages	1326	
												Total Shipments		790

[1]Stages to be shipped
[2]Shipments to move the stages

Table 2.1-2. Minuteman II Propellant-Nominal Composition (Percent)

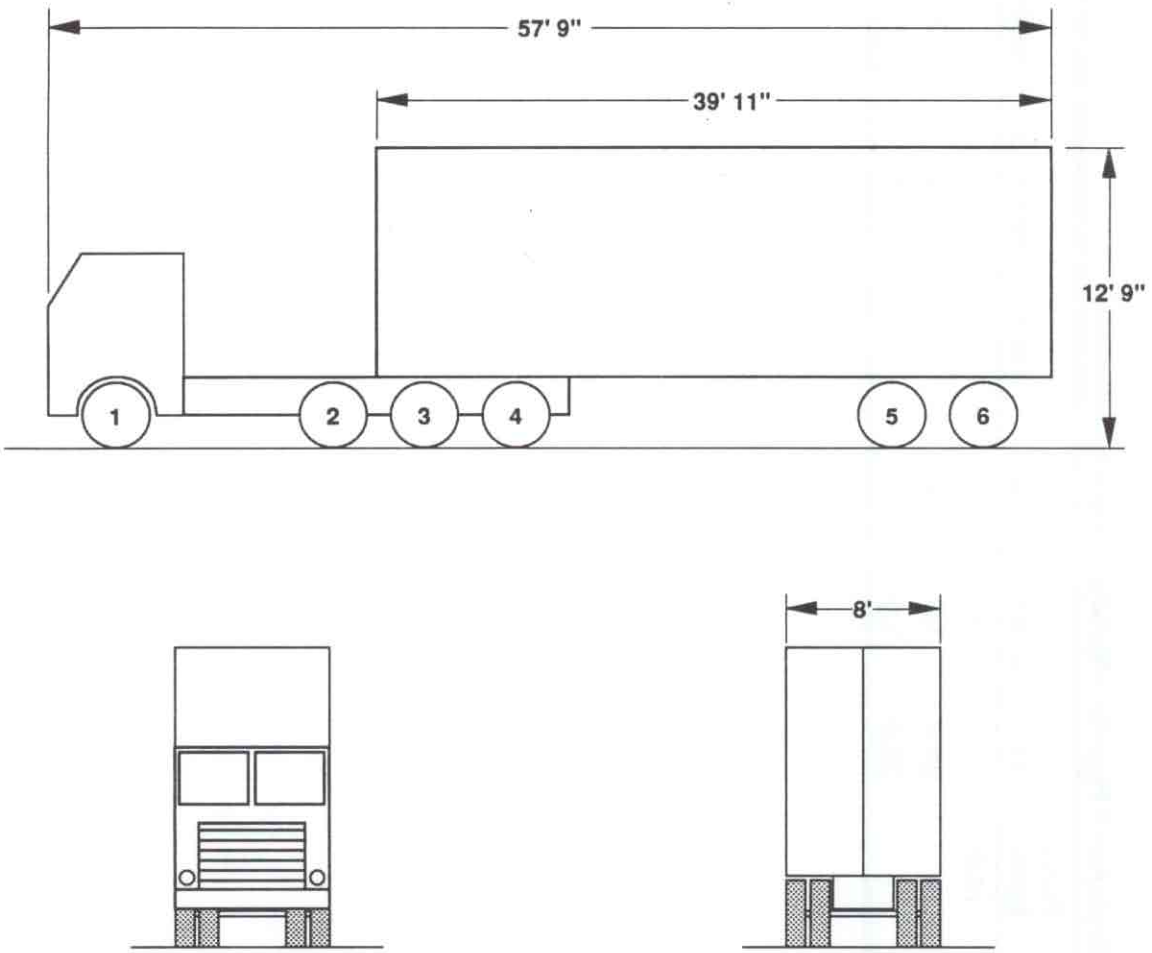
Usage	Propellant Class	Ammonium Perchlorate	Aluminum Powder	Epoxy Binder	NG	2-NDPA	NC	HMX	Resorcinol	Triacetin	Graphite
Stages 1 & 2	1.3	70.0	16.0	14.0	--	--	--	--	--	--	--
Stage 3	I.ICYII	11.0	20.0	--	28.0	1.0	22.0	11.0	1.0	6.0	Trace
Stage 3	I.IDDP	20.5	21.0	--	28.0	1.0	22.0	--	1.5	6.0	Trace

NG = Nitroglycerine

2-NDPA = 2-Nitrodephenylamine

NC = Nitrocellulose

HMX = Cyclotetramethylenetetranitramine



Tractor Trailer

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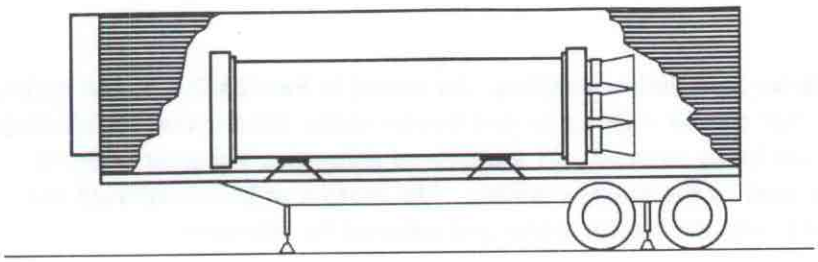
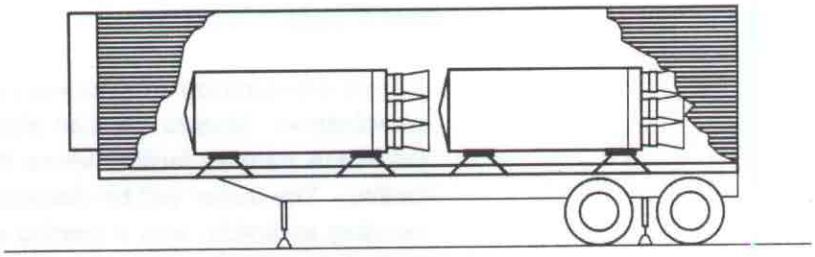
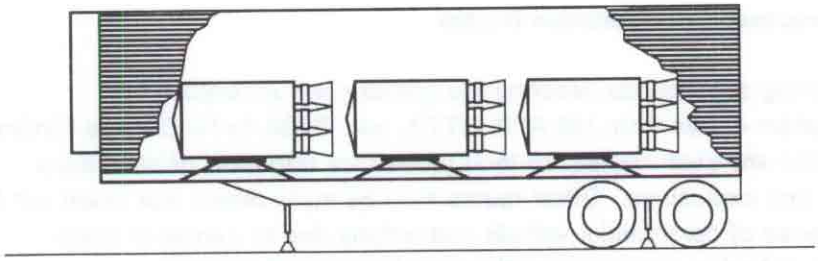
Figure 2.1-1



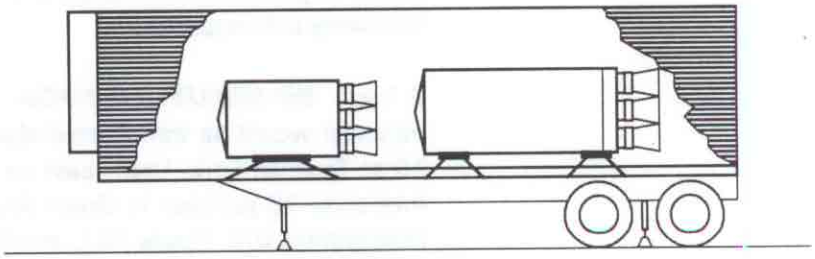
One Stage 1 Motor



Two Stage 2 Motors



Three Stage 3 Motors



One Stage 3 Motor and One Stage 2 Motor

Trailer Motor Transport Configurations

Figure 2.1-2

Not to Scale

that would be used during shipping. As stated in Section 2.1.1, the number of stages that can be shipped on one tractor trailer depends on which stage or stages are being shipped. At the time of shipment, a tractor trailer is positioned next to the storage facility. The motors to be transported are then moved onto the tractor trailer and secured for transport.

2.1.1.2 PUDA. Minuteman stage 2 and 3 motors are temporarily stored at PUDA in storage cradles within small storage igloos. PUDA does not store MM II stage 1 motors.

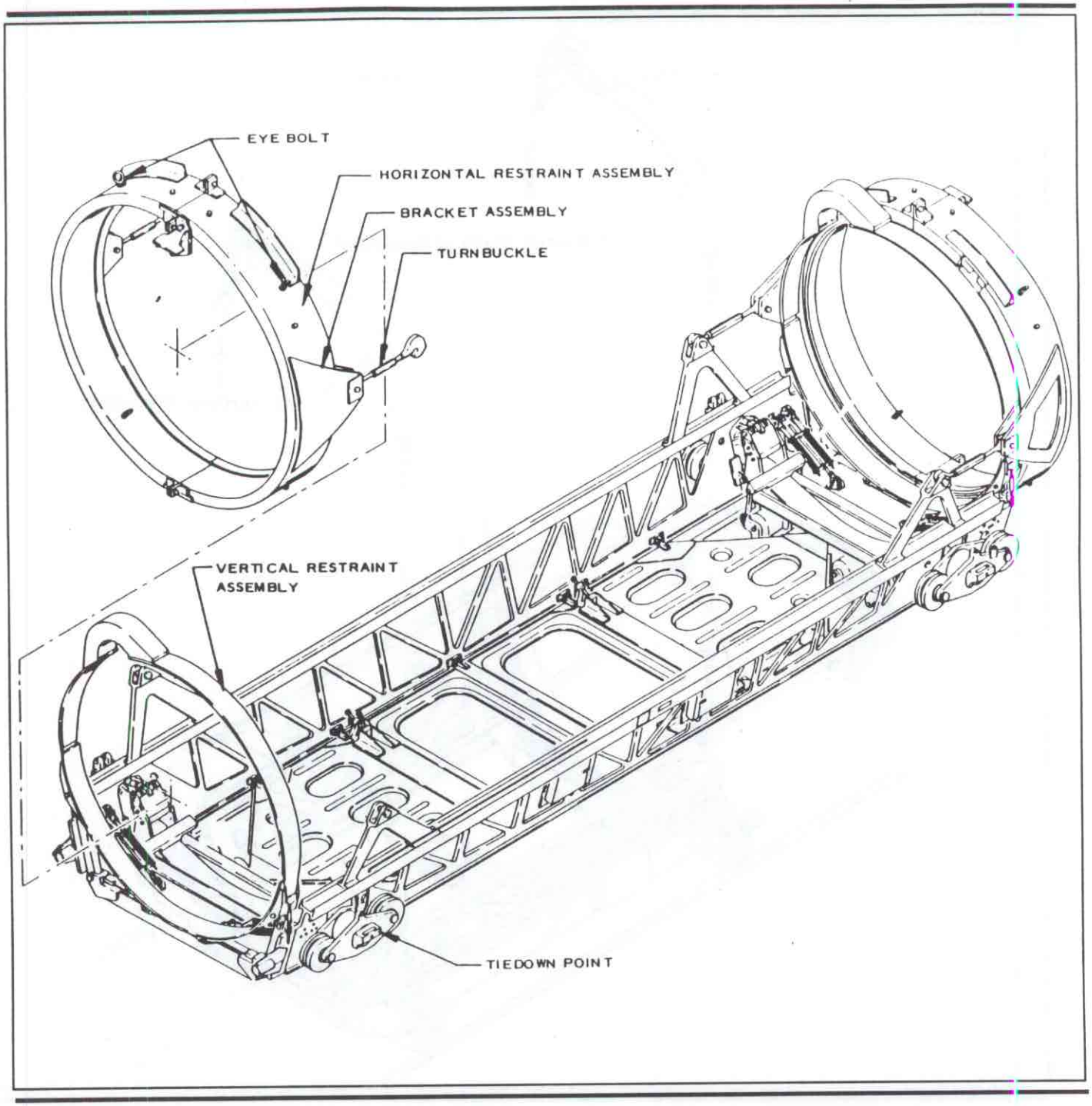
Motors are removed from storage igloos using a power pallet jack-crane combination. Motors are then placed on a flatbed truck and transported to the PUDA transfer facility where they will be moved into the transfer facility. The motor will be disconnected from the storage cradle and lifted, via sling assembly, into a waiting shipping carriage. The motor will then be moved, via transfer rails, into the waiting tractor trailer and secured for shipment (U.S. Air Force, 1992d).

2.1.2 Proposed Transportation Routes

The following subsections describe the primary and secondary transportation routes from Hill AFB, UTTR, and PUDA to NADA and Kirtland AFB. These are truck routes, state-approved for transport of hazardous materials and explosives. Other routes may be more direct, but could not be used because of commercial vehicle restrictions due to narrower steep roadways or bridge weight restrictions, or because of restrictions on transport of potentially explosive loads (e.g., on U.S. Route 93 over Hoover Dam). Figures 2.1-6 through 2.1-9 show all of the routes described in the following subsections.

2.1.2.1 Hill AFB/UTTR to NADA - Primary Routes. From Hill AFB, the motor(s) would be transported along the following route: south on Interstate 15 to Spanish Fork, Utah; east on U.S. Route 6 from Spanish Fork to the Interstate 70 junction at Green River, Utah; east on Interstate 70 until intersecting U.S. Route 191; south on Route 191, west on U.S. Route 160 at Mexican Water, Arizona; and then south on U.S. Route 89 until arriving at Flagstaff, Arizona. At Flagstaff, the shipment would go west on Interstate 40 until arriving at NADA. From UTTR, the motor(s) would be transported south on Lakeside Road to Interstate 80, and then east on Interstate 80 to Interstate 215 connecting with Interstate 15 and at Salt Lake City. From here the shipment would go south on Interstate 215 continuing on the same route as that just described from Hill AFB (see Figure 2.1-6 and Table 2.1-3).

2.1.2.2 Hill AFB/UTTR to NADA - Secondary Routes. From Hill AFB, the motor(s) would be transported south on Interstate 15 until intersecting State Road (SR) 146 at Las Vegas, Nevada. The shipment would then go east on



Stage 1
Rocket Motor Carriage

Figure 2.1-3

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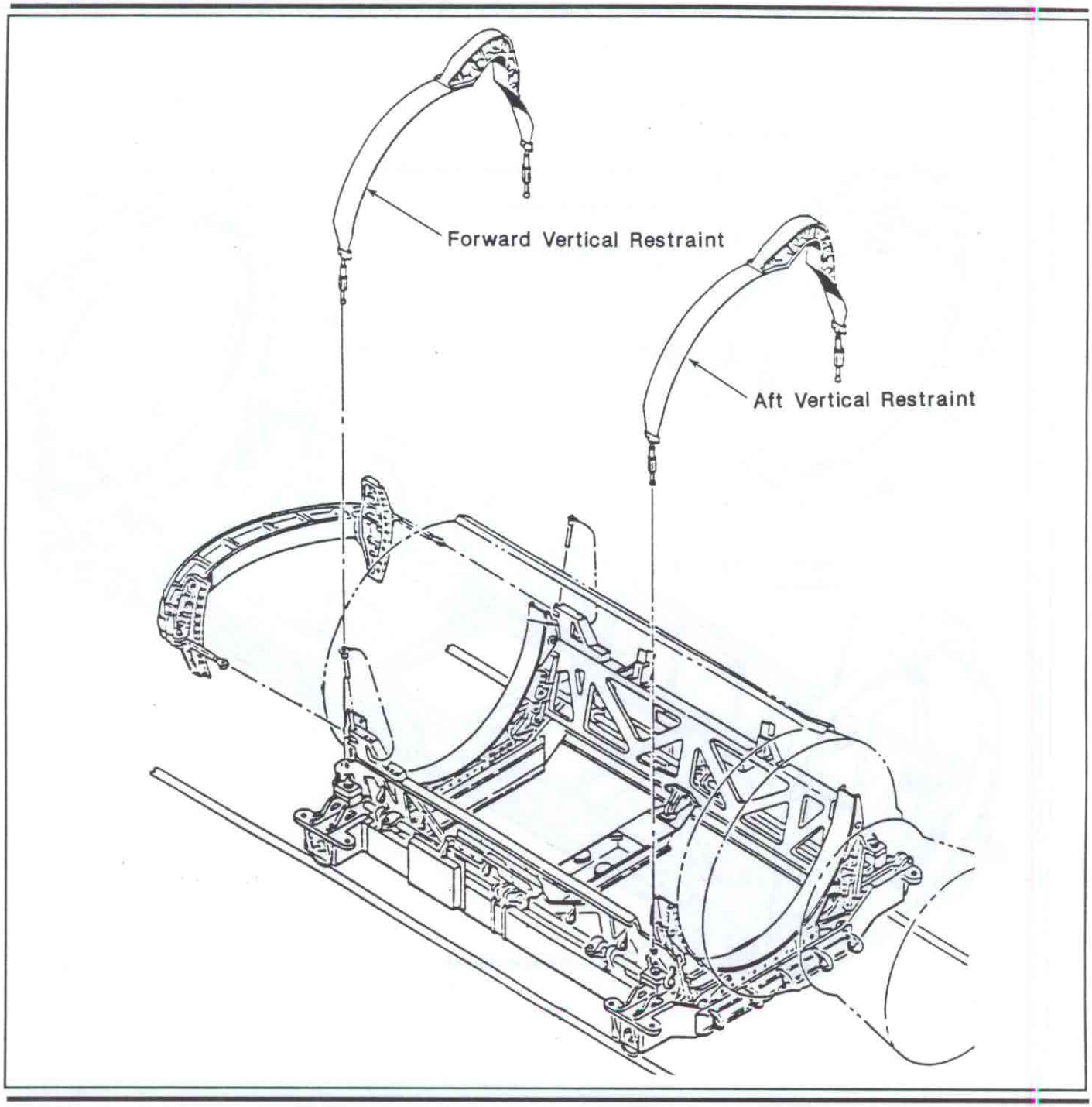

Stage 2
Rocket Motor Carriage

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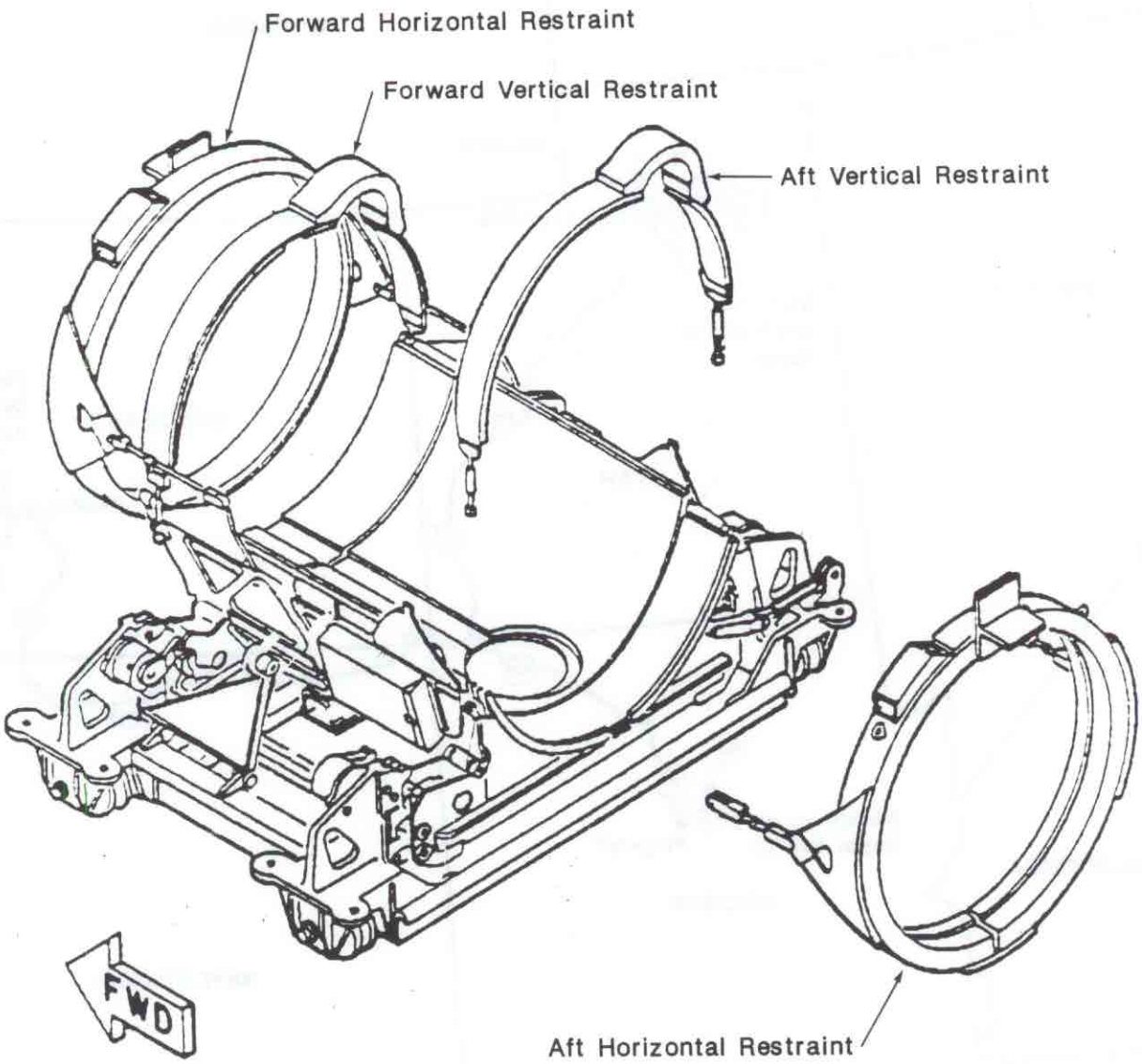
Figure 2.1-4



Stage 3
Rocket Motor Carriage

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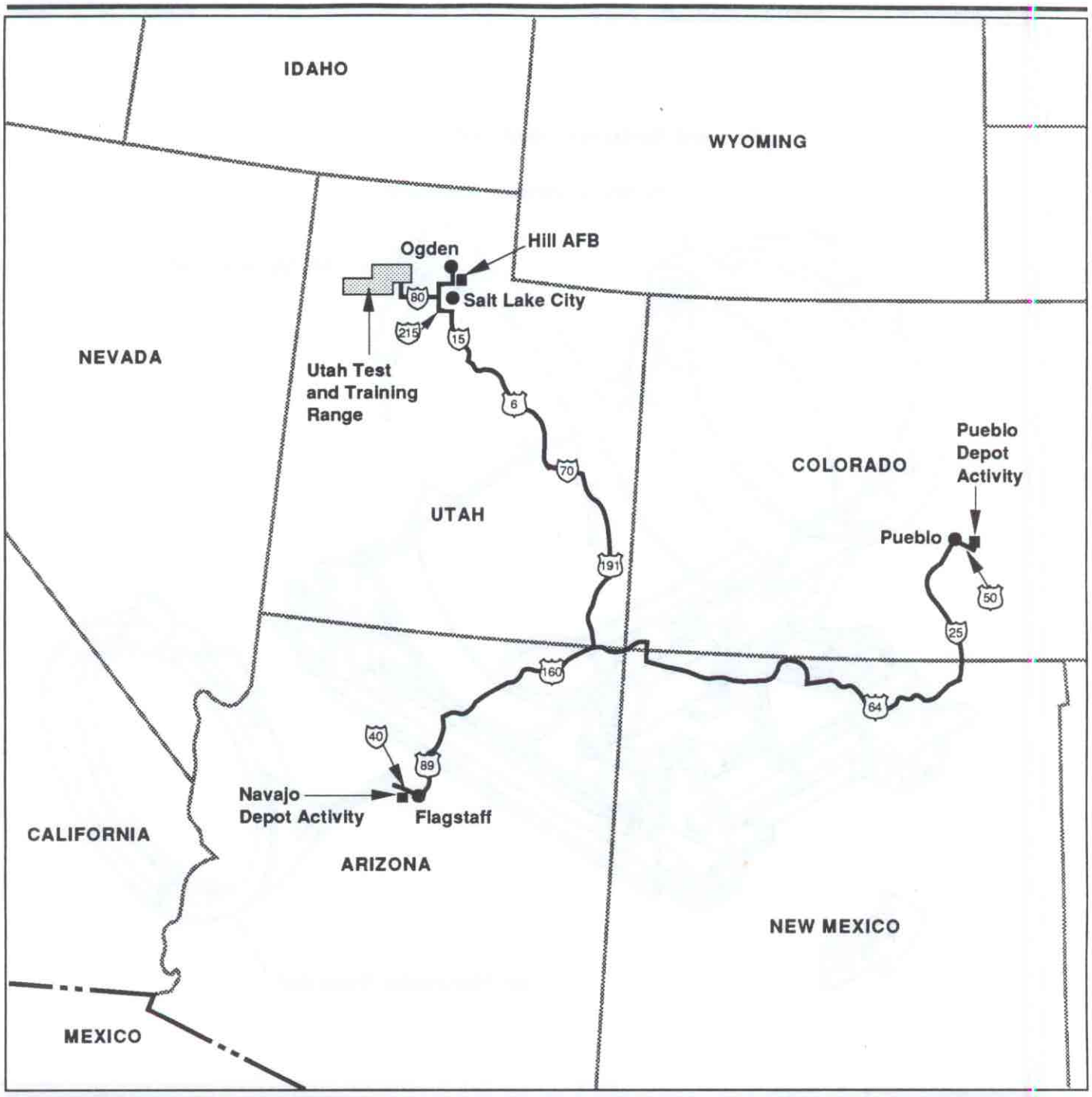
Figure 2.1-5



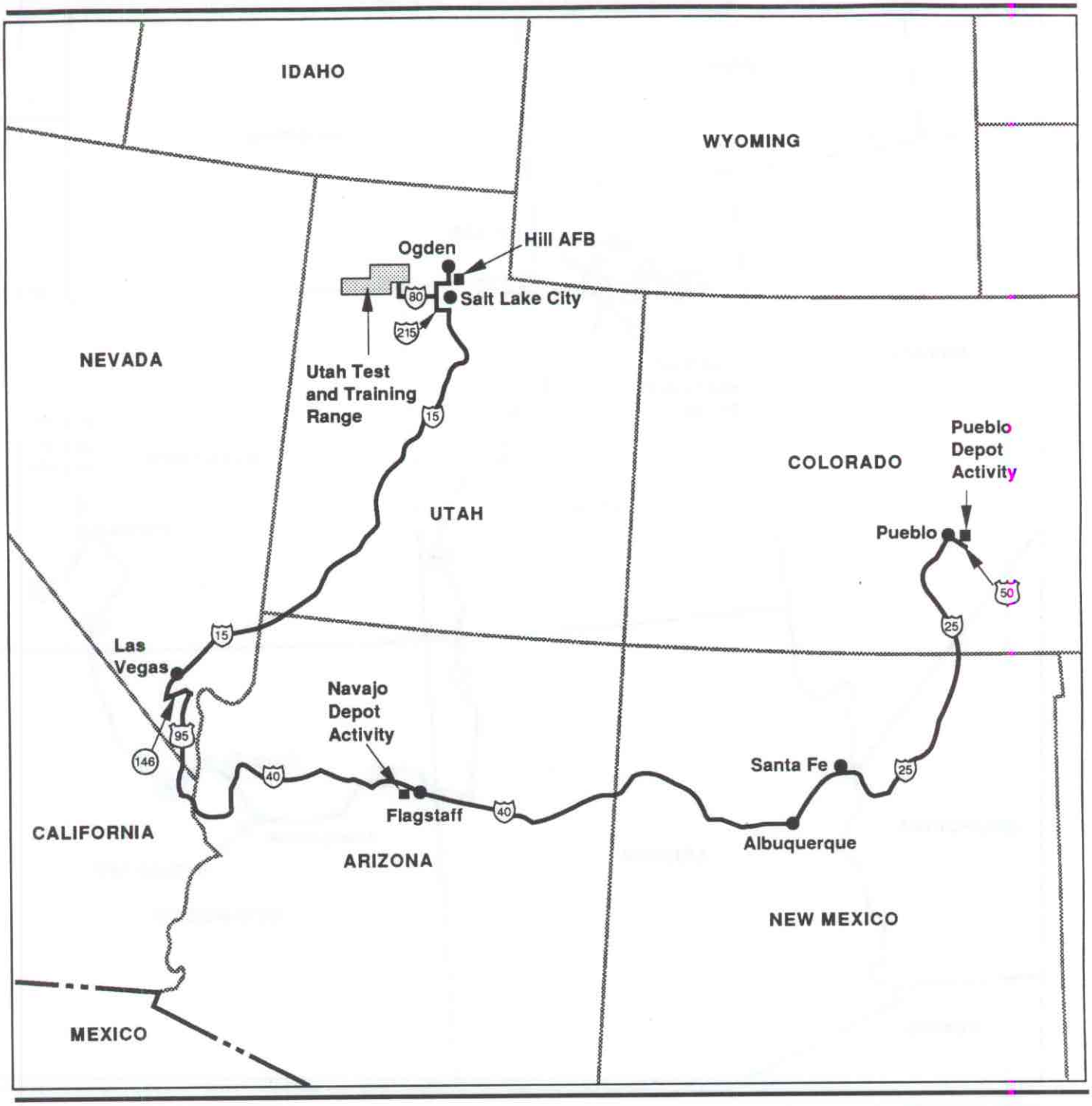
EXPLANATION

- 15 Interstate Highways
- 160 U.S. Highways
- Transportation Routes

0 25 50 100 Miles

Primary Transportation Routes to NADA

Figure 2.1-6



EXPLANATION

- 15 Interstate Highways
- 160 U.S. Highways
- 146 State Highways
- Transportation Routes

0 25 50 100 Miles

Secondary Transportation Routes to NADA

Figure 2.1-7

EXPLANATION

- 15 Interstate Highways
- 160 U.S. Highways
- Transportation Routes

0 25 50 100 Miles

Primary Transportation Routes to Kirtland AFB

Figure 2.1-8

EXPLANATION

- (15) Interstate Highways
- (160) U.S. Highways
- (146) State Highways
- Transportation Routes

0 25 50 100 Miles

Secondary Transportation Routes to Kirtland AFB

Figure 2.1-9

Table 2.1-3. Hill AFB/UTTR to NADA - Primary Routes

From/To	Road/Direction	Classification*	Mileage**
From Hill AFB			
Hill AFB/Interstate 215 Jct.	Interstate 15/South	1	14
Interstate 215 Jct/Interstate 15 Jct	Interstate 215/South	1	17
From UTTR			
UTTR/Interstate 80 Jct	Lakeside Road/South	3	18
Interstate 80 Jct/Lake Point	Interstate 80/East	3	40
Lake Point/Interstate 215 Jct	Interstate 80/East	2	16
Interstate 215 Jct/Interstate 15 Jct	Interstate 215/South	1	11
From Interstate 15 Jct (from both Hill AFB and UTTR)			
Interstate 15 Jct/Sandy City	Interstate 15 South	1	3
Sandy City/Spanish Fork	Interstate 15/South	2	34
Spanish Fork/U.S. 89 Jct	U.S. Route 6/East	2	5
U.S. 89 Jct/Price	U.S. Route 6/East	4	58
Price	U.S. Route 6/East	2	2
Price/Interstate 70 Jct	U.S. Route 6/East	3	54
Interstate 70 Jct/Green River	Interstate 70/East	3	4
Green River	Interstate 70/East	2	2
Green River/U.S. 191 Jct	Interstate 70/East	3	20
U.S. 191 Jct/Moab	U.S. Route 191/South	3	32
Moab	U.S. Route 191/South	2	2
Moab/Mexican Water	U.S. Route 191/South	3	116
Mexican Water/U.S. 89 Jct	U.S. Route 160/West	3	124
U.S. 89 Jct/ Wupatki Nat'l Monument	U.S. Route 89/South	3	36
Wupatki Nat'l Monument/Flagstaff	U.S. Route 89/South	4	24
Flagstaff	Interstate 40/West	1	6
Flagstaff/NADA	Interstate 40/West	4	12
Total Mileages			
From Hill AFB			565
From UTTR			619

* Explanation
1 Urban: The area in or around a metropolitan area (e.g., Salt Lake City); population above 15,000.
2 Suburban: An area of combined open space and scattered development; population below 15,000.
3 Undeveloped: Areas with little or no development; may include small towns.
4 National Forest: Designated on map as national forest (may include small portions of undeveloped land not within actual NF boundary).

** All mileage is approximate.

SR 146 and then south on U.S. Route 95 until arriving at Interstate 40. The shipment would then go east on Interstate 40 until arriving at NADA. From UTTR, the motor(s) would be transported south on Lakeside Road to Interstate 80, and then east on Interstate 80 to Interstate 215 at Salt Lake City. From here the shipment would go south on Interstate 215 continuing on the same route as that just described from Hill AFB (see Figure 2.1-7 and Table 2.1-4).

2.1.2.3 PUDA to NADA - Primary Route. From PUDA, the motor(s) would be transported west on U.S. Route 50 and then south on Interstate 25, past Raton, New Mexico, until intersecting U.S. Route 64. The shipment would then go west on Route 64 across the New Mexico border into Arizona. Route 64 turns into U.S. Route 160 in Arizona. The driver would continue west on Route 160 and then go south on U.S. Route 89 until Flagstaff, Arizona. From Flagstaff, the shipment would travel west on Interstate 40 until arriving at NADA (see Figure 2.1-6 and Table 2.1-5).

2.1.2.4 PUDA to NADA - Secondary Route. From PUDA, the motor(s) would be transported west on U.S. Route 50 and then south on Interstate 25 until reaching Albuquerque. At Albuquerque, the shipment would travel west on Interstate 40 until arriving at NADA (see Figure 2.1-7 and Table 2.1-6).

2.1.2.5 PUDA to Kirtland AFB - Only Route. From PUDA, the motor(s) would be transported west on U.S. Route 50 and then south on Interstate 25 to Kirtland AFB in Albuquerque (see Figure 2.1-8 and Table 2.1-7). No other practical route between the PUDA and Kirtland AFB exists.

2.1.2.6 Hill AFB/UTTR to Kirtland AFB - Primary Routes. From Hill AFB/UTTR, the motor(s) would travel south on Interstate 15 until intersecting U.S. Route 6 at Spanish Fork, Utah. The shipment would travel east on Route 6 until Green River, Utah, and then go east on Interstate 70 until intersecting U.S. Route 191. The shipment would go south on Route 191 and then east on Interstate 40 until arriving at Kirtland AFB in Albuquerque. From UTTR, the motor(s) would be transported south on Lakeside Road to Interstate 80, and then east on Interstate 80 to Interstate 215 at Salt Lake City. From here the shipment would go south on Interstate 215, connecting with Interstate 15 and continuing on the same route as that just described from Hill AFB (see Figure 2.1-8 and Table 2.1-8).

2.1.2.7 Hill AFB/UTTR to Kirtland AFB - Secondary Routes. Two secondary routes between Hill AFB/UTTR and Kirtland AFB could be used; however, because both would be prohibitively long, it is unlikely that either would be used. One route (route "A") would be identical to the Hill AFB/UTTR to NADA - Secondary Routes described in Section 2.1.2.2, except that the shipment would continue east on Interstate 40 beyond NADA until arriving at Kirtland AFB in Albuquerque (see Figure 2.1-9 and Table 2.1-9a).

Table 2.1-4. Hill AFB/UTTR to NADA - Secondary Routes

From/To	Road/Direction	Classification*	Mileage**
From Hill AFB			
Hill AFB/Interstate 215 Jct.	Interstate 15/South	1	14
Interstate 215 Jct/Interstate 15 Jct	Interstate 215/South	1	17
From UTTR			
UTTR/Interstate 80 Jct	Lakeside Road/South	3	18
Interstate 80 Jct/Lake Point	Interstate 80/East	3	40
Lake Point/Interstate 215 Jct	Interstate 80/East	2	16
Interstate 215 Jct/Interstate 15 Jct	Interstate 215/South	1	11
From Interstate 15 Jct (from both Hill AFB and UTTR)			
Interstate 15 Jct/Sandy City	Interstate 15 South	1	3
Sandy City/Santaquin	Interstate 15/South	2	50
Santaquin/Nephi	Interstate 15/South	3	18
Nephi	Interstate 15/South	2	2
Nephi/Scipio	Interstate 15/South	3	36
Scipio/Holden	Interstate 15/South	4	14
Holden/Fillmore	Interstate 15/South	3	10
Fillmore	Interstate 15/South	2	4
Fillmore/Beaver	Interstate 15/South	3	50
Beaver	Interstate 15/South	2	2
Beaver/Summit	Interstate 15/South	3	41
Summit/Leeds	Interstate 15/South	4	52
Leeds/Las Vegas	Interstate 15/South	3	118
Las Vegas area	Interstate 15/South	1	20
Las Vegas/Henderson	SR 146/East	3	14
Henderson	SR 146/East	1	2
Henderson/Interstate 40 Jct	U.S. Route 95/South	3	79
Interstate 40 Jct/Kingman	Interstate 40/East	3	71
Kingman	Interstate 40/East	2	6
Kingman/Ash Fork	Interstate 40/East	3	88
Ash Fork/Williams	Interstate 40/East	4	18
Williams	Interstate 40/East	2	2
Williams/NADA	Interstate 40/East	4	20
Total Mileages			
From Hill AFB			751
From UTTR			805

* Explanation
1 Urban: The area in or around a metropolitan area (e.g., Salt Lake City); population above 15,000.
2 Suburban: An area of combined open space and scattered development; population below 15,000.
3 Undeveloped: Areas with little or no development; may include small towns.
4 National Forest: Designated on map as national forest (may include small portions of undeveloped land not within actual NF boundary).

** All mileage is approximate.

Table 2.1-5. PUDA to NADA - Primary Route

From/To	Road/Direction	Classification*	Mileage**
PUDA/Pueblo	U.S. Route 50/West	2	18
Pueblo	U.S. Route 50/West	1	4
Pueblo/Walsenburg	Interstate 25/South	3	44
Walsenburg	Interstate 25/South	2	4
Walsenburg/Trinidad	Interstate 25/South	3	32
Trinidad	Interstate 25/South	2	2
Trinidad/Raton	Interstate 25/South	3	20
Raton	Interstate 25/South	2	4
Raton/Cimarron	U.S. Route 64/West	3	36
Cimarron/Taos	U.S. Route 64/West	4	46
Taos	U.S. Route 64/West	2	2
Taos/Tres Piedras	U.S. Route 64/West	3	32
Tres Piedras/Ensenada	U.S. Route 64/West	4	34
Ensenada/Dulce	U.S. Route 64/West	3	36
Dulce/Manzanares	U.S. Route 64/West	4	54
Manzanares/Farmington	U.S. Route 64/West	3	26
Farmington	U.S. Route 64/West	2	3
Farmington/Mexican Water	U.S. Route 64/West	3	190
Mexican Water/U.S. 89 Jct	U.S. Route 160/West	3	124
U.S. 89 Jct/Wupatki Nat'l Monument	U.S. Route 89/South	3	36
Wupatki Nat'l Monument/Flagstaff	U.S. Route 89/South	4	24
Flagstaff	Interstate 40/West	1	6
Flagstaff/NADA	Interstate 40/West	4	12
Total Mileage			789

* Explanation
1 Urban: The area in or around a metropolitan area (e.g., Salt Lake City); population above 15,000.
2 Suburban: An area of combined open space and scattered development: population below 15,000.
3 Undeveloped: Areas with little or no development; may include small towns.
4 National Forest: Designated on map as national forest (may include small portions of undeveloped land not within actual NF boundary).

** All mileage is approximate.

Table 2.1-6. PUDA to NADA - Secondary Route

From/To	Road/Direction	Classification*	Mileage**
PUDA/Pueblo	U.S. Route 50/West	2	18
Pueblo	U.S. Route 50/West	1	4
Pueblo/Walsenburg	Interstate 25/South	3	44
Walsenburg	Interstate 25/South	2	4
Walsenburg/Trinidad	Interstate 25/South	3	32
Trinidad	Interstate 25/South	2	2
Trinidad/Raton	Interstate 25/South	3	20
Raton	Interstate 25/South	2	4
Raton/Las Vegas (NM)	Interstate 25/South	3	100
Las Vegas	Interstate 25/South	1	4
Las Vegas/Santa Fe	Interstate 25/South	4	58
Santa Fe	Interstate 25/South	1	4
Santa Fe/Albuquerque	Interstate 25/South	3	48
Albuquerque	Interstate 25/South	1	8
Albuquerque/Grants	Interstate 40/West	3	70
Grants	Interstate 40/West	2	2
Grants/Gallup	Interstate 40/West	4	60
Gallup	Interstate 40/West	1	2
Gallup/Winslow	Interstate 40/West	3	120
Winslow	Interstate 40/West	2	3
Winslow/Padre Canyon	Interstate 40/West	3	32
Padre Canyon/Flagstaff	Interstate 40/West	4	18
Flagstaff	Interstate 40/West	1	6
Flagstaff/NADA	Interstate 40/West	4	12
Total Mileage			675

* Explanation
1 Urban: The area in or around a metropolitan area (e.g., Salt Lake City); population above 15,000.
2 Suburban: An area of combined open space and scattered development; population below 15,000.
3 Undeveloped: Areas with little or no development; may include small towns.
4 National Forest: Designated on map as national forest (may include small portions of undeveloped land not within actual NF boundary).

** All mileage is approximate.

Table 2.1-7. PUDA to Kirtland AFB - Only Route

From/To	Road/Direction	Classification*	Mileage**
PUDA/Pueblo	U.S. Route 50/West	2	18
Pueblo	U.S. Route 50/West	1	4
Pueblo/Walsenburg	Interstate 25/South	3	44
Walsenburg	Interstate 25/South	2	4
Walsenburg/Trinidad	Interstate 25/South	3	32
Trinidad	Interstate 25/South	2	2
Trinidad/Raton	Interstate 25/South	3	20
Raton	Interstate 25/South	2	4
Raton/Las Vegas (NM)	Interstate 25/South	3	100
Las Vegas	Interstate 25/South	1	4
Las Vegas/Santa Fe	Interstate 25/South	4	58
Santa Fe	Interstate 25/South	1	4
Santa Fe/Albuquerque	Interstate 25/South	3	48
Albuquerque/Kirtland AFB	Interstate 25/South	1	8
Total Mileage			350

* Explanation
1 Urban: The area in or around a metropolitan area (e.g., Salt Lake City); population above 15,000.
2 Suburban: An area of combined open space and scattered development; population below 15,000.
3 Undeveloped: Areas with little or no development; may include small towns.
4 National Forest: Designated on map as national forest (may include small portions of undeveloped land not within actual NF boundary).

** All mileage is approximate.

Table 2.1-8. Hill/UTTR AFB to Kirtland AFB - Primary Routes

From/To	Road/Direction	Classification*	Mileage**
From Hill AFB			
Hill AFB/Interstate 215 Jct.	Interstate 15/South	1	14
Interstate 215 Jct/Interstate 15 Jct	Interstate 215/South	1	17
From UTTR			
UTTR/Interstate 80 Jct	Lakeside Road/South	3	18
Interstate 80 Jct/Lake Point	Interstate 80/East	3	40
Lake Point/Interstate 215 Jct	Interstate 80/East	2	16
Interstate 215 Jct/Interstate 15 Jct	Interstate 215/South	1	11
From Interstate 15 Jct (from both Hill AFB and UTTR)			
Interstate 15 Jct/Sandy City	Interstate 15 South	1	3
Sandy City/Spanish Fork	Interstate 15/South	2	34
Spanish Fork/U.S. 89 Jct	U.S. Route 6/East	2	5
U.S. 89 Jct/Price	U.S. Route 6/East	4	58
Price	U.S. Route 6/East	2	2
Price/I-70 Jct	U.S. Route 6/East	3	54
I-70 Jct/Green River	Interstate 70/East	3	4
Green River	Interstate 70/East	2	2
Green River/U.S. 191 Jct	Interstate 70/East	3	20
U.S. 191 Jct/Moab	U.S. Route 191/South	3	32
Moab	U.S. Route 191/South	2	2
Moab/Chambers	U.S. Route 191/South	3	255
Chambers/Gallup	Interstate 40/East	3	48
Gallup	Interstate 40/East	1	2
Gallup/Grants	Interstate 40/East	4	60
Grants	Interstate 40/East	2	2
Grants/Albuquerque	Interstate 40/East	3	70
Albuquerque/Kirtland AFB	Interstate 40/East	1	8
Total Mileages			
From Hill AFB			692
From UTTR			746

* Explanation
1 Urban: The area in or around a metropolitan area (e.g., Salt Lake City): population above 15,000.
2 Suburban: An area of combined open space and scattered development; population below 15,000.
3 Undeveloped: Areas with little or no development; may include small towns.
4 National Forest: Designated on map as national forest (may include small portions of undeveloped land not within actual NF boundary).

** All mileage is approximate.

Table 2.1-9a. Hill AFB/UTTR to Kirtland AFB - Secondary Route "A"

From/To	Road/Direction	Classification*	Mileage**
From Hill AFB			
Hill AFB/Interstate 215 Jct.	Interstate 15/South	1	14
Interstate 215 Jct/Interstate 15 Jct	Interstate 215/South	1	17
From UTTR			
UTTR/Interstate 80 Jct	Lakeside Road/South	3	18
Interstate 80 Jct/Lake Point	Interstate 80/East	3	40
Lake Point/Interstate 215 Jct	Interstate 80/East	2	16
Interstate 215 Jct/Interstate 15 Jct	Interstate 215/South	1	11
From Interstate 15 Jct (from both Hill AFB and UTTR)			
Interstate 15 Jct/Sandy City	Interstate 15 South	1	3
Sandy City/Santaquin	Interstate 15/South	2	50
Santaquin/Nephi	Interstate 15/South	3	18
Nephi	Interstate 15/South	2	2
Nephi/Scipio	Interstate 15/South	3	36
Scipio/Holden	Interstate 15/South	4	14
Holden/Fillmore	Interstate 15/South	3	10
Fillmore	Interstate 15/South	2	4
Fillmore/Beaver	Interstate 15/South	3	50
Beaver	Interstate 15/South	2	2
Beaver/Summit	Interstate 15/South	3	41
Summit/Leeds	Interstate 15/South	4	52
Leeds/Las Vegas	Interstate 15/South	3	118
Las Vegas area	Interstate 15/South	1	20
Las Vegas/Henderson	SR 146/East	3	14
Henderson	SR 146/East	1	2
Henderson/Interstate 40 Jct	U.S. Route 95/South	3	79
Interstate 40 Jct/Kingman	Interstate 40/East	3	71
Kingman	Interstate 40/East	2	6
Kingman/Ash Fork	Interstate 40/East	3	88
Ash Fork/Williams	Interstate 40/East	4	18
Williams	Interstate 40/East	2	2
Williams/Flagstaff	Interstate 40/East	4	32
Flagstaff	Interstate 40/East	1	6
Flagstaff/Padre Canyon	Interstate 40/East	4	18
Padre Canyon/Winslow	Interstate 40/East	3	32
Winslow	Interstate 40/East	2	3
Winslow/Gallup	Interstate 40/East	3	120
Gallup	Interstate 40/East	1	2
Gallup/Grants	Interstate 40/East	4	60
Grants	Interstate 40/East	2	2
Grants/Albuquerque	Interstate 40/East	3	70
Albuquerque/Kirtland AFB	Interstate 40/East	1	8
Total Mileages			
From Hill AFB			1,084
From UTTR			1,138

* Explanation
1 Urban: The area in or around a metropolitan area (e.g., Salt Lake City); population above 15,000.
2 Suburban: An area of combined open space and scattered development; population below 15,000.
3 Undeveloped: Areas with little or no development; may include small towns.
4 National Forest: Designated on map as national forest (may include small portions of undeveloped land not within actual NF boundary).

** All mileage is approximate.

The other secondary route (route "B") would follow the same route as the Primary Routes from Hill AFB/UTTR to Kirtland AFB (described in Section 2.1.2.6) until reaching Mexican Water, Arizona, on U.S. Route 191. From here the shipment would continue east on U.S. Route 64 to Interstate 25 and then head south on Interstate 25 until reaching Kirtland AFB in Albuquerque (see Figure 2.1-9 and Table 2.1-9b).

2.1.3 Unloading Motors at Kirtland AFB and NADA

Upon notification of a rocket motor shipment, personnel from NADA or Kirtland AFB would ensure that all appropriate support equipment is in place at the designated installation transfer facility. Upon arrival at the transfer facility, the tractor trailer would be positioned in line with the facility. The rocket motor would then be roll-transferred into the transfer facility. The specific procedures for transferring the motor to the storage facility would depend on the type of motor(s) being transferred. All MM II rocket motors require controlled environmental conditions and shock protection during all movements and phases of storage and transportation. To provide this protection, all movements would be made according to applicable regulations and technical orders and would utilize specially designed, government-owned transport and storage equipment.

2.1.4 Transporting Motors Back to Hill AFB for Reassembly

MM II motors that are stored at Kirtland AFB and NADA may eventually be reassembled into complete booster systems at Hill AFB sometime in the future. In the event that reassembly is required, all applicable routes, procedures, regulations, and requirements, which are current and consistent with this EA, would be followed.

2.1.5 Mishap Procedures

A Missile Potential Hazard Network (MPHN) has been established within the OO-ALC to provide total management of the MM II missile system. This system is composed of missile potential hazard teams that attempt to resolve potential hazard situations as soon as possible following an incident. All special equipment required for recovery operations is maintained at OO-ALC and is readily available for use by the recovery team (U.S. Air Force 1992b).

In the unlikely event of an accident during transport of MM II motors to NADA and Kirtland AFB, the control of access to the site, fires, and the rescue and treatment of casualties would be the immediate concerns. The OO-ALC and other DOD teams would assist responding local, state, and federal agencies with these efforts. Commercial carriers would be informed of procedures and applicable telephone numbers to be used in the event of a mishap. BMO, in coordination with the NADA or Kirtland AFB safety staff,

Table 2.1-9b. Hill AFB/UTTR to Kirtland AFB - Secondary Route "B"

From/To	Road/Direction	Classification*	Mileage**
From Hill AFB			
Hill AFB/Interstate 215 Jct.	Interstate 15/South	1	14
Interstate 215 Jct/Interstate 15 Jct	Interstate 215/South	1	17
From UTTR			
UTTR/Interstate 80 Jct	Lakeside Road/South	3	18
Interstate 80 Jct/Lake Point	Interstate 80/East	3	40
Lake Point/Interstate 215 Jct	Interstate 80/East	2	16
Interstate 215 Jct/Interstate 15 Jct	Interstate 215/South	1	11
From Interstate 15 Jct (from both Hil AFB and UTTR)			
Interstate 15 Jct/Sandy City	Interstate 15 South	1	3
Sandy City/Spanish Fork	Interstate 15/South	2	34
Spanish Fork/U.S. 89 Jct	U.S. Route 6/East	2	5
U.S. 89 Jct/Price	U.S. Route 6/East	4	58
Price	U.S. Route 6/East	2	2
Price/I-70 Jct	U.S. Route 6/East	3	54
I-70 Jct/Green River	Interstate 70/East	3	4
Green River	Interstate 70/East	2	2
Green River/U.S. 191 Jct	Interstate 70/East	3	20
U.S. 191 Jct/Moab	U.S. Route 191/South	3	32
Moab	U.S. Route 191/South	2	2
Moab/Mexican Water	U.S. Route 191/South	3	116
Mexican Water/Farmington	U.S. Route 64/East	3	190
Farmington	U.S. Route 64/East	2	3
Farmington/Manzanares	U.S. Route 64/East	3	26
Manzanares/Dulce	U.S. Route 64/East	4	54
Dulce/Ensenada	U.S. Route 64/East	3	36
Ensenada/Tres Piedras	U.S. Route 64/East	4	34
Tres Piedras/Taos	U.S. Route 64/East	3	32
Taos	U.S. Route 64/East	2	2
Taos/Cimarron	U.S. Route 64/East	4	46
Cimarron/Raton	U.S. Route 64/East	3	36
Raton/Las Vegas (NM)	Interstate 25/South	3	100
Las Vegas	Interstate 25/South	1	4
Las Vegas/Santa Fe	Interstate 25/South	4	58
Santa Fe	Interstate 25/South	1	4
Santa Fe/Albuquerque	Interstate 25/South	3	48
Albuquerque/Kirtland AFB	Interstate 25/South	1	8
Total Mileages			
From Hill AFB			1,044
From UTTR			1,098

* Explanation
1 Urban: The area in or around a metropolitan area (e.g., Salt Lake City); population above 15,000.
2 Suburban: An area of combined open space and scattered development; population below 15,000.
3 Undeveloped: Areas with little or no development; may include small towns.
4 National Forest: Designated on map as national forest (may include small portions of undeveloped land not within actual NF boundary).

** All mileage is approximate.

would investigate and report any mishap that occurs while the rocket motor is in storage at Kirtland AFB or NADA. (See Section 5.0 of this EA for a more complete discussion of Safety Considerations related to the transportation of MM II rocket motors).

2.2 ALTERNATIVES TO THE PROPOSED ACTION

2.2.1 Alternatives Considered but Eliminated

The CEQ regulations do not require an agency to consider all possible alternatives to a Proposed Action. Rather, the agency is required to consider "reasonable alternatives" to the Proposed Action. Neither air nor rail constitute reasonable modes of transportation for shipping the MM II rocket motors to Kirtland AFB or NADA.

A special Shipping/Storage Container, Ballistic Missile (SSCBM) has been devised for transporting full boosters (U.S. Air Force, 1980). The SSCBM is designed to travel by rail, air, or truck. Individual motors, however, are not shipped in SSCBMs, and no air- or rail-certified containers have been designed for the shipment of individual motors. Individual motors can, however, be transported by a tractor-pulled trailer. Unlike the SSCBM, the trailer (i.e., Fig A101 trailer without a tractor) cannot travel by plane or train because the tie-down devices required to secure the trailer for air or rail transportation are yet to be designed.

2.2.2 No-Action Alternative

The No-Action Alternative is the baseline against which environmental impacts are assessed. Adoption of this alternative would mean that MM II motors temporarily stored at Hill AFB, UTTR, and PUDA would remain in place. Choosing this alternative would eliminate all of the potential environmental impacts associated with transporting the MM II motors to Kirtland AFB and NADA. However, implementation of this alternative would be inconsistent with the Air Force deactivation plan which has designated both Kirtland AFB and NADA as the potential storage sites for MM II missile motors. In addition, PUDA is scheduled for closure, and motor storage at Hill AFB and UTTR is occupying storage space needed for missile maintenance activities. The No-Action Alternative, therefore, does not meet the Air Force mission requirement of providing long-term storage of MM II motors at approved storage facilities.

2.3 COMPARISON OF ALTERNATIVES

A summary comparison of the environmental impacts for each resource associated with the Proposed Action and No-Action Alternative is provided below. Potential effects to the environment are discussed in detail in

Chapter 4.0, Environmental Consequences. Accident probabilities and effects are discussed in Chapter 5.0, Safety Considerations.

Air Quality. Implementation of the Proposed Action would result in a negligible increase in carbon monoxide emissions, which would not have a significant effect on local, regional, or national air quality. The No-Action Alternative would not have an adverse effect on air quality.

Water Resources. Under the Proposed Action, no impacts to water resources are expected since motors would be completely insulated from the natural environment during transportation activities. Similarly, the No-Action Alternative would not affect water resources.

Soils. Neither the Proposed Action nor the No-Action Alternative would adversely affect soils since neither involve activities which would result in the contamination or disturbance of soils.

Biological Resources. No significant impacts on plant life or wildlife would occur from the implementation of the Proposed Action. The Proposed Action would likely produce occasional "road kills", which would have an insignificant effect on biological resources. Threatened and endangered species would not be significantly affected by implementation of the Proposed Action. The No-Action Alternative would not have any effect on biological resources.

Noise. The amount of noise that would be produced from routine transportation activities under the Proposed Action is insignificant. The No-Action Alternative would have no adverse effects on ambient noise levels.

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3.0 AFFECTED ENVIRONMENT

This section describes the environment of the areas that would be affected by the Proposed Action if it were implemented. Based on the operational characteristics of the Proposed Action, along with associated safety considerations, it was determined that the following environmental resources could potentially be affected: air quality, water resources, soils, biological resources, noise, and public health and safety, which is discussed in Section 5.0.

This chapter is organized using environmental resources as the major points of division. For example, under the heading of "Air Quality" are subdivisions describing the air quality at Hill AFB, UTTR, PUDA, NADA, Kirtland AFB, and the proposed transportation corridors. Further, the following classifications will be used to describe the affected environment associated with the transportation corridors: urban, suburban, undeveloped, and National Forest. For purposes of this EA, the term "Urban" shall mean any densely populated area in or around a metropolitan area. "Suburban" means an area of open space and scattered development which is usually on the outlying part of a city or town. "Undeveloped" refers to areas with little or no development. "National Forest" refers to federal lands set aside for their multi-purpose, open-space value concerning recreation, forest, and wildlife management. Finally, as mentioned above, only relevant environmental resources within these subsections will be discussed.

3.1 LOCATION AND BACKGROUND

3.1.1 Hill AFB

Hill AFB is located 5 miles south of Ogden, Utah, and 30 miles north of Salt Lake City. The base is approximately 6,698 acres in size and has served as a major aircraft support and maintenance facility for over 50 years. Hill AFB was originally designated as Hill Field by the U.S. War Department in April 1939. In February 1948, Hill Field was officially redesignated Hill AFB.

Currently, the major organization on the base is the OO-ALC which is assigned worldwide logistics management and maintenance support responsibilities for the nation's fleet of strategic intercontinental ballistic missiles (ICBMs). Included are the Minuteman and Peacekeeper classes of missiles. More than 100 Minuteman missiles are processed annually for programmed depot maintenance and modification (Hill Air Force Base, 1992). The MM II motors currently stored at Hill AFB and UTTR are occupying space needed for missile maintenance activities.

3.1.2 UTTR

The UTTR is located 100 miles west of Hill AFB and covers an area of approximately 900,000 acres. It is used for testing munitions and propellants up to the most powerful ICBM rocket motors and explosive components. The UTTR is also used by Hill AFB, Air Force transient aircraft, and other military services' aircraft for flight training operations.

3.1.3 PUDA

The PUDA is located approximately 14 miles east of Pueblo, Colorado. PUDA was constructed in 1942 and covers about 23,000 acres. Following World War II, it assumed responsibility for the rebuilding and maintenance of artillery fire control and optical materials, and the reconditioning of various transport and combat vehicles. The PUDA is one of four installations assigned as an Activity under the administration of Tooele Army Depot, Utah. Its current mission is to operate a supply depot activity that provides for the receipt, storage, issue, maintenance, and disposal of assigned commodities, and retain limited shipping and receiving capabilities for assigned commodities (U.S. Army Corps of Engineers, 1991). PUDA is scheduled for closure in the near future pursuant to the Defense Base Closure and Realignment Act of 1990.

3.1.4 NADA

The NADA is located approximately 12 miles west of Flagstaff, Arizona. The NADA occupies 28,428 acres of land in the north-central portion of the state. It was activated for the first time in November 1942 as the Navajo Ordnance Depot. The NADA, like the PUDA, is one of four installations assigned as an Activity under the administration of Tooele Army Depot. Its assigned mission is to operate as a reserve supply depot for the receipt, storage, surveillance, minor maintenance, and demilitarization of ammunition and assigned commodities, and shipping of ammunition. The NADA has been and continues to be a major training area for the Arizona National Guard and a regional training site within the Sixth Army Area (U.S. Air Force, 1992a).

3.1.5 Kirtland AFB

Kirtland AFB is located in Bernalillo County in north-central New Mexico. The primary community near Kirtland AFB is the city of Albuquerque to the northwest. The base covers an area of 52,681 acres. The base was originally established as Kirtland Airfield in 1939 and renamed Kirtland AFB in 1948. Kirtland AFB is the home of the 542nd Combat Crew Training Wing which operates the consolidated Air Force Helicopter Training School for all Air Force helicopter crew members. A number of tenant organizations reside at the base including the New Mexico Air National Guard, Department

of Energy, U.S. Air Force's Phillips Laboratory, and Sandia National Laboratories (U.S. Air Force, 1992e). The base shares airfield facilities with the city of Albuquerque.

3.1.6 Hill AFB/UTTR to NADA - Primary Route

This route passes through a major urban area (Salt Lake City, Utah, and vicinity) and a small urban area (Flagstaff, Arizona). It also passes through several areas defined as suburban. There are suburban areas near Salt Lake City and Provo, Utah, and the towns of Price, Green River, and Moab, Utah. The remainder of the route is through undeveloped areas and national forests. This route passes through the Uinta National Forest in Utah and through the Coconino and Kaibab National Forests near Flagstaff, Arizona.

3.1.7 Hill AFB/UTTR to NADA - Secondary Route

This route passes through two major urban areas, Salt Lake City, Utah, and Las Vegas, Nevada, and a small urban area, Henderson, Nevada. Regions defined as suburban along this route are areas near Salt Lake City, and the towns of Nephi, Fillmore, and Beaver, Utah, and Kingman and Williams, Arizona. The remainder of the route passes through undeveloped areas and national forests. This route passes through Fishlake and Dixie National Forests in Utah, and through the Kaibab and Coconino National Forests in Arizona.

3.1.8 PUDA to NADA - Primary Route

This route passes through the small urban areas of Pueblo, Colorado, and Flagstaff, Arizona; a suburban area between the PUDA and Pueblo; the towns of Walsenberg and Trinidad, Colorado; and Raton, Taos, and Farmington, New Mexico. The remainder of the route passes through undeveloped areas and national forests. The route passes through three separate units of the Carson National Forest in New Mexico, and the Coconino and Kaibab National Forests near Flagstaff, Arizona.

3.1.9 PUDA to NADA - Secondary Route

This route passes through the large urban area of Albuquerque, New Mexico, and the small urban areas of Pueblo, Colorado; Las Vegas, Santa Fe, and Gallup, New Mexico; and Flagstaff, Arizona. The area between the PUDA and Pueblo, and the towns of Walsenberg and Trinidad, Colorado; Raton and Grants, New Mexico; and Winslow, Arizona, are defined as suburban areas. The remainder of the route passes through undeveloped areas and national forests. The route passes through the Santa Fe and Cibola National Forests in New Mexico, and the Coconino and Kaibab National Forests near Flagstaff, Arizona.

3.1.10 PUDA to Kirtland AFB - Only Route

This route passes through the large urban area of Albuquerque, New Mexico, and smaller urban areas in Pueblo, Colorado, Las Vegas, New Mexico, and Santa Fe, New Mexico. Areas defined as suburban are between the PUDA and Pueblo, and the towns of Walsenberg and Trinidad, Colorado, and Raton, New Mexico. The remainder of the route is through undeveloped areas and national forests. This route traverses the Santa Fe National Forest in New Mexico.

3.1.11 Hill AFB/UTTR to Kirtland AFB - Primary Route

This route passes through large urban areas in Salt Lake City, Utah, and Albuquerque, New Mexico, and the town of Gallup, New Mexico. Suburban areas are located near Salt Lake City; in the towns of Price, Green River, and Moab, Utah; and Grants, New Mexico. The remainder of the route traverses undeveloped areas and national forests. The route passes through the Uinta National Forest, Utah, and Cibola National Forest, New Mexico.

3.1.12 Hill AFB/UTTR to Kirtland AFB - Secondary Routes

Route "A" passes through the major urban areas of Salt Lake City, Utah; Las Vegas, Nevada; and Albuquerque, New Mexico, and the small urban areas of Henderson, Nevada; Flagstaff, Arizona; and Gallup, New Mexico. It also passes through suburban areas near Salt Lake City and the towns of Nephi, Fillmore, and Beaver in Utah; Kingman, Williams, and Winslow, Arizona; and Grants, New Mexico. The remainder of the route passes through undeveloped areas and the following national forests: Fishlake and Dixie in Utah, Coconino and Kaibab in Arizona, and Cibola in New Mexico.

Route "B" passes through two major urban areas: Salt Lake City, Utah, and Albuquerque, New Mexico, and the small urban areas of Las Vegas and Santa Fe, New Mexico. Several areas are defined as suburban. These are near Salt Lake City and Provo, Utah, and the towns of Price, Green River, and Moab, Utah, and Farmington and Taos, New Mexico. The remainder of the route passes through undeveloped areas; the Unita National Forest, Utah; and the Carson and Santa Fe National Forests in New Mexico.

3.2 AIR QUALITY

3.2.1 Hill AFB/UTTR

The Wasatch Front Intrastate Air Quality Control Region (AQCR), as designated by the U.S. Environmental Protection Agency (EPA), encompasses five Utah counties: Davis, Salt Lake, Tooele, Utah, and Weber. Hill AFB is within portions of Weber and Davis counties. The UTTR is in

Tooele County and the highway connecting Hill AFB and UTTR passes through Salt Lake County.

Currently, there are portions of Salt Lake County which do not meet the National Ambient Air Quality Standards (NAAQS) for carbon monoxide, ozone, and particulates (40 CFR Part 81) (Parkin, 1992). Davis County does not meet the ozone standard (Bird, 1992). Any plans for activities or new facilities which would lead to an increase in any of these pollutants would be examined critically by the Utah Bureau of Air Quality before granting a permit to construct a facility or perform various activities. Utah, Tooele, and Weber counties are in attainment of all NAAQS (Bird, 1992).

3.2.2 PUDA

Pueblo County, Colorado, within which PUDA is located, is in compliance with the NAAQS for all criteria pollutants. Colorado's state air quality monitors are located primarily within the city of Pueblo. The state has previously monitored Pueblo County for carbon monoxide and sulfur dioxide. Monitoring was discontinued because the pollutants were shown to be present only at very low levels and well within the minimum requirements of the air quality standards. Sources of air pollutants at PUDA include vehicle and heating plant emissions, and emissions from detonation of explosives.

3.2.3 NADA

NADA is located within the EPA's Northern Arizona Intrastate air quality control region and is in compliance with current and expected standards for priority pollutants. Air quality is considered good. Due to atmospheric conditions and favorable air circulation patterns in the area, discharged air pollutants are readily dispersed.

3.2.4 Kirtland AFB

Kirtland AFB is located within the Albuquerque/Bernalillo County Air Quality Control District of New Mexico, which is administered by the Albuquerque Environmental Health Department. Kirtland AFB is located in the Rio Grande Valley between two mountain ranges that greatly modify the area weather. Under low wind conditions, mixing is reduced and local pollutant concentrations can increase somewhat. Calm wind conditions occur most frequently during the winter months. Albuquerque does not meet the NAAQS for carbon monoxide (Storey, 1992; U.S. Air Force, 1992c).

3.2.5 Hill AFB/UTTR to NADA - Primary Route

This route passes through portions of 13 counties in Utah and Arizona. The majority of the route is through sparsely populated and undeveloped areas. This route includes one major urban area: Salt Lake City, Utah. Air quality

for Salt Lake, Davis, Tooele, Utah, and Weber counties is discussed in Section 3.2.1. Carbon, Emery, Grand, San Juan, and Wasatch counties in Utah are in attainment of all NAAQS (Juniel, 1992).

Apache, Navajo, and Coconino counties in Arizona are in attainment for all NAAQS (Domsky, 1992; Juniel, 1992).

3.2.6 Hill AFB/UTTR to NADA - Secondary Route

This route passes through portions of 15 counties in four states: Utah, Nevada, California, and Arizona. This route includes two major urban areas: Salt Lake City, Utah, and Las Vegas, Nevada. Air quality for Salt Lake, Davis, Tooele, Utah, and Weber counties is discussed in Section 3.2.1. Beaver, Iron, Juab, Millard, and Washington counties in Utah are in attainment of all NAAQS (Juniel, 1992). Clark County, Nevada, does not meet the NAAQS for carbon monoxide and particulates (Glasser, 1992). The portion of San Bernardino County, California, through which U.S. Route 95 passes, is in nonattainment of NAAQS for ozone and particulates (Desalvio, 1992). Mohave County, Arizona, does not meet the NAAQS for particulates (Juniel, 1992). Yavapai and Coconino counties in Arizona are in attainment for all NAAQS (Domsky, 1992; Juniel, 1992).

3.2.7 PUDA to NADA - Primary Route

This route passes through portions of 10 counties in Colorado, New Mexico, and Arizona. This route does not include any major urban areas. Pueblo, Huerfano, and Las Animas counties, Colorado, are in attainment for all NAAQS (Halvey, 1992; Hance, 1992). Colfax, Taos, Rio Arriba, and San Juan counties in New Mexico are also in compliance with all NAAQS (State of New Mexico, 1991). Air quality for Apache, Coconino, and Navajo counties in Arizona is discussed in Section 3.2.5.

3.2.8 PUDA to NADA - Secondary Route

This route passes through portions of 14 counties in Colorado, New Mexico, and Arizona. This route includes one large urban area: Albuquerque, New Mexico. Air quality for this area is discussed in Section 3.2.4. Air quality for counties within Arizona (i.e., Apache, Coconino, and Navajo) and Colorado (i.e., Pueblo, Huerfano, and Las Animas) is described in Sections 3.2.5 and 3.2.7, respectively, and for Bernalillo County, New Mexico, in Section 3.2.4. Other counties within New Mexico (i.e., Colfax, McKinley, Cibola, Santa Fe, Sandoval, San Miguel, and Mora) are in attainment for all criteria pollutants.

3.2.9 PUDA to Kirtland AFB - Only Route

This route passes through portions of nine counties in Colorado and New Mexico. Air quality for the counties within Colorado (i.e., Pueblo, Huerfano, and Las Animas) and New Mexico (i.e., Colfax, Bernalillo, Mora, San Miguel, Santa Fe, and Sandoval) is described in Sections 3.2.4, 3.2.7, and 3.2.8.

3.2.10 Hill AFB/UTTR to Kirtland AFB - Primary Route

This route passes through portions of 14 counties in Utah, Arizona, and New Mexico. Air quality for the only major urban area along this route, Salt Lake City, Utah, is discussed in Section 3.2.1. Air quality for Davis, Utah, Tooele, and Weber counties in Utah is also described in Section 3.2.1. Section 3.2.5 discusses air quality for Carbon, Emery, Grand, San Juan, and Wasatch counties in Utah. Apache County, Arizona, is in attainment of all criteria pollutants. Air quality for Cibola and McKinley counties is discussed in Section 3.2.8, and for Bernalillo County in Section 3.2.4.

3.2.11 Hill AFB/UTTR to Kirtland AFB - Secondary Routes

Route "A" passes through portions of 20 counties in Utah, Nevada, California, Arizona, and New Mexico. Air quality for the portion of the route in Utah, Nevada, California and Arizona through Flagstaff (Coconino County) is described in Section 3.2.6. Air quality for the remainder of the route is discussed in Section 3.2.5 (Navajo and Apache counties, Arizona), Section 3.2.8 (McKinley and Cibola counties, New Mexico) and Section 3.2.4 (Bernalillo County and Albuquerque, New Mexico).

Route "B" passes through portions of 20 counties in Utah, Arizona, and New Mexico. Air quality for the Utah and Arizona portions is described in Section 3.2.5. Air quality for the New Mexico portion is described in Section 3.2.7 (San Juan, Rio Arriba, Taos, and Colfax counties), Section 3.2.8 (Mora, San Miguel, Santa Fe, and Sandoval counties) and Section 3.2.4 (Bernalillo County and Albuquerque).

3.3 WATER RESOURCES

3.3.1 Hill AFB/UTTR

Hill AFB lies in the eastern edge of the Great Basin watershed which drains to the west to the Great Salt Lake. Drainage of Hill AFB is accomplished by overland flow to Kays Creek, Fife Ditch, and Davis & Weber Canal, and to dry swales, or simply by infiltration into the surface soils. There are no permanent surface water bodies or perennial streams on the UTTR or near Hill AFB. Any runoff is ponded in surface depressions and evaporates or infiltrates within a few days. (Engineering-Science, 1982)

The primary sources of potable water in the area are a number of aquifers to the east and south of the Great Salt Lake. Hill AFB and adjacent communities derive groundwater from the Delta Aquifer, which is the major source of groundwater in the region. The principal aquifer in the eastern portion of the UTTR is in the North Valley Subdistrict of the Sink Valley Hydrogeologic Basin (U.S. Air Force, 1990a).

3.3.2 PUDA

The surface water drainage on the PUDA is controlled by the Chico Creek, Boone Creek, and Haynes Creek drainages. These three creeks tend to flow only after periods of rainfall and snowmelt. The PUDA is located within the Arkansas River Basin. The alluvial terrace aquifer is present under much of the base and the Arkansas alluvial aquifer occurs to the south. These two alluvial aquifers are separated by outcrops of bedrock and are not hydraulically connected. The regional groundwater flow in the alluvial terrace aquifer is to the south and southeast (U.S. Air Force, 1991a).

3.3.3 NADA

Surface water flows at the NADA are ephemeral and intermittent due to semiarid conditions. Since there is little or no groundwater or bank storage to maintain stream flow, flow occurs only during rainstorms or in the spring season. The Kaibab Limestone occurs throughout the NADA, either exposed on the surface or underlying alluvium or volcanics. Groundwater flows uniformly throughout this formation, with increased flow rates in areas of faulting.

3.3.4 Kirtland AFB

The primary source of surface water in the vicinity is the Rio Grande River. There are no perennial streams or waterways on the base. Storm runoff enters intermittent stream beds which eventually feed into the Rio Grande. Potable water for Kirtland AFB is supplied primarily from eight groundwater wells located on base. Water supplies are generally considered adequate with no constraints on the base water system.

3.3.5 Hill AFB/UTTR to NADA - Primary Route

Approximately eight bodies of water (e.g., rivers, lakes) intersect or are adjacent to this route. The most prominent of these are the Great Salt Lake near Salt Lake City, Utah; Utah Lake near Provo, Utah; Green River located off Interstate 70 near Green River, Utah; and Colorado River at Moab, Utah. These water bodies occur within any of the four classifications (i.e. urban, suburban, undeveloped, and national forest).

3.3.6 Hill AFB/UTTR to NADA - Secondary Route

This route intersects or is adjacent to approximately six bodies of water. The most prominent of these are the Great Salt Lake near Salt Lake City, Utah; Utah Lake near Provo, Utah; Virgin River near Littlefield, Arizona; and Colorado River near Needles, California. These water bodies occur within any of the four classifications.

3.3.7 PUDA to NADA - Primary Route

This route intersects or is adjacent to approximately 11 bodies of water. Starting from Pueblo Depot Activity, the most notable of these water bodies include the Purgatoire River near Trinidad, Colorado; Eagle Nest Lake near Eagle Nest, New Mexico; Rio Grande; and Little Colorado River near Winslow, Arizona. These water bodies occur within any of the four classifications.

3.3.8 PUDA to NADA - Secondary Route

There are approximately 12 bodies of water that intersect or are adjacent to this route. The prominent water bodies along this route include the Purgatoire River near Trinidad, Colorado; Rio Grande near Albuquerque, New Mexico; and the Little Colorado River near Winslow, Arizona. These water bodies occur within any of the four classifications.

3.3.9 PUDA to Kirtland AFB - Only Route

There are approximately 11 bodies of water that intersect or are adjacent to this route. The prominent water body along this route is the Purgatoire River near Trinidad, Colorado. This route crosses the Purgatoire River in a primarily suburban area.

3.3.10 Hill AFB/UTTR to Kirtland AFB - Primary Route

This route intersects or is adjacent to approximately nine bodies of water. The prominent water bodies include the Great Salt Lake near Salt Lake City, Utah; Utah Lake near Provo, Utah; Green River near Green River, Utah; Colorado River at Moab, Utah; and Rio Grande in Albuquerque, New Mexico. These water bodies occur within any of the four classifications.

3.3.11 Hill AFB/UTTR to Kirtland AFB - Secondary Routes

Routs "A" intersects or is adjacent to approximately ten bodies of water. These include the Great Salt Lake near Salt Lake City; Utah Lake near Provo, Utah; Virgin River near Littlefield, Arizona; Colorado River at Needles, California; Little Colorado near Winslow, Arizona; and Rio Grande in Albuquerque, New Mexico.

Approximately 19 water bodies intersect or are adjacent to Route "B". The most prominent of these are the Great Salt Lake near Salt Lake City, Utah; Utah Lake near Provo, Utah; Green River at Green River, Utah; Colorado River at Moab, Utah; Eagle Nest Lake near Eagle Nest, New Mexico; and Rio Grande near both Taos and Albuquerque, New Mexico. Water bodies on both routes occur within any of the four classifications.

3.4 SOILS

3.4.1 Hill AFB/UTTR

Soils at Hill AFB and the UTTR are arid soils. Hill AFB soils are mapped as Francis-Timpanogos-Kilburn association. UTTR soils are mapped as Mazuma family-Cliffdown-Papoose. The soils at both Hill AFB and UTTR are very deep, well drained to excessively drained, on level to steep sloping terraces in a moist, subhumid climate zone (Trickler, 1986).

3.4.2 PUDA

Six major soil associations occur on the PUDA: Stoneham-Adena-Mananola, Arvada-Keyner, Olney-Vons, Valent, Limon-Razor-Midway, and Las Animas-Glenburg-Apishaps. The soils are deep, poorly to excessively drained, and include silt, sand, and clay.

3.4.3 NADA

Residual soils at the NADA are predominantly clays, while soils overlying the alluvium and other unconsolidated materials are varying proportions of sands, silts, and clays. Previous soil surveys and test borings show the soils to be erratically variable in depth, which is not uncommon in volcanic regions with varying topography and rock types.

3.4.4 Kirtland AFB

There are a total of 10 different soil types on Kirtland AFB. The soil at the base varies in composition, drainage, and depth.

3.4.5 Transportation Corridors

Soils located along all of the routes that are within urban or suburban areas are more likely to have been disturbed by construction activities associated with population growth, while soils within undeveloped areas and national forests remain undisturbed.

3.5 BIOLOGICAL RESOURCES

The vegetation and wildlife associated with the ecoregions of each area are defined below. The ecoregions used are those developed by the U.S. Forest Service and USFWS (1981) after the classification of J.M. Crowley. The USFWS offices in the affected states were contacted regarding threatened and endangered species along the routes, and their concerns were incorporated into the analysis. The USFWS letters are included in Appendix B.

3.5.1 Hill AFB

Vegetation at Hill AFB is at the edge of the Intermountain Sagebrush Province and the Rocky Mountain Forest Province. The native species include rabbitbrush, wheatgrass, big sagebrush, and scrub oak. Vegetation at the northern portion of the base includes western wheatgrass, ragweed, gumweed, daisy fleabane, thistle, mustards, and snakeweed (Bailey, 1976). The most common species of mammals in the region are ground squirrels, jackrabbits, kangaroo mice, and wood rats. No threatened or endangered species are known to be full-time residents on Hill AFB, although bald eagles and peregrine falcons occur in close proximity to the base and their occurrence on Hill AFB would not be unusual.

3.5.2 UTTR

The primary plant communities in the area are from the Intermountain Sagebrush Province and include the salt shrub and Great Basin sagebrush. This community is dominated by sagebrush and includes rabbitbrush, Mormon tea, spiny hopsage, shadscale, alkali sacaton, ricegrass, galleta, and gramma grasses (Bailey, 1978). The most common species of mammals in the region are pronghorn, ground squirrels, jackrabbits, kangaroo mice, and wood rats. Three threatened or endangered species occur within the UTTR. These are the bald eagle, American peregrine falcon, and the arctic peregrine falcon which migrates through the range.

3.5.3 PUDA

The principal native vegetation type on the PUDA is Great Plains Short-grass Prairie. Grass species include blue grama, western wheat grass, buffalo grass, sand dropseed, galleta, and alkali sacaton. Shrubs and half shrubs include broom snakeweed, rubber rabbitbrush, sand sage, and small soapweed. Both mule and white-tailed deer occur on the installation in small numbers. Pronghorn antelope are common. Coyotes are the most common furbearer; other furbearers include badgers, skunks, raccoons, squirrels, and foxes. The USFWS lists three endangered or threatened wildlife species that could possibly occur on or in the vicinity of the PUDA: the black-footed ferret, the American peregrine falcon, and the bald eagle.

3.5.4 NADA

The NADA is located in the upper Gila Mountains Forest Province and is bordered by two national forests: the Kaibab on the west and the Coconino on the east. The Colorado Plateau and upper Gila Mountains forests contain the world's largest contiguous stand of ponderosa pine. Other habitats in the area include: juniper-pinyon woodlands, mixed conifer woodlands, riparian habitat, and mountain meadows. These habitats contain spruce, aspen, Utah and one-seed juniper, Colorado pinyon, willow, scrub oak, gambel oak, Douglas fir, and grasses, forbs, and herbs in open stands. The high watershed reservoirs in the area feed permanent springs, streams, and rivers in the semi-arid lands below, although there are no permanent streams or rivers at NADA (Arizona Game and Fish Department, 1973).

Species that inhabit the NADA include elk, rocky mountain mule deer, antelope, black bear, mountain lion, bobcat, coyote, grey fox, raccoon, skunk, porcupine, badger, Abert squirrel, jackrabbit, cottontail, ducks, doves, geese, turkey, and pigeons. There are no known threatened or endangered species permanently residing at the NADA. However, the NADA vicinity is used by wintering endangered bald eagles and protected golden eagle as well as by the proposed threatened Mexican spotted owl and protected goshawk.

3.5.5 Kirtland AFB

Vegetation at Kirtland AFB can be classified into two ecological associations. A desert grassland association characteristic of the Great Plains Short-grass Prairie Province is prevalent over most of the base area, and a juniper-pinyon association characteristic of the Colorado Plateau Province is present at elevations above 5,800 feet.

Due to extensive grassland habitat on the base, herbivores are abundant. A number of mammal species have been reported in the area, including coyote, gray fox, skunk, and small rodents. Three federally listed endangered species occur in Bernalillo County where the base is located: the American peregrine falcon, the bald eagle, and the whooping crane.

3.5.6 Hill AFB/UTTR to NADA - Primary Route

This route passes through major urban areas and several areas defined as suburban. The remainder of the route is undeveloped areas and national forests. This route passes through the Uinta National Forest in Utah and through the Coconino and Kaibab National Forests near Flagstaff, Arizona. The route begins at Hill AFB/UTTR in the Intermountain Sagebrush Province described in Sections 3.5.1 and 3.5.2. It passes into the Rocky Mountain Forest Province characterized by Douglas fir, ponderosa pine, and scrub oak, inhabited by elk, coyote, grey squirrel, and red-tailed hawk (U.S. Air Force,

1991b). While still in Utah, the route passes into the Colorado Plateau Province which is characterized by the predominance of the Utah and one-seed junipers over the Colorado pinyon pine. Bluegrass and Arizona fescue grasses, chaparral, or Great Basin desert scrub such as sagebrush (Northern Arizona University, 1981) are associated with these trees. The bushy-tailed woodrat, pinyon jay, gray flycatcher, and black-throated gray warbler can be found in the Colorado Plateau Province. The route ends at NADA whose biological community is described in 3.5.4. In Utah, the USFWS (letter dated November 6, 1992) identified 2 endangered and 1 proposed as threatened birds, 7 endangered fish, 1 endangered and 1 threatened mammal (associated species), the threatened desert tortoise, a proposed as endangered snail, 2 endangered and 1 threatened plants, and 34 candidate species that may occur along the route. Sensitive areas along the route in Utah include wetlands along the margins of the Great Salt Lake and Utah Lake which are of critical importance to migrating and nesting birds. In Arizona, the USFWS (letter dated October 30, 1992) identified one endangered fish (chub), two endangered cactus, and three category 1 plant species that may occur along the route.

3.5.7 Hill AFB/UTTR to NADA - Secondary Route

This route passes through two major urban areas, one smaller urban area, and a number of suburban areas. The remainder of the route passes through undeveloped areas and national forests. The route passes through Fishlake and Dixie National Forests in Utah and through the Kaibab and Coconino National Forests in Arizona. The route begins at Hill AFB/UTTR in the Intermountain Sagebrush Province (see Section 3.5.1). It passes through the Rocky Mountain Forest Province and the Colorado Plateau Province in Utah (see Section 3.5.6). The Nevada and California portions of the route enter the American Desert Province, Mojave Desert subdivision. Creosote, white bursage, blackbrush, Mojave yucca, Mojave sage, and Joshua trees are prevalent with mesquite trees in the valleys and basins and pinyon and juniper trees in the highlands. The little yucca night lizard, Gambel quail, golden eagle, cottontail rabbits, coyotes, and wild burro are characteristic with this plant community (Arizona Game and Fish Department, 1973; Bostick, 1971; Holland, 1982; U.S. Department of the Interior, 1980). The last portion of the route through Arizona is in the upper Gila Mountain Forest Province as described in Section 3.5.4. In Utah, the USFWS (letter dated November 6, 1992) identified 2 endangered and 1 proposed as threatened birds, 7 endangered fish, 1 endangered and 1 threatened mammal (associated species), the threatened desert tortoise, a proposed as endangered snail, 2 endangered and 1 threatened plants, and 34 candidate species that may occur along the route. Sensitive areas along the route in Utah include wetlands along the margins of the Great Salt Lake and Utah Lake which are of critical importance to migrating and nesting birds. In Nevada, the USFWS (letter dated October 26, 1992) identified two endangered birds (migrants), two endangered fish, the threatened desert

tortoise, and ten candidate species including birds, fish, mammals, reptiles, amphibians, and invertebrates that may occur along the route. In California, the USFWS (letter dated October 23, 1992) identified the threatened desert tortoise, the endangered Yuma clapper rail, the endangered razorback sucker, and the category 1 California black rail (bird) as being along the route. The USFWS also identified two unusual plant assemblages along California U.S. 95: the Piute creek smoketree assemblage and ocotillo assemblage. Interstate 40 runs through the Sacramento and Dead Mountains which is habitat for the sensitive golden eagle. Beal Slough, a sensitive wetland adjoining the Colorado River, and the Needles Revegetation Area (burn recovery) also occur along the route. In Arizona (letter dated October 30, 1992) five endangered fish (mostly chubs), two endangered cactus, the threatened Mohave desert tortoise, and four category 1 plant species may occur along the route.

3.5.8 PUDA to NADA - Primary Route

This route passes through two small urban areas and a number of suburban areas. The remainder of the route passes through undeveloped areas and national forests. The route passes through three separate units of the Carson National Forest in New Mexico, and the Coconino and Kaibab National Forests near Flagstaff, Arizona. The route begins at PUDA in the Great Plains Short-grass Prairie Province as described in Section 3.5.3. However, most of the route through New Mexico is in the Rocky Mountain Forest Province and picks up the route described in Section 3.5.6 after entering the Colorado Plateau Province. It ends at NADA whose surrounding biological characteristics are described in Section 3.5.4. In Colorado, the USFWS (letter dated October 20, 1992) has identified four endangered birds (migrants), one endangered mammal (black-footed ferret), one threatened plant (Ute ladies' tresses), and nineteen candidate species including birds, mammals, fish, reptiles, and plants. The USFWS is not concerned with any threatened or endangered species in New Mexico (letter dated October 30, 1992). In Arizona, the USFWS (letter dated October 30, 1992) identified one endangered fish (chub), two endangered cactus, and three category 1 plant species that may occur along the route.

3.5.9 PUDA to NADA - Secondary Route

This route passes through at least one large urban area and a number of smaller urban and suburban areas. The remainder of the route passes through undeveloped areas and national forests. The route passes through the Santa Fe and Cibola National Forests in New Mexico and the Coconino and Kaibab National Forests near Flagstaff, Arizona. The route begins at PUDA in the Great Plains Short-grass Prairie Province as described in Section 3.5.3. In New Mexico, the route travels through the Colorado Plateau Province previously described in Section 3.5.6. The route ends at NADA

(see Section 3.5.4). Threatened and endangered species of USFWS concern along the route are similar to those along the primary route discussed in Section 3.5.8.

3.5.10 PUDA to Kirtland AFB - Only Route

This route passes through one large urban area and several smaller urban and suburban areas. The remainder of the route is through undeveloped areas and National Forests. This route traverses the Santa Fe National Forest in New Mexico. The route begins at PUDA in the Great Plains Short-grass Prairie Province and continues to travel through that biological province through most of the route (see Section 3.5.3). The route passes into the Colorado Plateau Province before it reaches Kirtland AFB (see Section 3.5.5) whose biological characteristics are representative of the last 75 miles of the route. In Colorado, the USFWS (letter dated October 20, 1992) has identified four endangered birds (migrants), one endangered mammal (black-footed ferret), one threatened plant (Ute ladies' tresses), and nineteen candidate species including birds, mammals, fish, reptiles, and plants. The USFWS is not concerned with any threatened or endangered species in New Mexico (letter dated October 30, 1992).

3.5.11 Hill AFB/UTTR to Kirtland AFB - Primary Route

This route passes through two large urban areas and a number of smaller urban and suburban areas. The remainder of the route traverses undeveloped areas and national forests. The route passes through the Uinta National Forest, Utah and Cibola National Forest, New Mexico. The route begins at Hill AFB/UTTR in the Intermountain Sagebrush Province (see Section 3.5.1). The route passes into the Rocky Mountain Forest Province and the Colorado Plateau Province similar to that described in Section 3.5.6 Mule deer, coyotes, and red-tailed hawks have been seen in the area (U.S. Department of the Interior, 1981). The route ends at Kirtland AFB (see Section 3.5.5) which shows a Great Plains Short-grass Prairie influence. In Utah, the USFWS (letter dated November 6, 1992) identified 2 endangered and 1 proposed as threatened birds, 7 endangered fish, 1 endangered and 1 threatened mammal (associated species), the threatened desert tortoise, a proposed as endangered snail, 2 endangered and 1 threatened plants, and 34 candidate species that may occur along the route. Sensitive areas along the route in Utah include wetlands along the margins of the Great Salt Lake and Utah Lake which are of critical importance to migrating and nesting birds. In New Mexico, the USFWS (letter dated October 30, 1992) is not concerned with any threatened or endangered species along the route. Nor are they concerned with protected species in Apache County, AZ.

3.5.12 Hill AFB/UTTR to Kirtland AFB - Secondary Routes

Route "A" passes through three large urban areas and a number of smaller urban and suburban areas. The remainder of the route traverses undeveloped areas and the following national forests: Fishlake and Dixie in Utah, Kaibab and Coconino in Arizona, and Cibola in New Mexico. Biological resources for the portion of the route through Flagstaff are already described in Section 3.5.6. From here the route again enters the Colorado Plateau Province (described in Section 3.5.6), previously traversed in Utah, and ends at Kirtland AFB (see Section 3.5.5). Threatened and endangered species of USFWS concern are similar to the primary route except in Navajo County, AZ the endangered Peebles Navajo cactus may be found along the route.

Route "B" passes through two major urban areas and several smaller urban and suburban areas. The remainder of the route traverses undeveloped areas and the Uinta National Forest, Utah, and the Carson and Santa Fe National Forests, New Mexico. This route begins in the Intermountain Sagebrush Province (described in Sections 3.5.1 and 3.5.2), continues through the Rocky Mountain Forest Province (described in Section 3.5.6) in Utah; crosses the Colorado Plateau Province (described in Section 3.5.6) in Utah, Arizona, and New Mexico; re-enters the Rocky Mountain Forest Province in northern New Mexico; passes through the Great Plains Short-grass Prairie Province (described in Section 3.5.3) along Interstate 25 in New Mexico; and re-enters the Colorado Plateau Province before reaching Kirtland AFB (see Section 3.5.5). Threatened and endangered species of USFWS concern along route B are similar to those along the primary route discussed in Section 3.5.11.

3.6 NOISE

3.6.1 Hill AFB

Hill AFB is located in an urbanizing environment just south of Ogden, Utah. It is also adjacent to Interstate 15 and Interstate 84 and Union Pacific rail lines. Transient noise levels in the area are therefore affected by the constant highway traffic. In addition, approximately 60 types of aircraft use the base with daily takeoff operations in excess of 300. Fighter aircraft account for approximately 90 percent of the takeoff operations.

3.6.2 UTTR

Background noise levels are generally at ambient levels, punctuated by frequent flyovers by fighter aircraft on training missions and occasional detonations, firings, or burnings of ordnance or motors during training or disposal activities. Movement of trucks and cars at the complex or occasional helicopter landings are other sources of man-made noise.

3.6.3 PUDA

Because the PUDA is surrounded on three sides by undeveloped grazing land, there are few significant noise generators or noise receptors within the immediate vicinity of its boundaries. The highway and railroad located to the south of the PUDA act as a minor noise generator. The major noise influences around the installation include the Department of Transportation (DOT) Test Center and aircraft overflight related to the Pueblo Memorial Airport.

3.6.4 NADA

The overall noise levels at the NADA are generally low. Major generators of noise include the Interstate 40 corridor and the Santa Fe Railroad line adjacent to the northern boundary of the installation. The operations of the ammunition demolition area cause periodic noises heard by residents in the local area.

3.6.5 Kirtland AFB

The existing noise environment in the vicinity of Kirtland AFB is one of relatively insignificant localized noise sources (e.g., road traffic, with intermittent occurrences of aircraft noise events which are relatively loud and readily discernable). The city of Albuquerque maintains a noise ordinance which regulates noise through noise level standards. Motor vehicles are specifically addressed by the ordinance. Motor vehicles, including trucks, can not emit in excess of 82 A-weighted decibels (dBA), measured 50 feet from the center of the vehicle path. This noise level applies to roads with a posted speed limit of above 40 miles per hour (U.S. Air Force, 1992e).

3.6.6 Transportation Corridors

Vehicles are the primary noise generators along the various transportation corridors. State and local noise ordinances do not apply to vehicles, including tractor trailers, traveling on federal highways. In general, local noise ordinances apply to construction vehicle noise limitations within residential areas.

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4.0 ENVIRONMENTAL CONSEQUENCES

4.1 PROPOSED ACTION

This section describes the potential environmental consequences of the Proposed Action. Section 5.0, Safety Considerations, discusses the potential effects of an accidental explosion and/or the burning of a rocket motor.

4.1.1 Air Quality

The Proposed Action would not have a significant effect on air quality. The pollutants emitted by the tractor trailer combination would be negligible. Additionally, the frequency of motor shipments is expected to be low (approximately 2 per month). The only relevant criteria pollutant that would be produced by the Proposed Action is carbon monoxide. Of the areas within close proximity to the subject transportation routes, only Albuquerque, New Mexico; Salt Lake City, Utah; and Las Vegas, Nevada, do not meet the NAAQS for carbon monoxide. The minute amounts of carbon monoxide emitted into the environment as a result of the Proposed Action would not be significant, even for areas that are in nonattainment for carbon monoxide.

4.1.2 Water Resources

The Proposed Action would not have a significant effect on the surrounding surface water or groundwater. The proposed transportation routes pass over, by, or near approximately 30 separate bodies of water. These bodies of water would not be affected since motors are insulated from the environment via the tractor trailer. In addition, the routes are routinely traveled by commercial tractor trailers with negligible impact to water resources.

4.1.3 Soils

No impacts on soils are anticipated from the proposed transportation activities. No new construction is planned, so no disturbance of soils is anticipated.

4.1.4 Biological Resources

The Proposed Action would not significantly affect biological resources. No impacts on plant or animal species are anticipated from routine transportation of rocket motors. The Proposed Action would be expected to have no impact on threatened or endangered species.

4.1.5 Noise

The Proposed Action would not significantly affect ambient noise levels along transportation corridors, since the amount of noise emitted from the tractor trailer is negligible. Further, state and local noise ordinances do not apply to vehicles traveling along federal highways.

4.2 NO-ACTION ALTERNATIVE

The No-Action Alternative is a continuation of current storage activities and would not have a significant effect on the environment.

4.3 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

The Proposed Action would not be likely to result in the loss of habitat for plants or animals, the loss of or impact to threatened or endangered species, or the loss of cultural resources. Further, there would be no changes in land use or physical resources.

4.4 RELATIONSHIP BETWEEN SHORT-TERM USE OF THE ENVIRONMENT AND LONG-TERM PRODUCTIVITY

The Proposed Action would not eliminate any options for future use of the environment at or around the installations or along the transportation corridors.

4.5 UNAVOIDABLE ADVERSE ENVIRONMENTAL EFFECTS

There are no known adverse environmental effects that cannot be avoided for the Proposed Action.

5.0 SAFETY CONSIDERATIONS

The ICBM safety program developed by the Air Force extends from concept development through system design, deployment, operation, and deactivation. The objective of the ICBM safety program is to identify potential hazards and mishap risk and define methods to eliminate or effectively mitigate the hazards or risk. This process has been integrated and formally documented into safety programs that include the active participation of numerous Air Force, DOD, and contractor safety personnel. These safety programs are guided by directives and regulations that establish policy, procedures, and criteria based upon proven safety methods derived from both military and civilian experiences. An extensive range of specifications, manuals, and pamphlets have been developed to provide detailed safety requirements for the loading, unloading, shipment, storage, inspection, assembly, disassembly, and safety-related problems associated with the MM II missile system.

5.1 EMERGENCY RESPONSE

An Missile Potential Hazard Network (MPHN) has been established within the OO-ALC to provide total management of the missile system. The MPHN is composed of missile potential hazard teams and supporting elements, including associated communications support (U.S. Air Force, 1992a). The OO-ALC has established and maintains the capability to expeditiously accomplish recovery operations in the event of a mishap involving MM II motors. Pertinent factors such as location, terrain, weather, accessibility, imminent hazards to civilian population, and availability of equipment, will ultimately affect response activities. As stated in Section 2.0, missile motors will be loaded into government-owned trailers and transported to NADA and Kirtland AFB via commercial carrier. In the unlikely event of an accident during transport of MM II motors to NADA and Kirtland AFB, the control of access to the site, fires, and the rescue and treatment of casualties would be the immediate concerns. The OO-ALC and other DOD teams would assist responding federal, state, and local agencies with these efforts.

5.2 ACCIDENTS

The transport of MM II stages to Kirtland AFB and NADA from Hill AFB, UTTR, and PUDA, poses a low risk of accidents, and an even lower risk that such accidents could adversely affect human health or the environment. The analysis of potential accidents during transportation of MM II stages focuses on the three primary elements of such risks: the hazard/accident mechanism; the accident likelihood; and its severity on human health and the environment if such an accident were to occur. Military and civilian transportation statistics were used for the transportation safety analysis.

5.2.1 Hazard/Accident Mechanism

The MM II stages 1, 2, and 3 contain solid composite propellants designed to burn rapidly. Stages 1 and 2 contain a solid composite propellant which burns vigorously and would be difficult to extinguish. Any explosions would most likely be pressure ruptures of the motor casing, which may produce fragments. Blast overpressures would be localized. Stage 3 has a propellant which is principally considered a blast hazard, although if involved in a fire it will burn at a rate comparable to that of rubber tires. If detonated, a Stage 3 would produce blast overpressures and fragments beyond 1,000 feet. Accidental ignition mechanisms of the above-mentioned propellants can be caused by static discharge, lightning, or a nearby fire or explosion. Additionally, impact of the rocket motor casing against an object or penetration of the rocket motor's casing may produce enough internal or external frictional energy release to cause ignition. The mechanisms for detonation could be caused by impact or nearby explosion. Detonation resulting solely from impact is highly unlikely. For example, a quantity of bare propellant the size of one Stage 3 motor, approximately 3,700 pounds, would require an impact on steel at a rate of 140 miles per hour to have a 50 percent probability of detonation. Much less energy is required for ignition of the propellant. Therefore, in an accident, the most credible event is a brief but intense fire caused by a rupture of the motor casing and ignition by some source.

5.2.2 Accident Likelihood

For any shipment of rocket motors, the DOD employs strict safety precautions to minimize the likelihood of an ignition accident. In addition, routes will be established to minimize the time spent traveling through population centers. The stages are shipped in specially designed transport vehicles which are designed to provide a stable, shock-free environment for the rocket motors. The rocket motors are placed on carriages in the tractor trailer transport vehicle. These carriages are designed to provide a degree of restraint given an inadvertent ignition.

The DOD has had years of experience with road transport of stages including roughly 500,000 road miles transporting Minuteman missiles with transporter-erector vehicles between the deployment bases and launch facilities. In roughly thirty years only four rollover accidents have occurred, with none causing propellant ignition (Department of Defense, 1991). The OO-ALC, which is the weapons system manager for Minuteman, reported that during the system's life from inception to 1990 (the latest date for which data are available), over 11,000 Minuteman missile movements have occurred by air, rail, or road. In addition, over 12,400 individual Minuteman solid stages have been transported without mishap (U.S. Air Force, 1992d).

This experience is reassuring; however, for completeness, an analysis using statistical data from highway truck accidents was performed for the accident mechanisms discussed in the previous section to determine the probability of an accident resulting in a rocket motor propellant fire. These mechanisms will be addressed in two categories: propellant fires resulting from highway transport accidents (collisions at closing speeds greater than 75 miles per hour, rocket motor case penetration, and nearby fire or explosions), and propellant fires resulting from natural events (static discharge and lightning).

Transport Accident Induced Propellant Fires: Probability Analysis

Step (1). The likelihood of a rocket motor propellant fire per mile of travel can be expressed as the product of probabilities derived from existing data on truck highway accidents (U.S. Nuclear Regulatory Commission, 1987). These are:

(a) the probability of a truck being involved in an accident for every mile traveled (6.4 in 1 million)

(b) the probability of a propellant fire occurring as a result of the accident. This is the summation of the probabilities of propellant fires from collision (3 in 1,000), rocket motor case penetration (due to uncertainties in the accident mechanism the range of probabilities is between 0 and 80 in 1,000) and nearby fire or explosion (19 in 1,000). The summation of the probabilities ranges between a probability of 22 in 1,000 (approximately 1 in 50) and 102 in 1,000 (approximately 1 in 10).

The product of (a) and (b) is a probability range for a propellant fire between 1 in 7.3 million and 5 in 7.3 million per mile traveled.

Step (2). To determine the probability of a propellant fire for each rocket motor shipment, the miles of travel per shipment (average of 575 miles) are multiplied by the probability of a propellant fire per mile of transport from Step (1). The result is a probability range for a propellant fire per shipment between 1 in 12,800 and 5 in 12,800 for each of the 790 shipments (Smith, 1992).

This probability of a propellant fire resulting from a transporter accident is based on data for all truck accidents. For any shipment of rocket motors, DOD personnel employ strict safety precautions to minimize the likelihood of an ignition accident. Additionally, due to lack of specific data, every fire resulting from an accident and every impact at speeds greater than 75 miles per hour was assumed to result in a propellant fire, even though this is highly unlikely. As a result, the probability of a propellant fire from a

transporter highway accident likely overstates the real accident probability for the transport of rocket motors.

Propellant Fires Caused By Natural Events: Probability Analysis

Lightning strikes and static discharges are very unlikely events. In the 30 years of operations in the Minuteman Missile Wings, there has been no record of lightning striking a missile transporter. The probability of lightning striking a rocket motor shipment is less than 1 in 1 million. Measures will be taken to mitigate static charge build-up in the transporter; consequently, this risk will be relatively low, also.

The fact that the probability of propellant fires caused by natural events is so much lower than the probability of highway accidents means that the overall propellant fire probability can be reasonably represented by the highway accident probability.

In evaluating this highway accident probability, consideration should be given to the fact that routes will be established to minimize the time spent traveling through population centers; as a result, the probability of a propellant fire in an urban area is much less than the probability stated above, which is the probability of a propellant fire anywhere on the route.

5.2.3 Potential Consequences of a Highway Accident

The most reasonable maximum credible event would involve an accident where an ignition and resulting rupture explosion occurred in a stage 1 Minuteman II motor during shipment. The mishap could result in temperatures at the burning stage 1 of up to 6,000 degrees Fahrenheit and scattering of debris and burned and unburned propellant. Additionally, the burning propellant could result in the dispersal of air pollutants for several kilometers.

Health Effects

The severity of the human health consequences could depend on the proximity to and number of people exposed. The force of the rupture explosion and the ejection of debris could be fatal to persons within 300 feet and could cause serious injuries and property damage within 700 feet of the mishap. Life threatening radiated heat injury could occur to unprotected persons within 130 feet of the visible flame. Disabling injuries could result within 200 feet of the open flame.

Respiratory impairment and burning of the eyes, nose, and throat attributable to airborne particulates may extend beyond the immediate accident site; for the worst case meteorological conditions the concentrations of air pollutants may peak 9 kilometers from the accident

Table 5.2-1. Emission Concentrations from Burning a Minuteman II Stage I Rocket Motor and Maximum Health-Related Exposure Levels

Emission Products	One-Hour Average Concentration ($\mu g/m^3$) From Firing a Stage I Rocket Motor	Suggested Criteria for Air Contaminants to Protect Health & Safety
Aluminum oxide	140.00	1,000
Carbon monoxide	2.30	40,000
Hydrogen chloride	80.00	750
Nitrogen oxide	18.00	3,000
Asbestos	0.44	6

$\mu g/m^3$ = micrograms per cubic meter.
Source: U.S. Department of Defense, 1990.

site (Department of Defense, 1991). However, no life threatening or long-term effects due to airborne emissions are anticipated. Predicted concentrations of the propellant emissions and the suggested criteria for air contaminants to protect health and safety are presented in Table 5.2-1. With the exception of maximum concentrations (Appendix C) which may only cause very brief exposure, all anticipated levels of air contaminants would be expected to be below the suggested health criteria. Relatively minor amounts of asbestos would also be produced in the fire. The asbestos particles would be expected to settle rapidly near the site of the fire. It is likely that concentrations of asbestos would be very low.

Sound pressure waves emanating from the explosion would be of short duration and may adversely affect individuals in the immediate vicinity of the accident.

Water Quality

Hydrogen chloride (HCl) emissions could mix with water vapor in the air and be deposited in lakes and streams as acid rain. However, it is anticipated that the impacts due to acid rain would be insignificant because of the low concentrations of HCl and the one-time nature of the release. For the same reasons, other released particulates would not be expected to affect water quality significantly.

Soils

Soil impacts at the site may be long term and may require cleanup actions to restore productivity. The small amounts of acid rain anticipated would likely be neutralized by generally alkaline soils.

Biological Impacts

Vegetation and wildlife could be adversely affected within 700 feet of the accident. Additionally, acid rain could cause spotting of vegetation downwind from the accident. Although there is the possibility that threatened and endangered species could be affected by an accident, the scarcity of these species locations coupled with the low probability of an accident occurring make this highly unlikely. In the event of an accident that affects sensitive species, the localized effect of the accident is not likely to jeopardize the continued existence of any species.

Cultural

Any cultural or historical resources directly impacted by the accident would likely be severely damaged or destroyed by heat, fire, or the explosion. However, this possibility is considered remote.

Transportation

Transportation in the area may be altered by physical destruction and/or blockage of routes following the accident. Emergency equipment may also block local transportation for a short period. Impacts would continue during rebuilding or repair of transportation routes.

5.2.4 Conclusions

Since the probability of an accident involving the ignition of propellant is low, and the probability of its occurrence in an urban area is substantially less, the transportation of the MM II stages would not be likely to have a significant impact on human health and safety or the environment.

6.0 CONSULTATION AND COORDINATION

The federal, state, and local agencies and private agencies/organizations that were contacted during the course of preparing this EA are listed below.

FEDERAL AGENCIES

U.S. Fish and Wildlife Service, Region 1
U.S. Fish and Wildlife Service, Reno, NV, Field Office
U.S. Fish and Wildlife Service, Sacramento, CA, Field Office

U.S. Fish and Wildlife Service, Region 2
U.S. Fish and Wildlife Service, Albuquerque, NM, Field Office
U.S. Fish and Wildlife Service, Phoenix, AZ, Field Office

U.S. Fish and Wildlife Service, Region 6
U.S. Fish and Wildlife Service, Salt Lake City, UT, Field Office
U.S. Fish and Wildlife Service, Golden, CO, Field Office

STATE AGENCIES

Arizona Environmental Quality Department, Office of Air Quality
Arizona Transportation Department
California Highway Patrol
California Transportation Department
Colorado Health Department, Air Pollution Control Division
Colorado Revenue Department, Port of Entry
Nevada Transportation Department
New Mexico Department of Health and Environment
New Mexico Taxation and Revenue Department
Utah Department of Health, Air Quality Bureau
Utah Transportation Department

LOCAL/REGIONAL AGENCIES

Albuquerque Environmental Health Department, Air Pollution Control Division
City of Flagstaff Community Development
City of Las Vegas, Central Action Office
City of Santa Fe, Noise Ordinance Division
Clark County Health Department
Community Development of the City of Provo
County of San Bernardino, Air Pollution Control District
Pueblo County Health Department
Pueblo Police Department, Traffic Division
Salt Lake City-County Health Department

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APPENDIX A

APPENDIX A

GLOSSARY OF TERMS

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Air Quality Control Region. An area designated by Section 107 of the Clean Air Act which is based on jurisdictional boundaries, urban-industrial concentrations, and other factors including atmospheric areas, that is necessary to provide adequate implementation of air quality standards.

Ambient Air Quality. Standards established on a state or federal level that define the limits for airborne concentrations of designated criteria pollutants to protect public health with an adequate margin of safety (primary standards) and to protect public welfare, including plant and animal life, visibility, and materials (secondary standards).

Attainment Area. An air quality control region that has been designated by the Environmental Protection Agency (EPA) and the appropriate state air quality agency as having ambient air quality levels better than the standards set by the National Ambient Air Quality Standards (NAAQS).

Cultural Resources. Objects, structures, buildings, sites, districts, or other physical remains used by humans in the past. Such resources may be historic, architectural, or archival in nature.

Endangered Species. A species that is threatened with extinction throughout all or a significant portion of its range.

Environmental Protection Agency (EPA). The independent federal agency, established in 1970, that regulates environmental matters and oversees the implementation of environmental laws.

Environmental Assessment (EA). A concise public document in which a federal agency provides sufficient analysis and evidence for determining the need for an Environmental Impact Statement (EIS) or Finding of No Significant Impact (FONSI). EAs provide agencies with useful data regarding compliance with the National Environmental Policy Act and are an aid in the preparation of an EIS.

Impact. An assessment of the meaning of changes in all attributes being studied for a given resource; an aggregation of all the adverse effects, usually measured by a qualitative and nominally subjective techniques.

National Ambient Air Quality Standards (NAAQS). EPA-promulgated allowable ambient air concentrations established to protect public health and welfare by defining the limits of airborne concentrations of designated "criteria" pollutants. Standards cover ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, particulates, and hydrocarbons.

Nonattainment Area. An air quality control region that has been designated by the EPA and the appropriate state air quality agency as having ambient air quality levels below the primary standards set by the NAAQS.

Threatened Species. Species likely to become endangered in the foreseeable future.

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APPENDIX B

DEPARTMENT OF THE AIR FORCE
BALLISTIC MISSILE ORGANIZATION (AFMC)
NORTON AIR FORCE BASE CA 92409-6468

Mr Wayne White, Field Supervisor
U.S. Fish and Wildlife Service, Region 1
2800 Cottage Way
Room E 1803
Sacramento, CA 95825

7 October 1992

Dear Mr White

The U.S. Air Force is considering the shipment of Minuteman II rocket stages (Stages 1, 2, and 3) from Hill Air Force Base, Ogden, Utah and the Pueblo Army Depot, near Pueblo, Colorado, to Kirtland Air Force Base, Albuquerque, New Mexico, and the Navajo Depot Activity, near Flagstaff, Arizona. This activity will involve the routine transportation of rocket motors in trucks along major highways. The U.S. Air Force will ensure that these activities are in compliance with all applicable state and federal transportation regulations. The intended routes of highway transportation are mapped out on Attachment 1 and are based on our coordination with respective state transportation authorities, the California Highway Patrol, California Transportation Department, and Nevada Transportation Department in Region 1. Each shipment will contain up to either one Stage 1, two Stage 2s, or three Stage 3s. The potential hazards/accidents that could directly influence biology up to 1,000 feet off the road are discussed below although believed to be highly unlikely as the Air Force has had over 30 years of experience transporting thousands of shipments of rocket motor hundreds of thousands of miles without serious accident between other locations in the United States.

However, to comply with the requirements of Section 7 of the federal Endangered Species Act of 1973, as amended, the Air Force is requesting your input regarding candidate, proposed, or listed threatened and endangered species, sensitive habitats, or sensitive biotic communities that may be impacted by these activities.

Hazard/Accident Mechanisms:

Stages 1 and 2 contain a solid composite propellant which burns vigorously and would be difficult to extinguish. Any explosions would most likely be pressure ruptures of the motor casing, which may produce fragments. Blast over pressures would be localized. Stage 3 has a propellant which is principally considered a blast hazard, although if involved

in a fire it will burn at a rate comparable to that of rubber tires. If detonated, a Stage 3 would produce blast overpressures and fragments beyond a 1,000 feet. Accidental ignition mechanisms of the above mentioned propellants can be caused by static discharge, lightning, or a nearby fire or explosion. Additionally, impact of the rocket motor casing against an object or penetration of the rocket motor's casing may produce enough internal or external frictional energy release to cause ignition. The mechanisms for detonation would be impact or nearby explosion. Detonation resulting solely from impact is highly unlikely. For example, a quantity of bare propellant the size of one Stage 3 motor, approximately 3,700 pounds, would require an impact on steel at a rate of 140 miles per hour to have a 50 percent probability of detonation. Much less energy is required for ignition of the propellant. Therefore, in an accident, the most credible event is a brief but intense fire caused by a rupture of the motor casing and ignition by some source.

Accident Consequences:

The most reasonable maximum credible event would involve an accident where an ignition and resulting rupture explosion occurred in a Stage 1 Minuteman II motor during shipment, as a Stage 1 has 45,800 lbs of propellant versus 13,700 lbs in a Stage 2 or 3,700 lbs in a Stage 3. The mishap could result in temperatures at the burning Stage 1 of up to 6,000 degrees Fahrenheit and scattering of debris and burned and unburned propellant. The severity of accident consequences could depend on the proximity to and number of people, animals, and amount of vegetation exposed. The force of the rupture explosion could be fatal to persons within 300 feet and could cause serious injuries and property damage within 700 feet of the mishap. Life threatening radiated heat injury could occur to unprotected persons within 130 feet of the visible flame; disabling injuries from heat could result within 200 feet of the flame. Vegetation and wildlife could be destroyed or severely damaged/injured within 700 feet of the accident. Sound pressure waves emanating from an explosion would be short duration and may adversely affect individuals and animals in the immediate vicinity of the accident.

Burning of Minuteman II solid propellants could result in the creation of toxic or irritating products. However, the fire and scattered debris has the greatest potential for causing injury. Combustion of a Stage I propellant has the potential of releasing 16,038 pounds of aluminum oxide (Al_2O_3), 9,623 pounds of hydrogen chloride (HCl) and small amounts of carbon monoxide (CO), nitric oxide (NO), and asbestos.

Respiratory impairment and burning of the eyes, nose and throat attributable to airborne particulates may extend beyond the immediate accident site; for the worst case meteorological conditions the concentrations of air pollutants may peak 9 kilometers from the accident site. However, no life threatening or long-term effects due to airborne emissions are anticipated. Predicted concentrations of the propellant emissions and the suggested criteria for air contaminants to protect health and safety are presented in the

attached table. With the exception of maximum concentrations which may only cause very brief exposure, all anticipated levels of air contaminants would be expected to be below suggested health criteria. The relatively minor amounts of asbestos produced in a fire would be expected to settle rapidly near the site of the fire. It is likely that any concentrations of asbestos would be very low.

Fallout of acid-coated aluminum oxide would cause spotting or killing of plants, and a burning sensation in the eyes, throat, and/or skin for some animals. Aquatic biological systems are not expected to be affected by the acid fallout because the acid would quickly become diluted and the exposure would be limited. Localized disturbance of vegetation from fire, fire-extinguishing chemicals, and mechanical cleanup would be anticipated.

Hydrogen chloride (HCl) could mix with water vapor in the air and be deposited in lakes and streams as acid rain. However, it is anticipated that the impacts due to acid rain would be insignificant because of the low concentrations of HCl and the one-time nature of the release. For the same reasons, other released particulates would not be expected to affect water quality significantly.

Soil impacts at the site may be long term and may require cleanup actions to restore productivity. The small amounts of acid rain anticipated would likely be neutralized by generally alkaline soils.

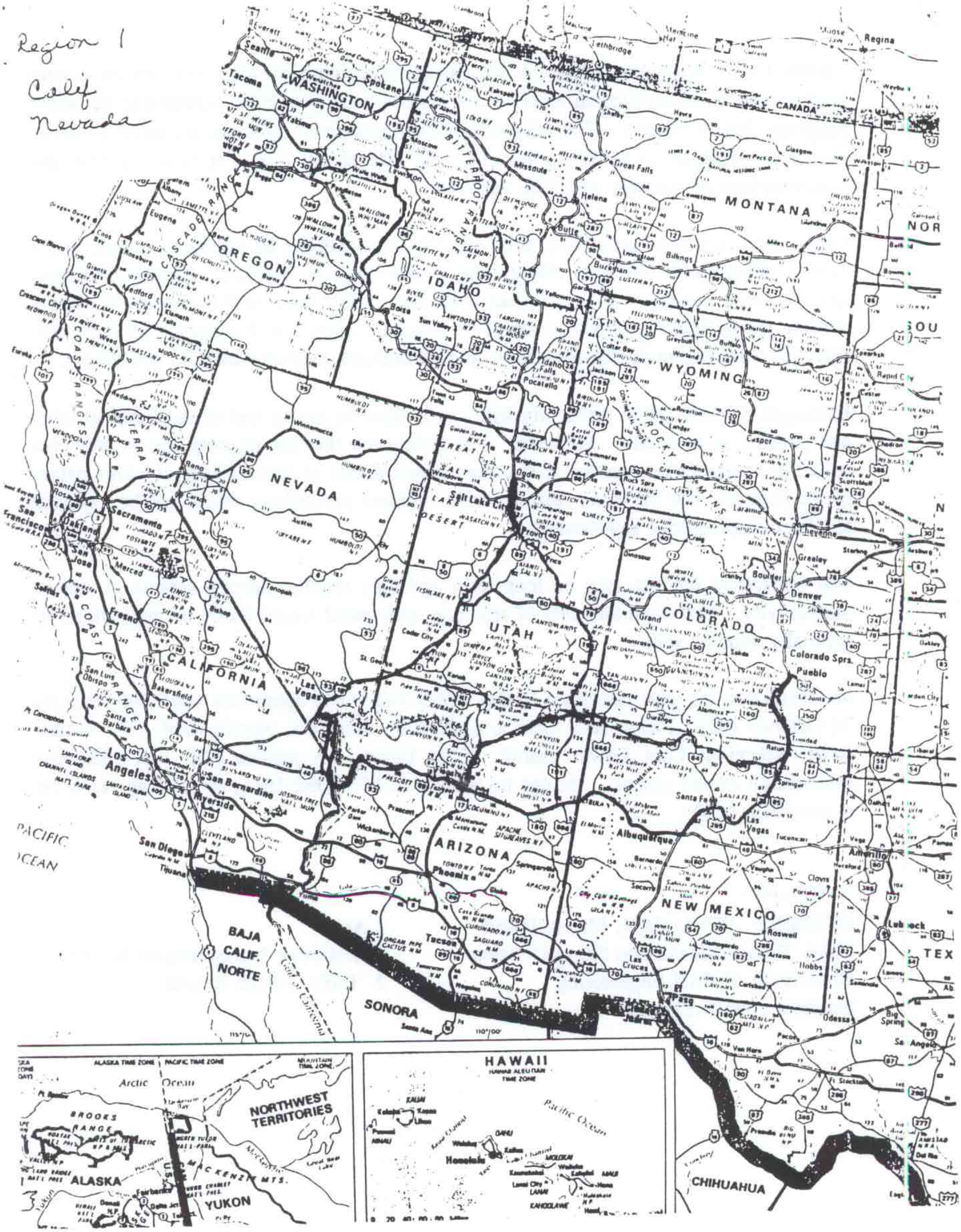
We thank you for your assistance in this matter and would appreciate your comments by 30 October 1992. Please send them to SMC/CJF, Bldg 953, Norton AFB, CA 92409-6448, Attention: Capt Edwin Daniel. Capt Daniel can provide you with additional information on this project. He can be reached at (714) 382-5911, or you can reach me at extension 4663.

(Signed)

DENNIS L. SULLIVAN, Major, USAF
Chief, Environmental and Siting Division
Directorate of Civil Engineering
National Launch System

2 Atch
1. Highway Transportation Routes
2. Table, Model Results

Region 1
Calif
Nevada



8 Arizona

Land Area: 113,510 sq. mi. (6)
Population: 3,677,985 (24)
Dimensions: N-S 390 miles, E-W 335 miles
Highest Point: Humphreys Peak 12,633 ft. G-7
Capital: Phoenix, K-6a
Largest City: Phoenix, K-6
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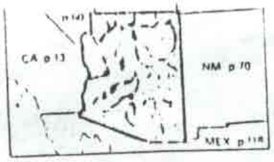
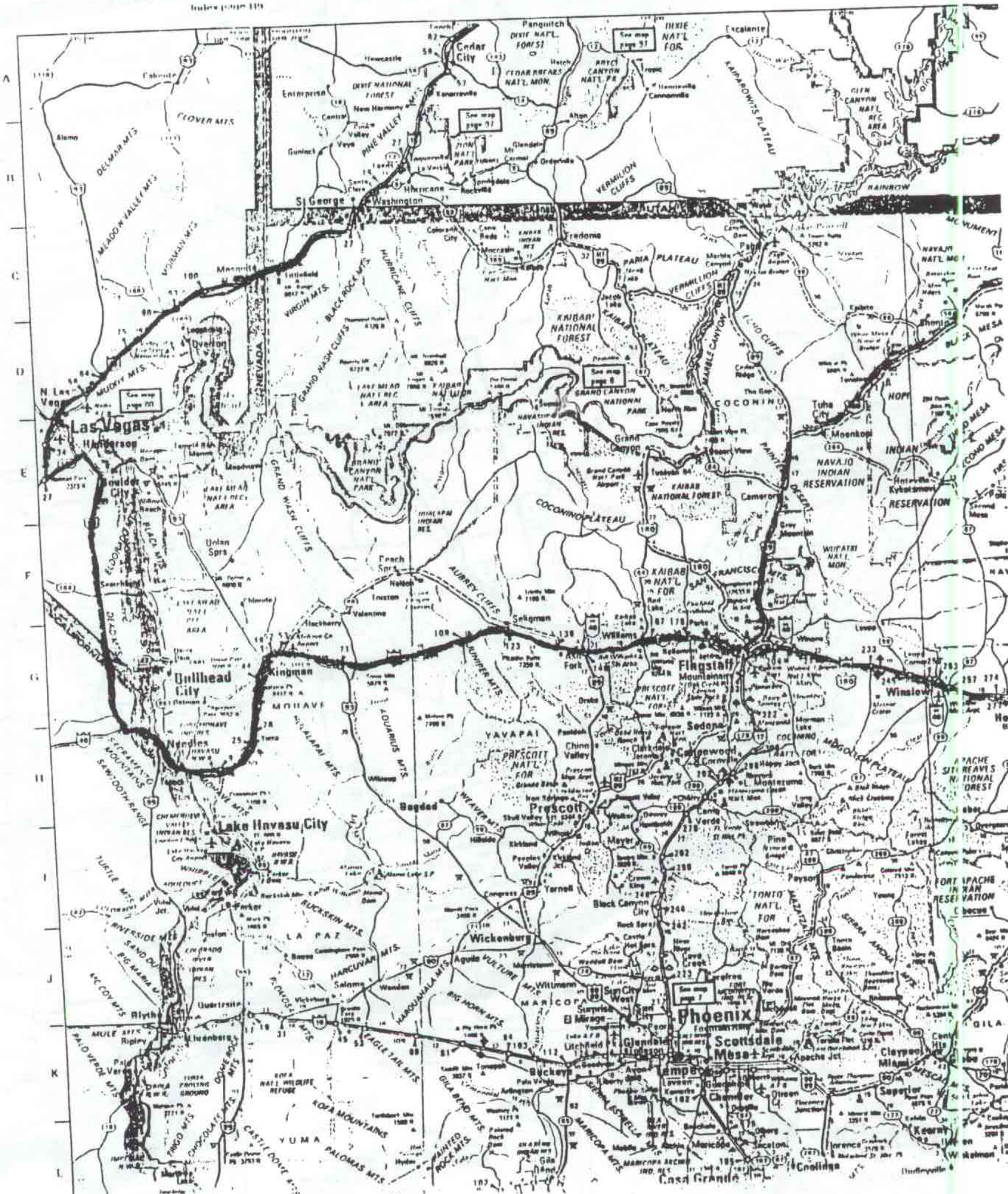
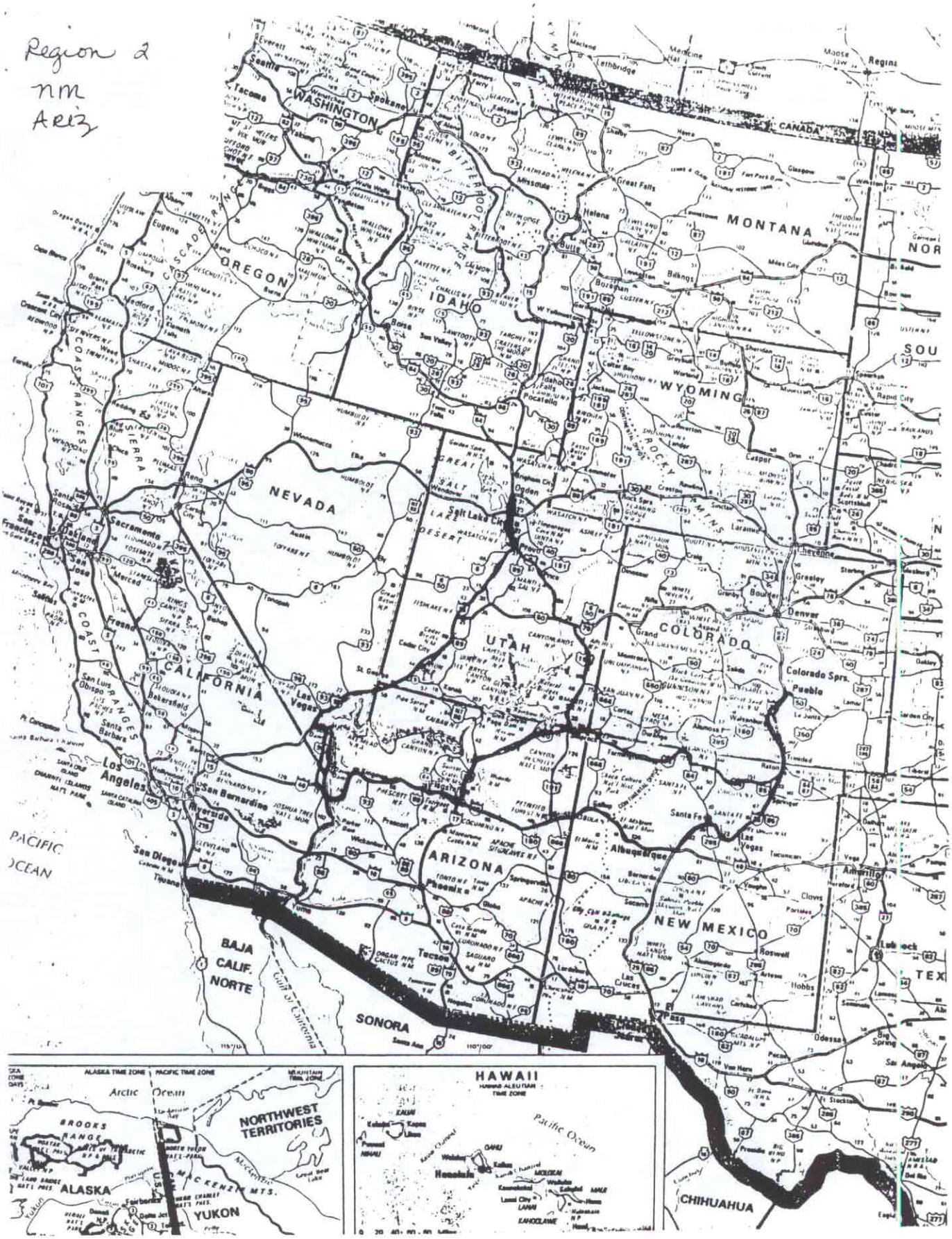


Arizona-Sonora Desert Museum, N-9
Canyon de Chelly National Monument, E-12
Grand Canyon National Park, E-6
Lake Powell (Glen Canyon Nat'l Rec. Area), C-8
London Bridge (Lake Havasu City), I-2
Oak Creek Canyon, G-7
Petrified Forest National Park, H-11
Saguaro National Monument, N-9

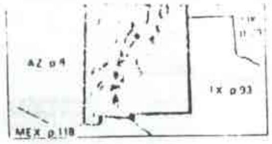
Mileage in red between red arrowheads, in black between intersections. Some interchange numbers indicate mileage.



Region 2
nm
Ariz

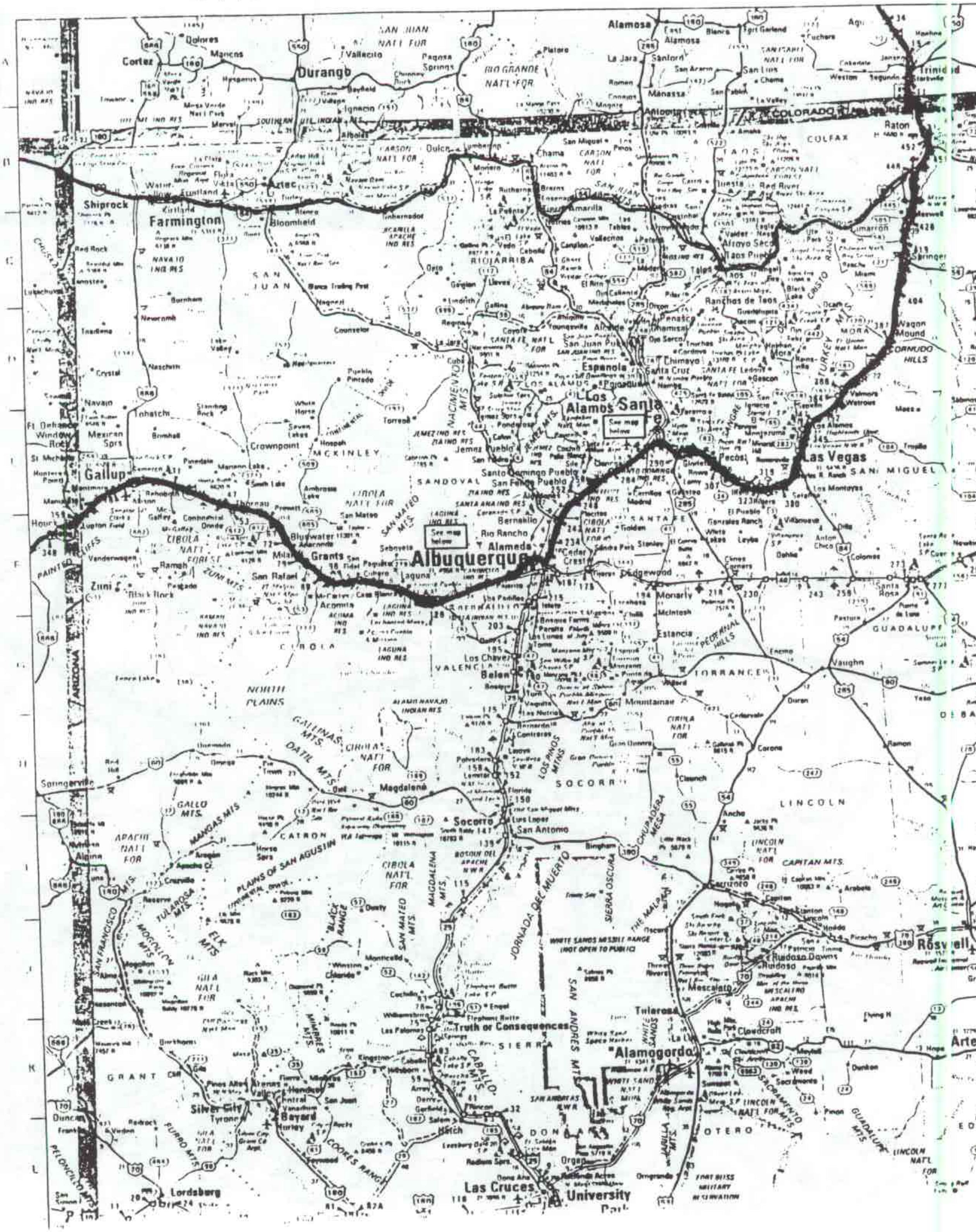


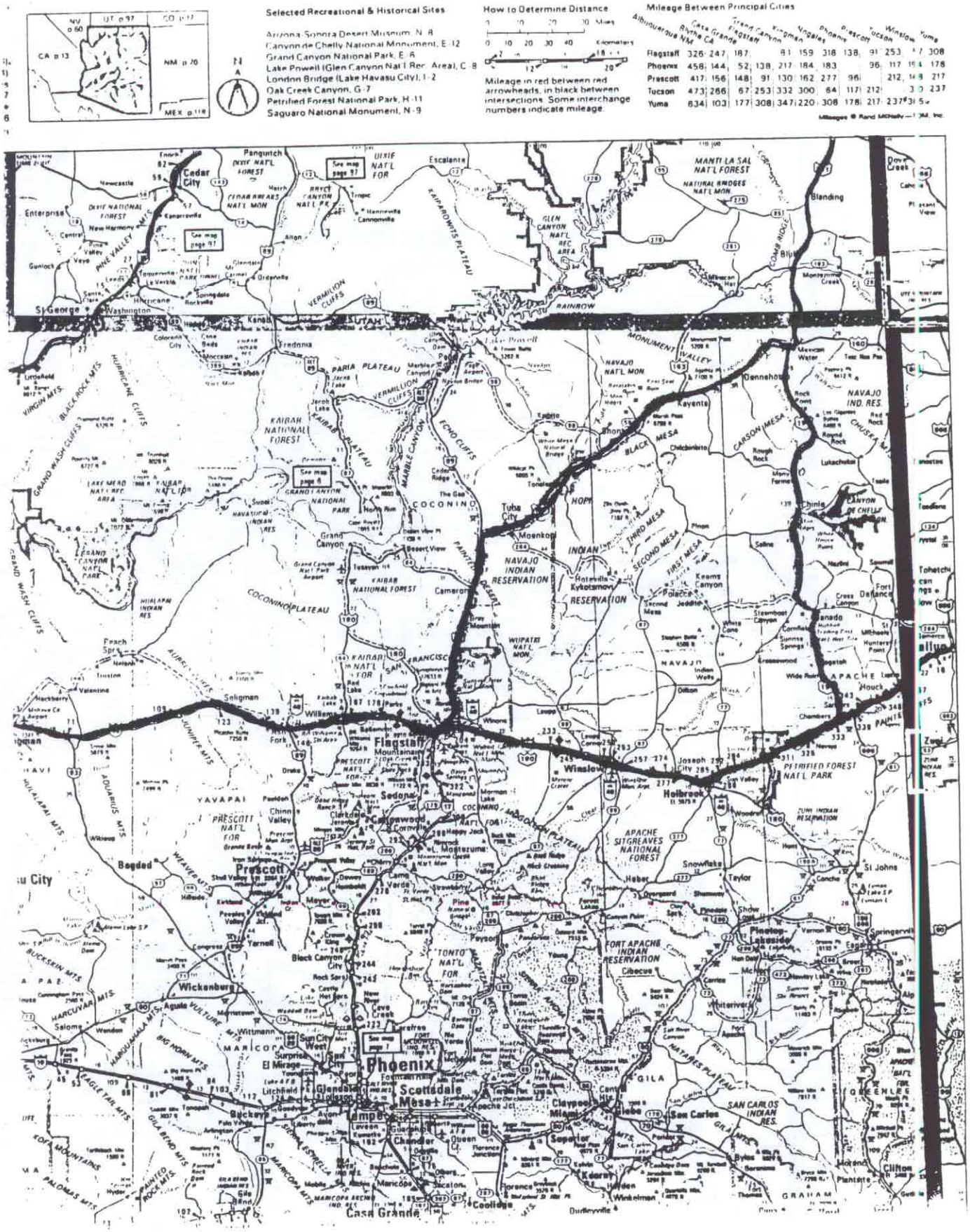
Land Area 121,336 sq. mi. (5)
Population 1,521,779 (37)
Dimensions N-S 390 miles E-W 350 miles
Highest Point Wheeler Peak 13,161 ft., C-7
Capital Santa Fe, E-6
Largest City Albuquerque, F-5



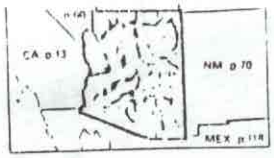
Aztec Ruins National Monument, B-3
Capulin Volcano National Monument, B-9
Carlsbad Caverns National Park, M-3
El Morro National Monument, E-2
Gila Cliff Dwellings National Monument, J-2
Pecos National Monument, E-7
Taos, C-7
White Sands National Monument, K-6

Mileage in red between red arrowheads, in black between intersections. Some interchange numbers indicate mileage




NV p 60
UT p 97
CO p 17
CA p 13
NM p 70
MEX p 118
Selected Recreational & Historical Sites
Arizona-Sonora Desert Museum, N-8
Canyon de Chelly National Monument, E-12
Grand Canyon National Park, E-6
Lake Powell (Glen Canyon Nat'l Rec. Area), C-8
London Bridge (Lake Havasu City), I-2
Oak Creek Canyon, G-7
Petrified Forest National Park, H-11
Saguaro National Monument, N-9
How to Determine Distance
Miles
Kilometers
Mileage in red between red arrowheads, in black between intersections. Some interchange numbers indicate mileage.
Mileage Between Principal Cities
Albuquerque NM
Casa Grande
Blythe CA
Flagstaff
Grand Canyon
Kingman
Nogales
Phoenix
Prescott
Tucson
Winslow
Yuma
Flagstaff 326 247 187 81 159 318 138 91 253 308
Phoenix 458 144 52 138 217 184 183 96 117 178
Prescott 417 156 148 91 130 162 277 96 212 217
Tucson 473 266 67 253 332 300 64 117 212 237
Yuma 634 103 177 308 347 220 308 178 217 237
Cedar City
Panguitch
Escalante
Enterprise
St George
Washington
Hurricane
Kanab
Fredonia
Page
Blanding
Dennehotso
Kayenta
Tuba City
Moenkopi
Grand Canyon
Cameron
Flagstaff
Winslow
Holbrook
Petrified Forest Nat'l Park
Sedona
Prescott
Chino Valley
Williams
Seligman
Peach Springs
Bagdad
Wickenburg
Yarnell
Black Canyon City
Phoenix
Scottsdale
Mesa
Tempe
Chandler
Glendale
Peoria
Sun City
Surprise
El Mirage
Buckeye
Casa Grande
Coolidge
Florence
Superior
Globe
Miami
Claypool
San Carlos
Show Low
Snowflake
Taylor
Springerville
Eagar
St Johns
Zuni
Gallup
Window Rock
Chinle
Ganado
Kayenta
Monument Valley
Navajo Ind. Res.
Navajo Nat'l Mon
Canyon de Chelly
Glen Canyon Nat'l Rec Area
Lake Powell
Rainbow Bridge Nat'l Mon
Natural Bridges Nat'l Mon
Manti La Sal Nat'l Forest
Kaibab National Forest
Kaibab Plateau
Paria Plateau
Vermilion Cliffs
Grand Canyon National Park
Coconino Plateau
Painted Desert
Navajo Indian Reservation
Hopi Indian Reservation
Hualapai Indian Res
Havasupai Indian Res
Prescott Nat'l For
Tonto Nat'l For
Apache Sitgreaves National Forest
Fort Apache Indian Reservation
San Carlos Indian Res.
Zuni Indian Reservation
Petrified Forest Nat'l Park
Virgin Mts
Black Rock Mts
Hurricane Cliffs
Grand Wash Cliffs
Hualapai Mts
Aquarius Mts
Juniper Mts
Weaver Mts
Harquahala Mts
Big Horn Mts
Eagletail Mts
Gila Bend Mts
Painted Rock Mts
Palomas Mts
Buckskin Mts
Harcuvar Mts
Mazatzal Mts
Superstition Mts
Santa Catalina Mts
Pinaleno Mts
Galiuro Mts
Chiricahua Mts
Graham Mts
Natanes Plateau
Gila
Coconino
Yavapai
Maricopa
Apache
Navajo
Graham
Greenlee

Land Area: 113,510 sq. mi. (6)
Population: 3,677,985 (24)
Dimensions: N-S 390 miles, E-W 335 miles
Highest Point: Humphreys Peak 12,633 ft., G-7
Capital: Phoenix, K-6
Largest City: Phoenix, K-6
Index page 119



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Arizona-Sonora Desert Museum, N-9
Canyon de Chelly National Monument, E-12
Grand Canyon National Park, E-6
Lake Powell (Glen Canyon Nat'l Rec. Area), C-8
London Bridge (Lake Havasu City), I-2
Oak Creek Canyon, G-7
Petrified Forest National Park, H-11
Saguaro National Monument, N-9

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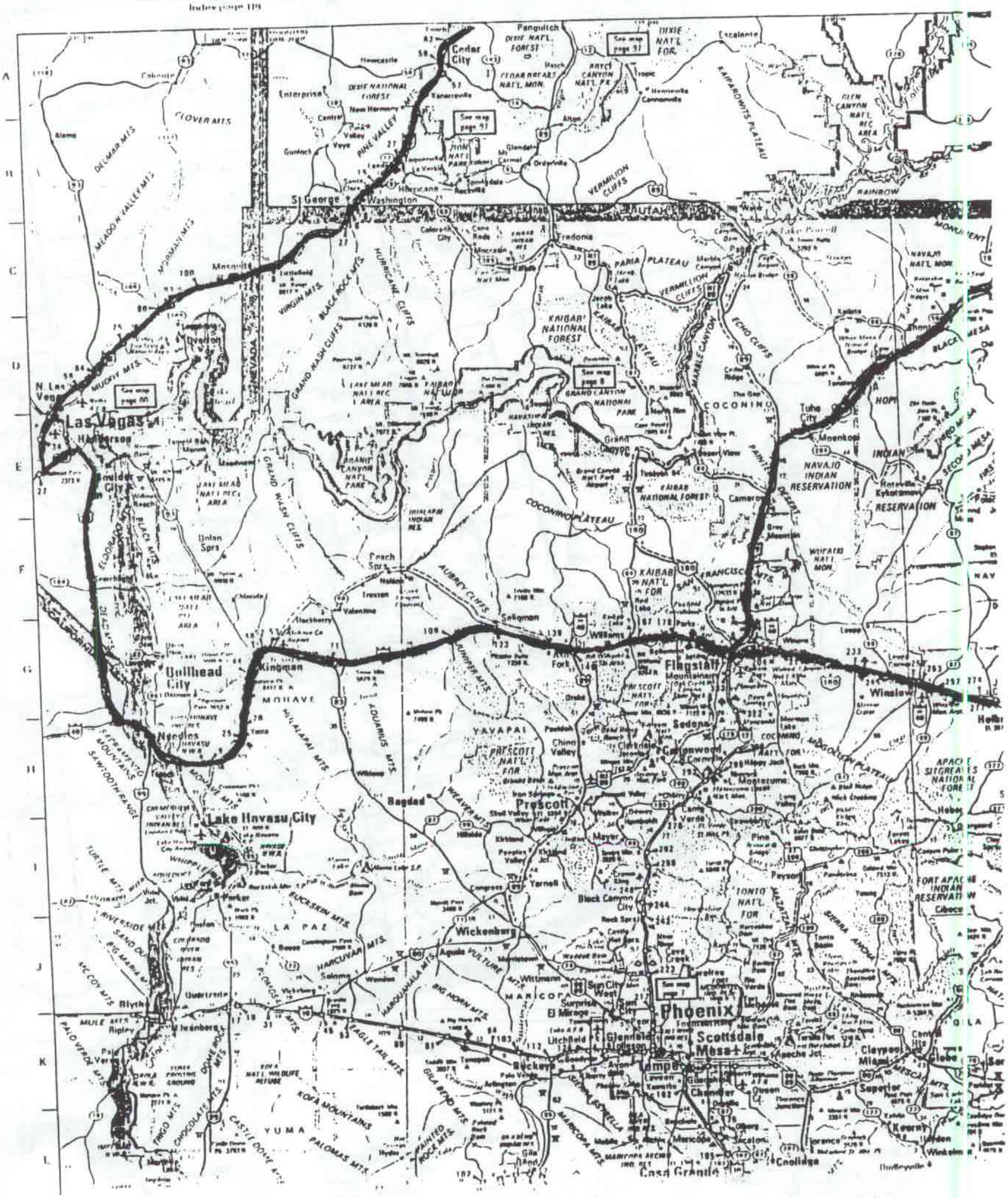
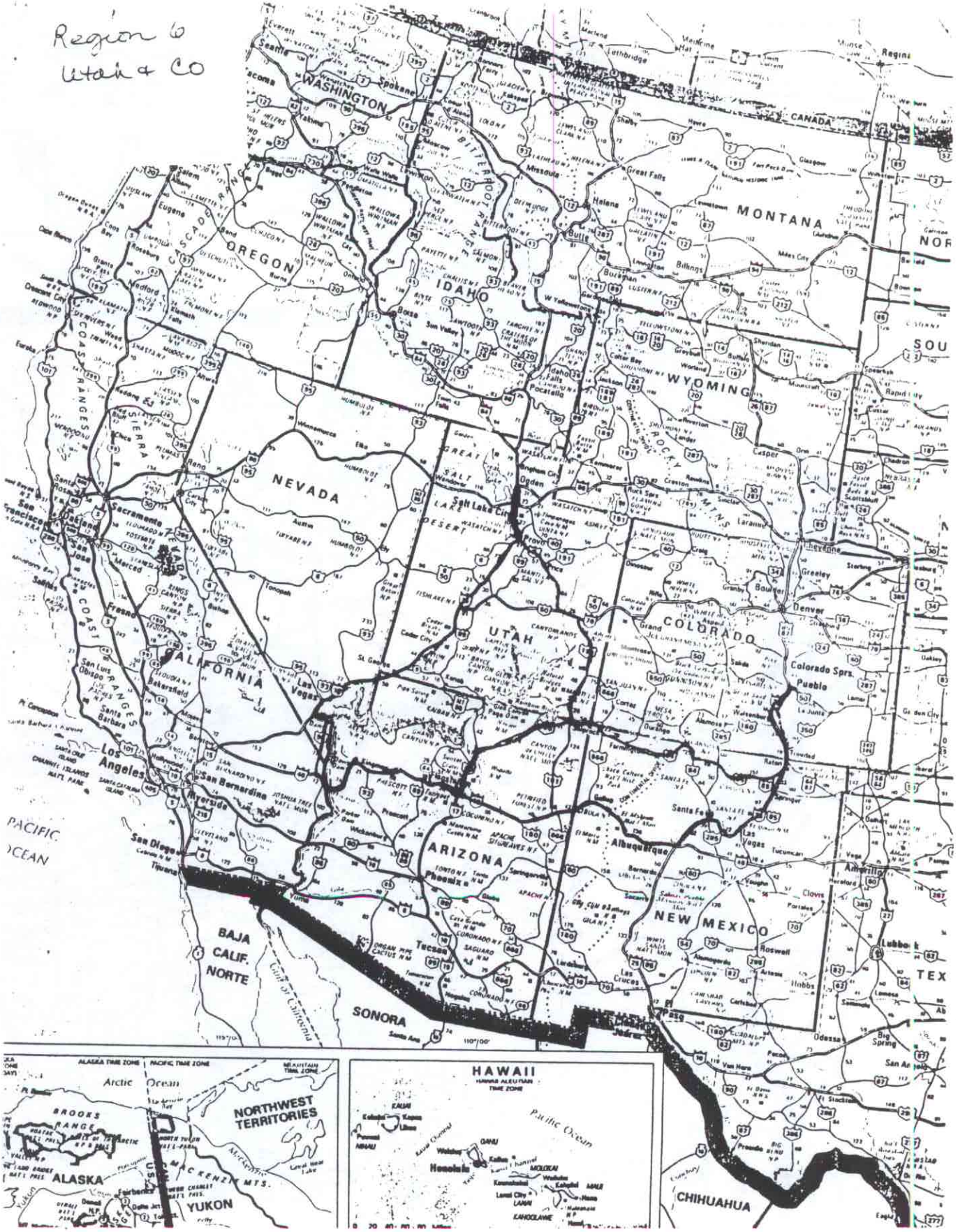
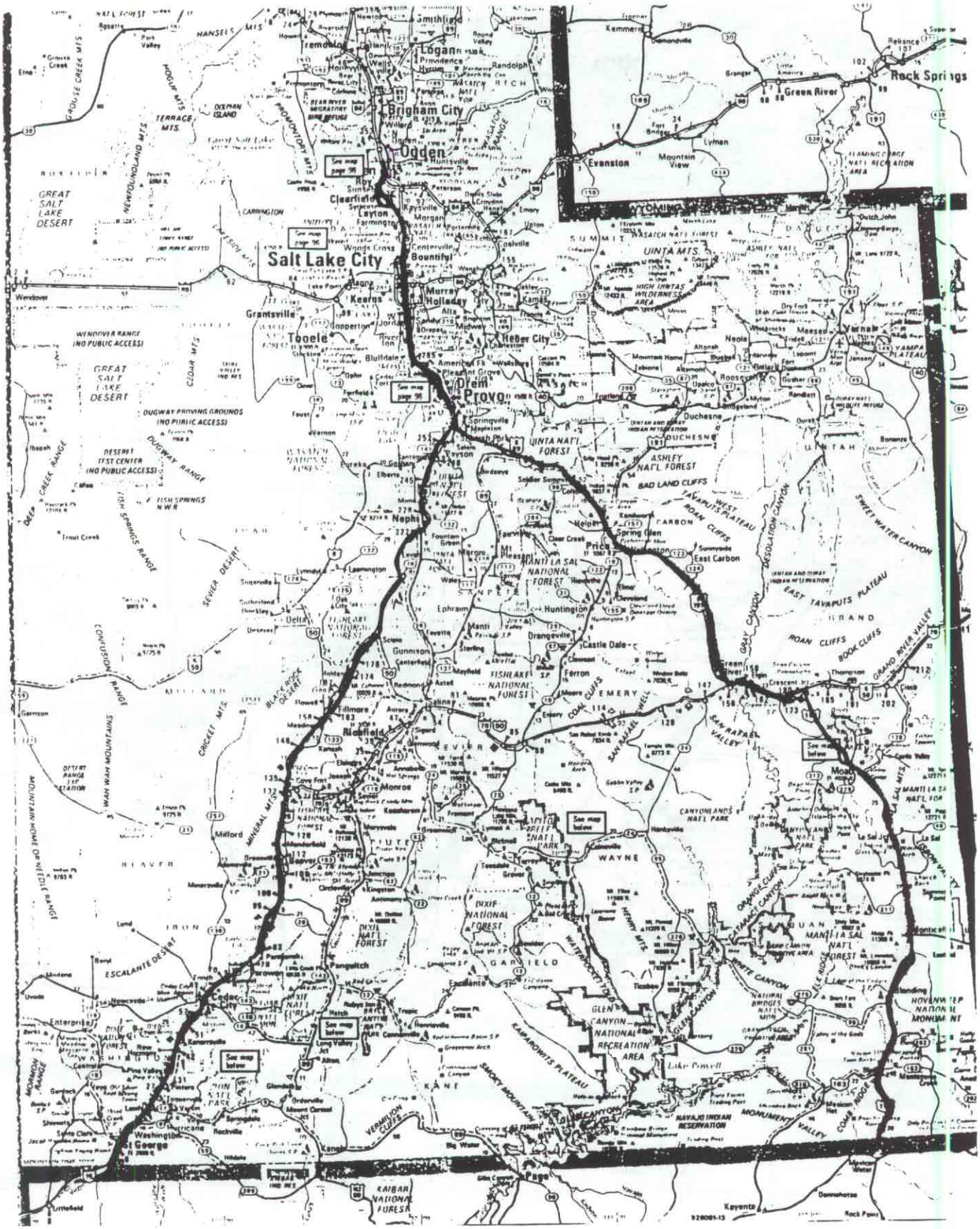
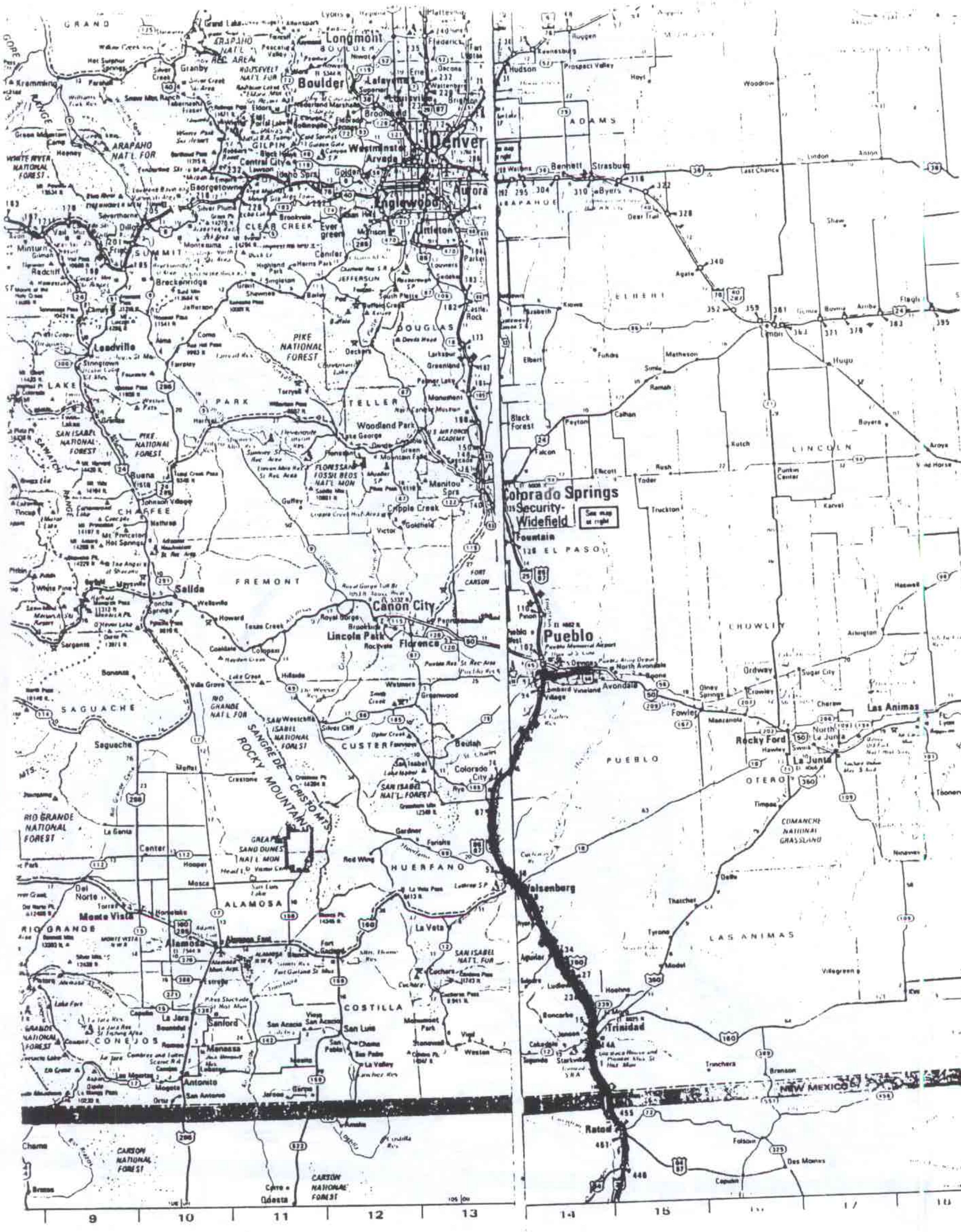



Region 6
Utah + CO
WASHINGTON
OREGON
CALIFORNIA
NEVADA
IDAHO
MONTANA
WYOMING
UTAH
COLORADO
ARIZONA
NEW MEXICO
CANADA
Seattle
Spokane
Portland
Salem
Eugene
Boise
Helena
Great Falls
Missoula
Billings
Butte
Cheyenne
Denver
Colorado Springs
Pueblo
Albuquerque
Santa Fe
Las Vegas
Phoenix
Tucson
Yuma
Los Angeles
San Diego
San Francisco
Sacramento
Fresno
San Jose
Oakland
Reno
Salt Lake City
Ogden
Provo
Grand Junction
Durango
Farmington
Roswell
Amarillo
Lubbock
Odessa
Midland
El Paso
Las Cruces
Tijuana
PACIFIC OCEAN
BAJA CALIF. NORTE
SONORA
CHIHUAHUA
Gulf of California
Arctic Ocean
ALASKA
NORTHWEST TERRITORIES
YUKON
BROOKS RANGE
MACKENZIE MTS.
HAWAII
Honolulu
OAHU
Pacific Ocean


Salt Lake City
Ogden
Brigham City
Logan
Provo
Orem
Tooele
Evanston
Rock Springs
Green River
Price
Richfield
Cedar City
St George
Moab
Page
GREAT SALT LAKE DESERT
UINTA MTS.
WASATCH NAT'L FOREST
UINTA NAT'L FOREST
ASHLEY NAT'L FOREST
FISHLAKE NATIONAL FOREST
MANTI LA SAL NATIONAL FOREST
DIXIE NATIONAL FOREST
CANYONLANDS NAT'L PARK
ARCHES NAT'L PARK
CAPITOL REEF NAT'L PARK
BRYCE CANYON NAT'L PARK
ZION NAT'L PARK
GLEN CANYON NATIONAL RECREATION AREA
NAVAJO INDIAN RESERVATION
HOVENWEEP NATIONAL MONUMENT
GOOSENECKS STATE PARK
DUGWAY PROVING GROUNDS (NO PUBLIC ACCESS)
DESERT TEST CENTER (NO PUBLIC ACCESS)
WENDOVER RANGE (NO PUBLIC ACCESS)
KAIBAB NATIONAL FOREST
GRAND
EMERY
WAYNE
GARFIELD
KANE
BEAVER
IRON
MILLARD
SEVIER
SANPETE
CARBON
DUCHESNE
UINTAH
SUMMIT
WASATCH
DAVIS
MORGAN
RICH
CACHE
BOX ELDER
TOOELE
UTAH
JUAB
MILLARD
SEVIER
PIUTE
WASHINGTON
IRON
GREEN RIVER CANYON
DESOLATION CANYON
GRAY CANYON
SWEET WATER CANYON
EAST TAVAPUTS PLATEAU
WEST TAVAPUTS PLATEAU
ROAN CLIFFS
BOOK CLIFFS
GRAND RIVER VALLEY
SAN RAFAEL VALLEY
SAN RAFAEL SWELL
COAL CLIFFS
ORANGE CLIFF
CATARACT CANYON
WATERPOCKET FOLD
KAIPAROWITS PLATEAU
SMOKY MOUNTAIN
VERMILION CLIFFS
COMB RIDGE
MONUMENT VALLEY
HENRY MTS.
ESCALANTE DESERT
BLACK ROCK DESERT
CRICKET MTS.
CONFUSION RANGE
DEEP CREEK RANGE
FISH SPRINGS RANGE
CEDAR MTS.
OQUIRRH MTS.
TOOELE VALLEY
WASATCH RANGE
PROMONTORY MTS.
HANSEL MTS.
NEWFOUNDLAND MTS.
HOGUP MTS.
TERRACE MTS.
CROUSE CREEK MTS.
MINERAL MTS.
MOUNTAIN HOME RANGE
DUGWAY RANGE
LAKE POWELL


Longmont
Boulder
Denver
Westminster
Arvada
Aurora
Englewood
Littleton
Georgetown
Breckenridge
Leadville
Granby
Bennett
Strasburg
Byers
Limon
Hugo
Colorado Springs
Security-Widefield
Fountain
Woodland Park
Cripple Creek
Canon City
Florence
Pueblo
Avondale
Rocky Ford
La Junta
Las Animas
Walsenburg
Trinidad
Raton
Salida
Buena Vista
Alamosa
Monte Vista
Del Norte
Saguache
Antonito
San Luis
La Veta
PIKE NATIONAL FOREST
ARAPAHO NAT'L FOR
RIO GRANDE NATIONAL FOREST
CARSON NATIONAL FOREST
COMANCHE NATIONAL GRASSLAND
SANGRE DE CRISTO MTS
ROCKY MOUNTAINS
GREAT SAND DUNES NAT'L MON
NEW MEXICO
ADAMS
ARAPAHOE
ELBERT
DOUGLAS
TELLER
PARK
FREMONT
CUSTER
HUERFANO
ALAMOSA
COSTILLA
CONEJOS
RIO GRANDE
SAGUACHE
CHAFFEE
LAKE
SUMMIT
CLEAR CREEK
JEFFERSON
GILPIN
GRAND
EL PASO
PUEBLO
OTERO
CROWLEY
LINCOLN
LAS ANIMAS
9
10
11
12
13
14
15
17

Model Results for Static Fire of Minuteman II Stage 1 Rocket Motor
(3.0 m/sec Windspeed)

Products of Combustion/Atmospheric Dispersion (PCAD) Model Results

Emission Products	Maximum Concentration $\mu g/m^3$	1 Hour Average Concentration ($\mu g/m^3$)	24 Hour Average Concentration ($\mu g/m^3$)	Suggested Criteria for Air Contaminants to Protect Health and Safety ($\mu g/m^3$) (a)
Aluminum Oxide	8,100	140	5.7	1,000 (c)
Carbon Monoxide	141	2.3	0.1	40,000 (d)
Hydrogen Chloride	4,700	80	3.3	750 (c)
Nitrogen Oxide (b)	1,100	18	0.7	3,000 (c)
Asbestos	NA	0.44	NA	6 (e)

Maximum concentration occurs at 9.2 kilometers downwind; Plume height is 944 meters.

(a) 1 Hour averaged concentration, except asbestos for which no time averaged values have been suggested
(b) Nitrogen Oxide (NO) is reported rather than NO_x because nitrogen oxides were found to be insignificant in comparison to NO concentrations during modeling efforts.
(c) Threshold Limit Value/10
(d) National Ambient Air Quality Standards
(e) OSHA (29 CFR 1910.1001)

NA = Not Available, m/sec = meters per second, $\mu g/m^3$ = micrograms per cubic meter

The PCAD model was used to calculate emission concentrations. PCAD was developed specifically for the modeling of propellants, explosives, and pyrotechnics combustion, and the atmospheric dispersion of the combustion products. It provides information on the types of combustion products and their pattern of dispersion.

Source: Department of Defense, Strategic Arms Reduction talks (START) Treaty, Preliminary Legislative Environmental Impact Statement, 16 October 1990.

Similar letters were also submitted to the following U.S. Fish and Wildlife Service offices.

Mr Ralph Morgenweck, Regional Director
U.S. Fish and Wildlife Service
Region 6
Denver Federal Center
P.O. Box 254
Denver, CO 80225

Mr Reed Harris, Field Supervisor
U.S. Fish and Wildlife Service
Region 6
2060 Administration Building
1745 W. 1700 South
Salt Lake City, UT 84104-5110

Mr. Lee Carlson, Field Surpervisor
U.S. Fish and Wildlife Service
Region 6
730 Simms Street
Suite 290
Golden, CO 80401

Mr. Michael J. Spear, Regional Director
U.S. Fish and Wildlife Service
Region 2
Dennis Chavez Field Building
500 Gold Avenue SW
P.O. Box 1306
Albuquerque, NM 87103

Ms. Jennifer Fowler-Propst, Field Supervisor
U.S. Fish and Wildlife Service
Region 2
3530 Pan American Highway
Suite D
Albuquerque, NM 87107

Mr. Sam Spiller, Field Supervisor
U.S. Fish and Wildlife Service
Region 2
3616 W. Thomas Road
Suite 6
Phoenix, AZ 85019

Mr. Marvin Plenert, Regional Director
U.S. Fish and Wildlife Service
Region 1
Eastside Federal Complex
911 NE 11th Avenue
Portland, OR 97232

Mr. David Harlow, Field Supervisor
U.S. Fish and Wildlife Service
Region 1
4600 Kietzhe Lane
Building C, Room 135
Reno, NV 89502

Mr. Wayne White, Field Supervisor
U.S. Fish and Wildlife Service
Region 1
2800 Cottage Way
Room E 1803
Sacramento, CA 95825

United States Department of the Interior

FISH AND WILDLIFE SERVICE
FISH AND WILDLIFE ENHANCEMENT
Colorado State Office
730 Simms Street, Suite 290
Golden, CO 80401

FWE/CO: USAF
Mail Stop 65412

Phone (303) 231-5280 FTS 554-5280
FAX (303) 231-5285

OCT 20 1992

Captain Edwin Daniel
Department of the Air Force
SMC/CJF, Building 953
Norton Air Force Base, California 92409-6448

RE: Environmental Assessment for the Proposed Minuteman II Rocket Stages Relocation from the Pueblo Army Depot to Kirtland AFB in New Mexico and the Navahoe Depot Activity in Arizona Proposed by the Air Force

Dear Captain Daniel:

This responds to Major Sullivan's letter dated October 7, 1992, regarding the subject project environmental impacts evaluation for the missile transportation route that includes parts of Pueblo, Huerfano, and Las Animas Counties, Colorado.

The following is a list of listed and candidate species that could occur along the proposed route:

SPECIES ↓	PUEBLO	HUERFANO	LAS ANIMAS
Bald eagle, *Haliaeetus leucocephalus*, Listed Endangered	●	●	●
Peregrine falcon, *Falco peregrinus*, Listed Endangered		●	
Whooping crane, *Grus americana*, Listed Endangered	●	●	●
Mountain plover, *Charadrius montanus*, Category 2	●	●	●
Loggerhead shrike, *Lanius ludovicianus*, Category 2	●	●	
Baird's sparrow, *Ammodramus bairdii*, Category 2	●	●	●
Swift fox, *Vulpes velox*, Category 2	●	●	
Speckled chub (Arkansas River Basin population), *Extrarius aestivalis tetranemus*, Category 2	●	●	●
Arkansas darter, *Etheostoma cragini*, Category 1	●	●	●
Ute ladies' tresses, *Spiranthes diluvialis*, Listed Threatened	●	●	●
Black-footed ferret, Mustela nigripes, listed endangered	●	●	●

SPECIES ↓	PUEBLO	HUERFANO	LAS ANIMAS
Texas horned lizard, *Phrynosoma cornutum*, Category 2	●		●
Colorado hog-nosed skunk, *Conepatus mesoleucus figginsi*, Category 2	●		●
Fringed-tailed myotis, *Myotis thysanodes pahasapensis*, Category 2	●		●
Southwestern willow flycatcher, *Empidonax trailli extimus*, Category 2			●
Eskimo curlew, *Numenius borealis*, Listed Endangered			●
Single-head goldenweed, *Haplopappus fremontii* ssp. *monocephalus*, Category 2		●	●
Colorado green gentian, *Frasera coloradensis*, Category 2			●
White-faced ibis, *Plegadis chihi*, Category 2	●		
Black tern, *Chlidonias niger*, Category 2	●		
Ferruginous hawk, *Buteo regalis*, Category 2	●	●	●
Western snowy plover, *Charadrius alexandrinus nivosus*, Category 2	●		
Plains topminnow, *Fundulus sciadicus*, Category 2	●		
Roundleaf four-o'clock, *Oxybaphus (Mirabilis) rotundifolius*, Category 2	●		
Arkansas River feverfew, *Parthenium tetraneuris*, Category 2	●		

Our review of the information you provided on the previously mentioned letter and the nature of the project leads us to believe that no species federally proposed or listed as threatened or endangered should be adversely impacted by the subject project.

For comments and species lists for the portions of the project crossing Arizona, New Mexico, and Utah we suggest you contact the following U.S. Fish and Wildlife Service, Fish and Wildlife Enhancement Offices:

Arizona: Arizona Field Office, 3616 West Thomas Road, Suite 6, Phoenix, AZ 85019 (602) 379-4720.

New Mexico: New Mexico Field Office, 3530 Pan American Highway, Suite D, Albuquerque, NM 87017 (505) 883-7877

Utah: Field Supervisor-CO/UT, 1745 West 1700 South, 2060 Administration Building, Salt Lake City, UT 84104-5110 (801) 524-5630

We appreciate your interest in conserving rare species. If we can be of further assistance, please contact Bernardo Garza of this office at (303) 231-5280.

Sincerely Yours,

LeRoy W. Carlson
Colorado State Supervisor

cc: FWS/FWAO, Golden, CO (Attn. Bruce Rosenlund)
FWS/FWE; Albuquerque, NM
FWS/FWE; Phoenix, AZ
FWS/FWE; SLC, UT
CDOW, Colorado Springs, CO (Attn. Bruce Goforth)
Reading file
Project file

Reference: JBG*AFMINUTE.WPF

United States Department of the Interior

FISH AND WILDLIFE SERVICE
FISH AND WILDLIFE ENHANCEMENT
SOUTHERN CALIFORNIA FIELD STATION
Ventura Office
2140 Eastman Avenue, Suite 100
Ventura, California 93003

October 23, 1992

Major Dennis L. Sullivan
Chief, Environmental and Siting Division
Directorate of Civil Engineering
National Launch System
Department of the Air Force
Ballistic Missile Organization
Norton Air Force Base, California 92409-6468

Subject: Species List for the Shipment of Minuteman II Rocket Stages along U.S. Highway 95 from the Nevada border south to Interstate 40, and along Interstate 40 from the junction with U.S. Highway 95 east to the Colorado River.

Dear Major Sullivan:

This is in response to your request for information, received by us on October 19, 1992, on listed and proposed endangered and threatened species which may be present in the vicinity of Highway 95 from the Nevada border south to Interstate 40, and in the vicinity of Interstate 40 from its intersection with Highway 95 east to the Colorado River.

If the project may affect a listed species, the Department of the Air Force has the responsibility to prepare a biological assessment if the project is a construction project which may require an environmental impact statement. If a biological assessment is not required, the Department of the Air Force still has the responsibility to review its proposed activities and determine whether the listed species will be affected.

During the assessment or review process, the Department of the Air Force may engage in planning efforts, but may not make any irreversible commitment of resources. Such a commitment could constitute a violation of section 7(d) of the Endangered Species Act (Act). If a listed species may be affected, the Department of the Air Force should request, in writing through our office, formal consultation pursuant to section 7 of the Act. Informal consultation may be used to exchange information and resolve conflicts with respect to listed species prior to a written request for formal consultation.

I have enclosed a list (Enclosure) of threatened, endangered and candidate species presently under review by the Fish and Wildlife Service for consideration for Federal listing. Only listed species receive protection under the Act. However, candidate species should be considered in the planning process in the event they become listed or proposed for listing prior to project completion. Preparation of a biological assessment, as described in section 7(c) of the Act, is not required. They are included for the sole

purpose of notifying Federal agencies in advance of possible proposals and listings which at some time in the future may have to be considered in planning Federal activities. If early evaluation of the project indicates that it is likely to adversely affect a candidate species, you may wish to request technical assistance from this office.

The Bureau of Land Management (Bureau), has provided the following information concerning sensitive areas of note along the route:

1. U.S. 95, midway between the Nevada border and the junction with I-40:
   Piute Creek Smoketree (Psorothamnus spinosus) Unusual Plant Assemblage

2. U.S. 95, 1 mi. west of junction with Goffs Rd., in Sections 10, 11, 14, 15, 22, 23:
   Ocotillo (Fouquieria splendens) Unusual Plant Assemblage

3. I-40, between U.S. 95 and Needles:
   this section of road runs between the Sacramento Mountains and the Dead Mountains, which are habitat for the golden eagle (Aquila chrysaetos), a sensitive species.

4. I-40, approximately 1 mile east of the agricultural inspection station:
   Beal Slough, a sensitive wetland adjoining the Colorado River.

5. I-40, near the U.S. 95 South exit:
   Needles Revegetation Area, a Bureau of Land Management burn recovery area.

These areas are not protected by the Act. For further information, contact Al Pfister of the Bureau's Needles Resource Area office at (619) 326-3896.

For further information regarding compliance with the Act, please contact Ray Bransfield of my staff at (805) 644-1766.

Sincerely,

John I. Ford
Assistant Office Supervisor

Enclosure

LISTED ENDANGERED AND THREATENED SPECIES, CANDIDATE SPECIES, AND SENSITIVE AREAS THAT MAY OCCUR WITHIN THE VICINITY OF U.S. HIGHWAY 95 AND INTERSTATE 40, SAN BERNARDINO COUNTY, CALIFORNIA

Listed Species

Reptile		
Desert tortoise	Gopherus agassizii	T
Bird		
Yuma clapper rail	Rallus longirostris yumanensis	E
Fish		
Razorback sucker	Xyrauchen texanus	E

Candidate Species

Birds		
Western yellow-billed cuckoo	Coccyzus americanus occidentalis	3
Arizona Bell's vireo	Vireo bellii arizonae	3
California black rail	Laterallus jamaicensis coturniculus	1

(E) -Endangered (T) -Threatened (CH) -Critical Habitat

(1) -Category 1: Taxa for which the Fish and Wildlife Service has sufficient biological information to support a proposal to list as endangered or threatened.

(2) -Category 2: Taxa which existing information indicates may warrant listing, but for which substantial biological information to support a proposed rule is lacking.

(3) -Category 3: no longer being considered for a listing proposal at this time.

United States Department of the Interior

FISH AND WILDLIFE SERVICE

FISH AND WILDLIFE ENHANCEMENT
RENO FIELD OFFICE
4600 Kietzke Lane, Building C-125
Reno, Nevada 89502-5093

October 26, 1992
File No.: 1-5-93-SP-05

Major Dennis L. Sullivan
Department of the Air Force
Ballistic Missile Organization (AFMC)
Norton Air Force Base, California 92409

Dear Major Sullivan:

Subject: Species List for the Proposed Shipment Routes Through Nevada of Minuteman II Rocket Stages from Hill Air Force Base and the Pueblo Army Depot to Kirtland Air Force Base and the Navajo Depot Activity

As requested by your letter dated October 7, 1992, we have attached a list of threatened and endangered species that may be present in the subject project area within Nevada (Attachment A). To the best of our knowledge, no proposed species occur within the area. This list partially fulfills the requirement of the Fish and Wildlife Service (Service) to provide a species list pursuant to section 7(c) of the Endangered Species Act of 1973, as amended (Act). Other Service offices will provide lists for their respective jurisdictional areas. Please reference the species list file number shown on Attachment A in all subsequent correspondence. Please see Attachment B for a discussion of the responsibilities Federal agencies have under section 7(c) of the Act and the conditions under which a biological assessment must be prepared by the lead Federal agency or its designated non-Federal representative. A list of published references dealing with the distribution, life history, and habitat requirements of the listed species is also attached (Attachment C). This information may be helpful in preparing the biological assessment for this project, if one is required.

If you determine that a listed species may be affected by the proposed project, you should initiate consultation pursuant to 50 CFR § 402.14. Informal consultation may be utilized prior to a written request for formal consultation to exchange information and resolve conflicts with respect to a listed species. If a biological assessment is required, and it is not initiated within 90 days of your receipt of this letter, you should informally verify the accuracy of this list with our office. If, through informal consultation or development of a biological assessment, or both, you determine that the proposed action is not likely to adversely affect the listed species, and the Service concurs in writing, then the consultation process is terminated and formal consultation is not required.

Also, for your consideration, we have included a list of candidate species that may be present in the project area (Attachment A). These species are currently being reviewed by the Service and are under consideration for possible listing as endangered or threatened. Candidate species have no protection under the Act, but are included for your consideration as it is possible that one or more of these candidates could be proposed and listed before the subject project is completed. Should the biological assessment reveal that candidate species may be adversely affected, you may wish to contact our office for technical assistance. One of the potential benefits

Major Dennis L. Sullivan, Norton AFB

from such technical assistance is that, by exploring alternatives early in the planning process, it may be possible to avoid conflicts that could otherwise develop, should a candidate species become listed before the project is completed.

Please contact Robin Hamlin at (702) 784-5227 if you have any questions regarding the attached list or your responsibilities under the Act.

Sincerely,

David L. Harlow
Field Supervisor

Attachments

cc:
Assitant Regional Director, Fish and Wildlife Enhancement, Portland, Oregon
(AFWE-EHC Attn: Richard Hill)

NOTE: ATTACHMENTS B AND C ARE NOT INCLUDED IN THIS APPENDIX

ATTACHMENT A

ENDANGERED AND THREATENED SPECIES AND CANDIDATE SPECIES THAT MAY OCCUR IN THE AREA OF THE PROPOSED

Shipment Routes Through Nevada for the Minuteman II Rocket Stages

File Number: 1-5-93-SP-05

Listed Species

Birds		
E	American peregrine falcon	Falco peregrinus anatum
E	bald eagle	Haliaeetus leucocephalus
Fishes		
E	Virgin River roundtail chub	Gila robusta seminuda
E	woundfin	Plagopterus argentissimus
Reptiles		
T	desert tortoise	Gopherus agassizii

(E)--Endangered (T)--Threatened

Candidate Species

Mammals		
2	spotted bat	Euderma maculatum
Birds		
2	black tern	Chlidonias niger
2	western least bittern	Ixobrychus exilis hesperis
2	loggerhead shrike	Lanius ludovicianus
2	white-faced ibis	Plegadis chihi
Fishes		
2	Moapa White River springfish	Crenichthys baileyi moapa
2	Virgin spinedace	Lepidomeda mollispinis mollispinis
Reptiles		
2	chuckwalla	Sauromalus obesus
Amphibians		
2	Arizona southwestern toad	Bufo microscaphus microscaphus

Candidates continued

Invertebrates		
2	MacNeil sooty wing skipper	Hesperopsis gracielae

(1)-- Category 1: Taxa for which the Fish and Wildlife Service has sufficient biological information to support a proposal to list as endangered or threatened.

(2)--Category 2: Taxa for which existing information indicates may warrant listing, but for which substantial biological information to support a proposed rule is lacking.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Post Office Box 1306
Albuquerque, N.M. 87103

In Reply Refer To:
R2/FWE-SE
CL 10-092

OCT 30 1992

2-01-I-93-01

Captain Edwin Daniel
Department of the Air Force
SMC/ CJF, Building 953
Norton Air Force Base, California 92409-6448

Dear Captain Daniel:

This responds to Major Dennis Sullivan's October 7, 1992, letter to Regional Director Michael Spear. The subject letter requested a list of candidate, proposed, and listed threatened and endangered species, sensitive habitats, and sensitive biotic communities that may be impacted in Arizona, New Mexico, and several other western states by the U.S. Air Force's routine transportation of Minuteman II rocket stages.

The subject rocket motors will be transported by truck on major highways from Utah and Colorado to Kirtland Air Force Base, Albuquerque, New Mexico, and the Navajo Depot Activity, near Flagstaff, Arizona. Based upon the information in your letter about the consequences of an accident that would result in the ignition of rocket motors, we do not believe the subject transportation activity will impact threatened and endangered species or other sensitive habitats in New Mexico, but several species could be affected in Arizona (enclosure).

We appreciate the U.S. Air Force's concern for important components of the environment. If you have further questions or comments on this response, please contact Gary Halvorson or Jamie Rappaport Clark, Deputy Assistant Regional Director, Division of Endangered Speceis, at (505) 766-3972.

Sincerely,

Acting Regional Director

Enclosure

ENDANGERED,THREATENED AND CANDIDATE SPECIES IN ARIZONA THAT MAY BE AFFECTED BY TRANSPORT OF MINUTEMAN II ROCKET STAGES

COCONINO COUNTY

Bonytail chub (Gila elegans)	Endangered
Siler pincushion cactus (Pediocactus sileri)	Endangered
Parish alkali grass (Puccinellia parishii)	Candidate Category 1
Fickeisen Plains cactus (Pediocactus peeblesianus var. fickeiseniae)	Candidate Category 1
Arizona leatherflower (Clematis hirsutissima var. arizonica)	Candidate Category 1

MOHAVE COUNTY

Bonytail chub (Gila elegans)	Endangered
Humpback chub (Gila cypha)	Endangered
Virgin River chub (Gila robusta seminuda)	Endangered
Woundfin (Plagopterus argentissima)	Endangered
Razorback sucker (Xyrauchen texanus)	Endangered
Siler pincushion cactus (Pediocactus sileri)	Endangered
Deset tortoise (Mohave population) (Gopherus agassizii)	Threatened
Fickeisen Plains cactus (Pediocactus peeblesianus var. fickeiseniae)	Candidate Category 1
Paradox milk vetch (Astragalus holmgreniorum)	Candidate Category 1

NAVAJO COUNTY

Peebles Navajo cactus (Pediocactus peeblesianus var. peeblesianus	Endangered

United States Department of the Interior

FISH AND WILDLIFE SERVICE
FISH AND WILDLIFE ENHANCEMENT
UTAH STATE OFFICE
2078 ADMINISTRATION BUILDING
1745 WEST 1700 SOUTH
SALT LAKE CITY, UTAH 84104-5110

In Reply Refer To

(FWE)

November 6, 1992

Captain Edwin Daniel
SMC/CJF, Bldg 953
Norton AFB, CA 92409-6448

Dear Capt. Daniel:

We have received a letter dated October 7, 1992 requesting a list of Threatened, Endangered or Candidate species occurring along a proposed transportation route for Minuteman II rocket stages. We are providing a list for portions of the transportation network within the state of Utah. You will need to get separate lists from Fish and Wildlife Service (Service) offices within each state through which the rockets will travel.

The U.S. Fish and Wildlife Service (Service) advises that the following listed or proposed threatened or endangered species may occur within the project affected area during some portion of the year:

American peregrine falcon	E	Falco peregrinus anatum
Bald eagle	E	Haliaeetus leucocephalus
Mexican spotted owl	PT	Strix occidentalis lucida
June sucker	E	Chasmistes liorus
Humpback chub	E	Gila cypha
Bonytail chub	E	Gila elegans
Virgin River chub	E	Gila robusta seminuda
Woundfin	E	Plagopterus argentissimus
Colorado squawfish	E	Ptychocheilus lucius
Razorback sucker	E	Xyrauchen texanus
Black-footed ferret	E	Mustela nigripes
Utah prairie dog	T	Cynomys parvidens
Desert tortoise	T	Gopherus agassizii
Utah valvata snail	PE	Valvata utahensis
Dwarf bear poppy	E	Arctomecon humilis
Clay phacelia	E	Phacelia argillacea
Ute ladies'tresses	T	Spiranthes diluvialis

The Air Force should review their proposed action to determine if it "may affect" any of the listed species or designated critical habitat or "may jeopardize the continued existence of" any proposed species. If the determination is "may affect" for listed species or critical

habitat you must request in writing formal consultation from the State Supervisor, Fish and Wildlife Enhancement, at the address given above. If the determination is "may jeopardize ..." for proposed species you should request a conference in writing. At the time of the request for either a consultation or a conference you should provide this office a copy of the biological assessment and any other relevant information that assisted you in reaching your conclusion.

The Service can enter into formal Section 7 consultation only with another Federal agency. State, county or any other governmental or private organizations can participate in the consultation process, help prepare information such as the biological assessment, participate in meetings, etc.

Your attention is also directed to Section 7(d) of the Endangered Species Act, as amended, which underscores the requirement that the Federal agency or the applicant shall not make any irreversible or irretrievable commitment of resources during the consultation period which, in effect, would deny the formulation or implementation of reasonable and prudent alternatives regarding their actions on any endangered or threatened species.

Many species which are candidates for official listing as either threatened or endangered species (Federal Register Vol. 55, No. 55, February 21, 1990 and Federal Register Vol. 56 No. 225, November 21, 1991) may be present within the affected area. Although these species have no legal protection at present, under the Endangered Species Act, we would ask that you take care to avoid impacting them or their habitats if they are found in the area of influence of your project. These species are:

Spotted frog	Rana pretiosa
Northern goshawk	Accipiter gentilis
Ferruginous hawk	Buteo regalis
Western snowy plover (interior)	Charadrius alexandrinus nivosus
Mountain plover	Charadrius montanus
Black tern	Chlidonias niger
Southwestern willow flycatcher	Empidonax traillii extimus
Western least bittern	Ixobrychus exilis hesperis
Loggerhead shrike	Lanius ludovicianus
White-faced ibis (Great Basin)	Plegadis chihi
Flannelmouth sucker	Catostomus latipinnis
Roundtail chub	Gila robusta
Utah hydroporus diving beetle	Hydroporus utahensis
Pygmy rabbit	Brachylagus idahoensis
Merriam's kangaroo rat	Dipodomys merriami frenatus
Spotted bat	Euderma maculatum
Southwestern otter	Lutra canadensis sonorae
Virgin River montane vole	Microtus montanus rivularis
Gumbo milk-vetch	Astragalus ampullarius
Cronquist milk-vetch	Astragalus cronquistii

Holmgren milk-vetch	Astragalus holmgreniorum
Cisco milk-vetch	Astragalus sabulosus
Mancos saltplant	Atriplex pleiantha
Virgin River thistle	Cirsium virginensis
Creutzfeldt catseye	Cryptantha creutzfeldtii
Canyon sweetvetch	Hedysarum occidentale v. canone
Low hymenoxys	Hymenoxys depressa
Latilobum biscuitroot	Lomatium latilobum
Book cliffs blazing star	Mentzelia multicaulis v. labrina
Trotter oreoxis	Oreoxis trotteri
Utah spike-moss	Selaginella utahensis
Chuckwalla	Sauromalus obesus
Utah physa	Physella utahensis
Thickshell pondsnail	Stagnicola utahensis

Wetlands which are of critical importance to nesting and migratory waterfowl and shorebirds occur along the margins of the Great Salt Lake and Utah Lake. The Great Salt Lake has been included in the Western Hemispheric Shorebird Reserve Network due to its significance to migratory shorebird species. Several state Waterfowl Management Areas occur along the shore of the Great Salt Lake. The proposed routes also pass near Zion, Arches, and Canyonlands National Parks. Any NEPA documentation should address possible project impacts on these areas and the wildlife that they support.

If you have further questions please contact Susan Linner, Fish and Wildlife Biologist at (801) 975-3630.

Sincerely,

Robert D. Williams
State Supervisor

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APPENDIX C

APPENDIX C

Suggested Criteria for Air Contaminants to Protect Health and Safety

	Concentrations ($\mu g/m^3$)		
	1 Hour	24 Hours	Annual
Aluminum Oxide	1,000[a]	150[b]	50[b]
Carbon Monoxide	40,000[b]	10,000[b]	1,000[b]
Hydrogen Chloride*	750[a]	750[a]	750[a]
Nitrogen Oxide	3,000[a]	300[c]	30[d]
Nitrogen Dioxide	1,800[e]	180[f]	100[b]
Asbestos	[g]	[g]	[g]

(a) Threshold Limit Value/10

(b) National Ambient Air Quality Standards

(c) Threshold Limit Value/100

(d) Threshold Limit Value/1,000

(e) National Institute for Occupational Safety and Health

(f) National Institute for Occupational Safety and Health/10

(g) OSHA (29 CFR 1910.1001 sets a "permissible exposure limit of 0.2 fibers/cm^3 (approximately 6 $\mu g/m^3$).

* The TLVs for these substances have a ceiling notation (TLV-C") indicating a maximum exposure level based on acute effects. Thus, a single exposure level is used for all exposure periods.

Sources: Department of Defense, 1990. Strategic Arms Reduction Talks (START) Treaty, Preliminary Legislative Environmental Impact Statement, 16 October.

U.S. Air Force, 1991. Environmental Assessment for Transportation and Storage of Missile Motors from the Minuteman II Missile Deactivation Program, September, Ogden Air Logistics Center - Hill Air Force Base, Utah.

Model Results for Static Fire of Minuteman II Stage I Rocket Motor

Under Stability Class C Conditions and 3.0 m/sec Windspeed

PCAD Results

Emission Products	Maximum Concentration ($\mu g/m^3$)	1 Hour Average Concentration ($\mu g/m^3$)	24 Hour Average Concentration ($\mu g/m^3$)
Aluminum Oxide	8,100	140	5.7
Carbon Monoxide	141	2.3	0.1
Hydrogen Chloride	4,700	80	3.3
Nitrogen Oxide[a]	1,100	18	0.7

Maximum concentration occurs at 9.2 kilometers downwind.

Plume height - 944 meters.

(a) Nitrogen oxide (NO) is reported rather than oxides of nitrogen (NOx) (equivalent to NO + nitrogen dioxide [NO_2]) because the NO_2 concentrations are approximately 0.1 percent that of NO. This proportion is insignificant in comparison to the sensitivity of the computer models.

m/sec = meters per second

$\mu g/m^3$ = micrograms per cubic meter.

The Products of Combustion/Atmospheric Dispersion (PCAD) model was used to calculate emission concentrations. PCAD was developed specifically for the modeling of propellants, explosives, and pyrotechnics combustion, and the atmospheric dispersion of the combustion products. It provides information on the types of combustion products and their pattern of dispersion.

Sources: Department of Defense, 1990. Strategic Arms Reduction Talks (START) Treaty, Preliminary Legislative Environmental Impact Statement, 16 October.