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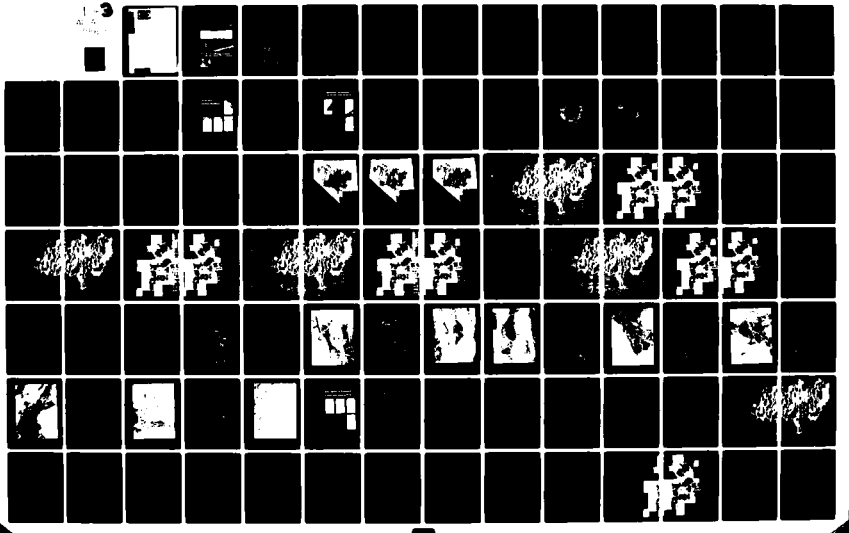

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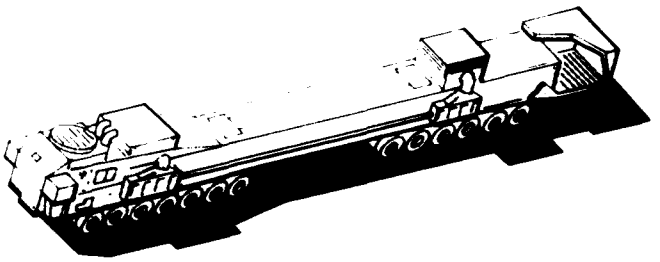
Comparative Analysis of Alternatives



Environmental Impact Analysis Process

DEPLOYMENT AREA SELECTION AND LAND WITHDRAWAL/ ACQUISITION DEIS

DEPARTMENT OF THE AIR FORCE

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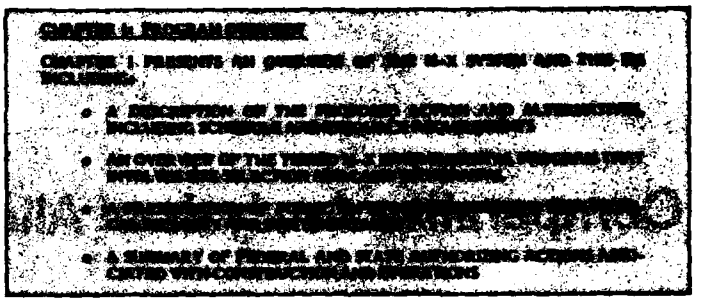
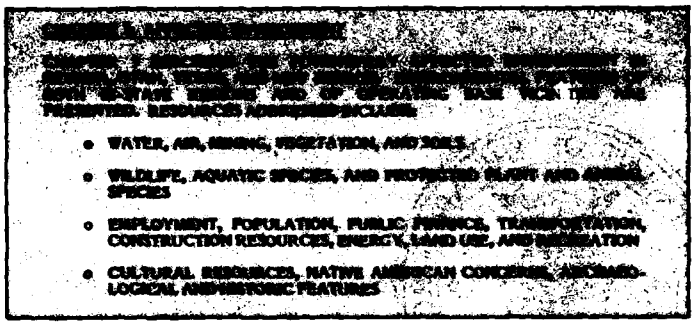
DEPLOYMENT AREA SELECTION
AND
LAND WITHDRAWAL/ACQUISITION DEIS



CHAPTER 2: COMPARATIVE ANALYSIS OF ALTERNATIVES

CHAPTER 2 COMPARES THE ENVIRONMENTAL IMPACTS OF ALTERNATIVE M-X SYSTEM AND OPERATING BASE COMBINATIONS. DETAILS INCLUDE:

- THE SELECTION OF LOCATIONS FOR TWO SUITABLE DEPLOYMENT REGIONS, 200 CLUSTERS, AND SEVEN ALTERNATIVE OPERATING BASES
- PRESENTATION OF CONCEPTUAL CONSTRUCTION SCHEDULES, PERSONNEL REQUIREMENTS, AND RESOURCE NEEDS FOR EACH ALTERNATIVE
- COMPARATIVE ENVIRONMENTAL ANALYSIS BY ALTERNATIVE FOR EACH RESOURCE PRESENTED IN CHAPTERS 3 AND 4



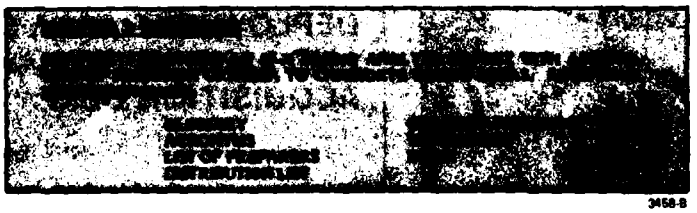


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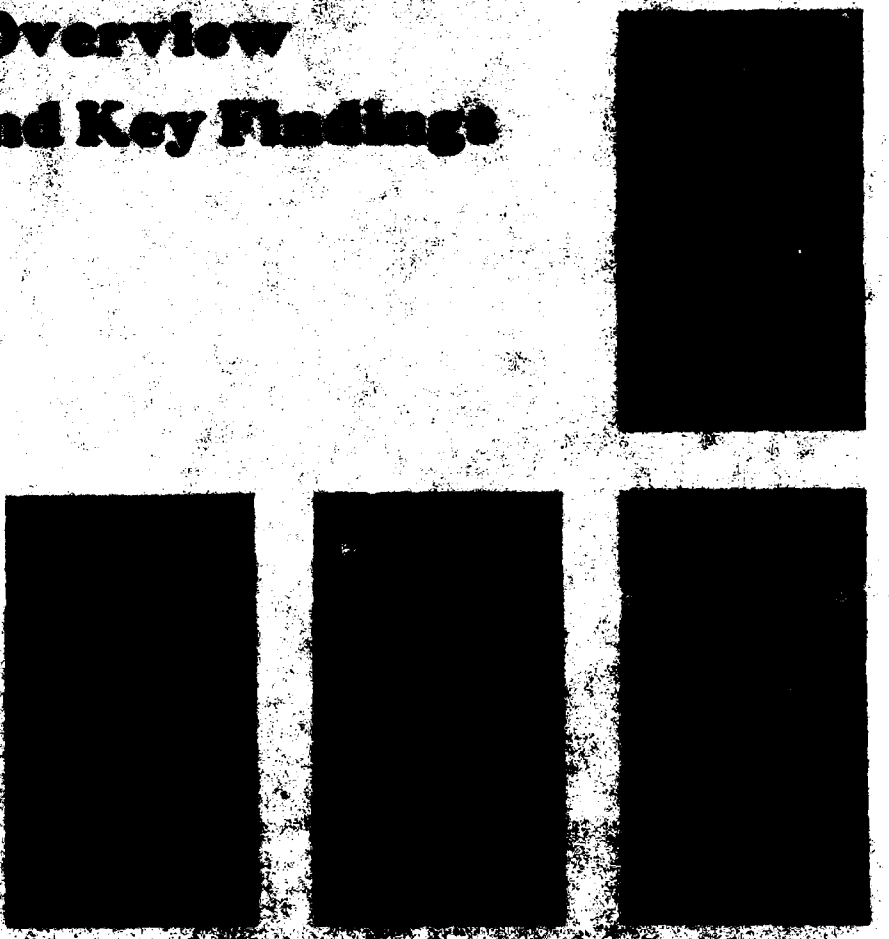
TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

Overview and Key Findings



OVERVIEW AND KEY FINDINGS

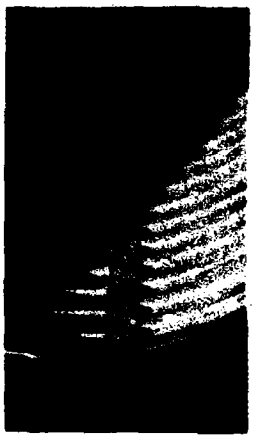
This chapter identifies all reasonable alternatives and objectively presents the project effects and environmental consequences of the Proposed Action and each alternative. The process by which alternative deployment areas and configurations were derived is presented first, followed by the projected construction and operation resource requirements for the Proposed Action and each alternative. The future conditions within the alternative deployment areas under no project, or no deployment decision at this time, are summarized for each key resource.

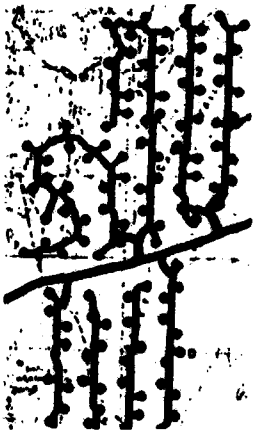
The scoping process identified key resources in both natural and human environments. In response to the public and agency comments, each resource is evaluated for each alternative and appropriate mitigations are discussed. The analysis covers significant environmental characteristics that could be substantially affected by system deployment. The interdisciplinary analysis identifies potential mitigation conflicts.

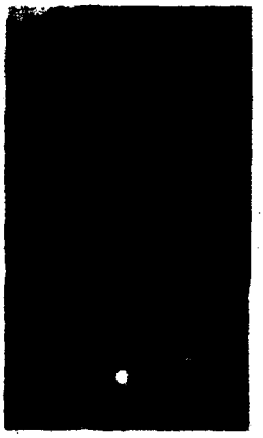
This detailed resource-by-resource analysis defines the issues and permits reviewers to evaluate the comparative merits of the Proposed Action and each alternative for each significantly affected resource. At the conclusion of the resource analysis for the Proposed Action, the available data, results of analyses performed, and scientific judgment were used to rank, where possible, each alternative relative to the resource under consideration.

Chapter 4 discusses the impact analysis in greater detail and includes other environmental features that may receive some project impacts.

Selection Of Suitable Locational Alternatives







SELECTION OF ALTERNATIVES

The selection of locational alternatives proceeded in three phases. First, through an extensive screening process, suitable deployment regions in the continental United States were reduced to those in the states of Nevada, Utah, Texas, and New Mexico. Second, suitable locations were identified for the designated deployment area (DDA) within those states. Finally, suitability zones for the operating base (OB) locations were determined in close proximity to the suitable deployment regions.

SUITABLE DEPLOYMENT LOCATIONS (2.1.1)

The deployment area selection process began in 1977. Three levels of screening were used, each progressive stage using more refined engineering and environmental detail. The first level, called coarse screening, considered all land within the entire 48 contiguous states.

Criteria (2.1.1.1)

Screening employed the geotechnical, cultural, and topographic avoidance criteria shown in Table 2.1-1. Areas with surface rock or rock within 50 ft of the surface were rejected because construction in such areas is more difficult and costly. Furthermore, the survivability of the proposed shelters might be degraded by possible blast waves (from near hits in an attack environment) reflected off bedrock less than 50 ft beneath the ground level.

Based on experience with the current Minuteman and Titan ICBM systems, it is desirable to site shelters to avoid flooding and/or the need for pumps in shelters. Areas were rejected that have groundwater within 50 ft of the surface or surface waters (lakes, reservoirs, swamps, and perennial drainages).

Cultural screening criteria exclude existing Indian Reservations, federal and state cultural and natural areas, and large-scale energy and mining resources and related activities. The exclusion zones near populated areas are for public safety and security, and to allow room for future community development.

Table 2.1-1. Principal exclusion/avoidance criteria used during screening.

CRITERION	DEFINITION
Geotechnical	Surface Rock and Rock within 50 ft. Surface Water and Ground Water within 50 ft.
Cultural and Environmental	Federal and State Forests, Parks, Monuments and Recreational Areas. Federal and State Wildlife Refugees, Grasslands, Ranges and Preserves. Indian Reservations. High Potential Economic Resource Areas, Including Oil and Gas Fields, Strippable Coal, Oil Shale and Uranium Deposits, and known Geothermal Resource Areas. Industrial Complexes such as Active Mining Areas Tank Farms, and Pipeline Complexes. 20 mi. Exclusion Radius of cities having populations of 25,000 or more. 3.5 mi. Exclusion Radius of cities having populations between 5,000 and 25,000. 1 mi. Exclusion Radius of cities having populations less than 5,000.
Topographic	Areas having Surface Gradients Exceeding 10% as determined from maps at scale 1:250,000. Areas having Drainage Densities averaging at least two 10 ft. deep drainages measured parallel to contours, as determined from maps at scale of 1:24,000.

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Topographic criteria exclude areas with slopes exceeding 10 percent or with deep drainages. These areas make construction more difficult and costly. The large vehicles planned for M-X should operate on terrain which is as flat as possible.

Application of these screening criteria identified land areas that total about 83,000 mi^2 scattered throughout the southwestern portion of the country. The suitable areas were defined as six candidate deployment areas (Figure 2.1-1).

1. Nevada/Utah
2. California
3. Western Arizona
4. Arizona/New Mexico
5. Colorado/Kansas/Nebraska
6. Texas/New Mexico

Each was reevaluated for military and operational suitability and compatibility with existing land uses, according to the following criteria:

1. The distance from the coast to the deployment area. Distance generally reduces the effectiveness of threatening sea-based forces. For physical threats such as aircraft or missiles, added distance directly increases the time needed to reach the target, increases probable warning time, and allows more time for defensive reactions. For electromagnetic threats which are often limited to "line of sight" or "ground-wave" distances, the power requirements increase in proportion to distance.

2. The distance from international borders to the deployment area. The location of deployment areas farther from borders reduces an enemy's capability to locate missiles in shelters through the use of sensors. The land surrounding the M-X deployment area should be U.S. territory to avoid international complications in any investigation of suspicious activities and to inhibit meaningful intelligence collections.

3. The distance from coasts and international borders to reduce the effects of radio jamming against the M-X communications system.

4. The compatibility of existing land use activities with M-X deployment.

Results (2.1.1.2)

The evaluation of the six deployment areas against the criteria resulted in the elimination of all but two deployment areas: Nevada/Utah and Texas/New Mexico (Figure 2.1-2).

SUITABLE CLUSTER/ROAD LOCATIONS (2.1.2)

The second phase of the alternative selection process consists of the application of more detailed criteria that define suitable zones for shelters, their support facilities, and roads within the candidate deployment areas of Nevada/Utah and Texas/New Mexico.

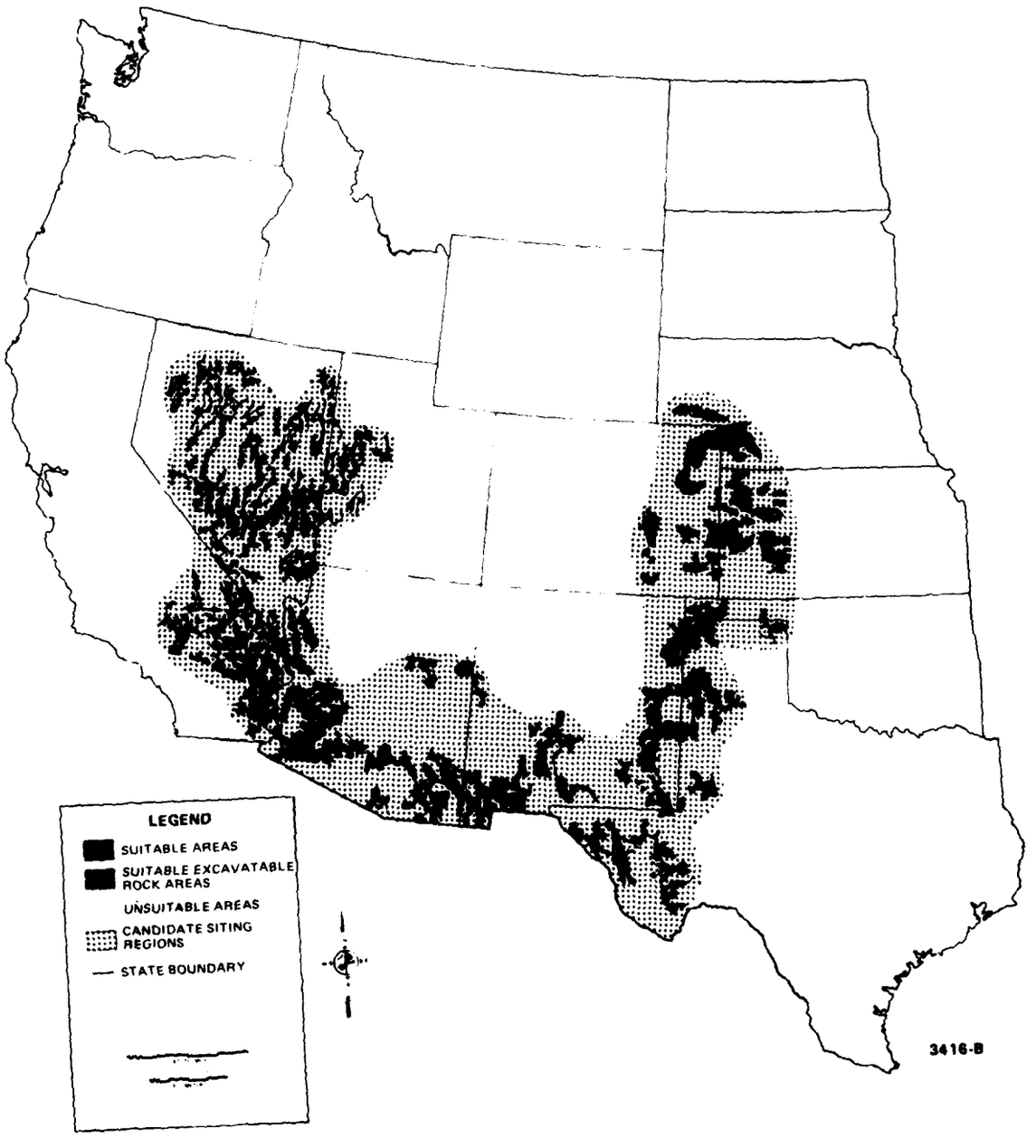


Figure 2.1-1. Candidate siting regions.

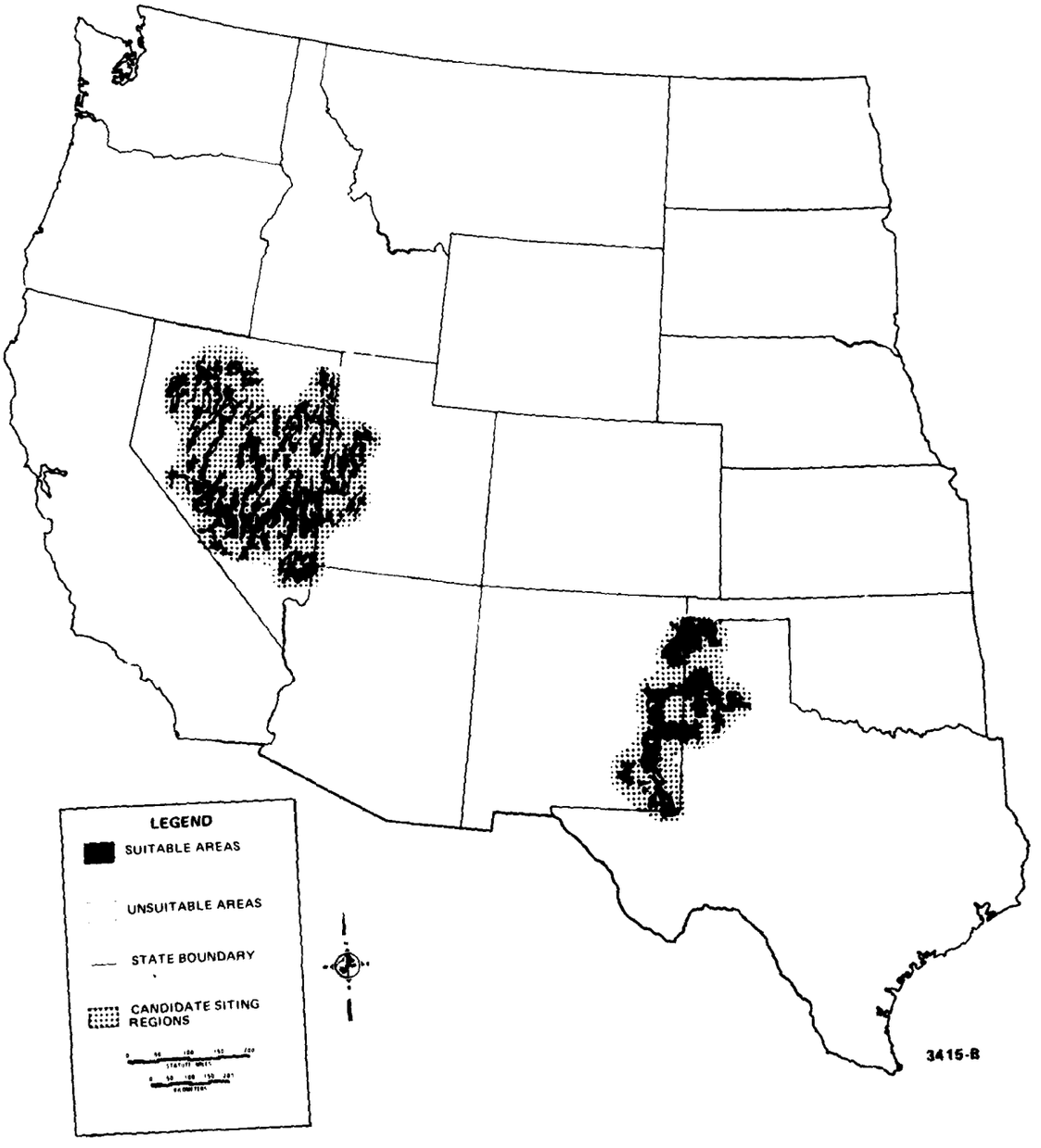


Figure 2.1-2. Suitable areas for further analysis.

Criteria (2.1.2.1)

Application of the criteria shown in Table 2.1-2 results in identifying unsuitable land which has been eliminated from further consideration and in identifying suitable land on which to deploy shelters, facilities, and roads.

Geotechnical, Topographic, and Demographic

The criteria for depth to bedrock and water table are the same as those used in selecting suitable deployment areas.

Rolling terrain and steep slopes are exclusionary criteria. It is desirable from construction, cost, and operational viewpoints to build shelters and roads on relatively flat lands. Large vehicles required for M-X require more power to negotiate steep inclines. Engineering limits have been established to keep DTN slopes at 7 percent or lower and shelter/cluster road slopes at 5 percent. The shelters need to be on flatter ground than the designated transportation network (DTN) to permit close alignment of vehicles next to the shelter during missile transfer operation. Additionally, the cost of shelter construction as well as the amount of disturbed land, vehicle fuel consumption, and air pollution would increase if shelters are constructed on slopes exceeding 5 percent.

Design objectives are to avoid, if possible, interstate highways or other busy roads. One exception might be in mountain pass regions where the DTN may have to share existing rights of way. Avoidance of busy thoroughfares assists the SAL monitoring process and possibly averts traffic delays when missiles must be moved over the DTN. Roads may cross through a nonsuitable area as long as slope criteria and environmental exclusions are not violated.

Distances from population centers are the same as used for earlier screening.

Explosive Safety and Electrical Standoff Distances

Explosive safety distances are required by regulation to protect the public from hazards of storing missiles in shelters and other M-X facilities applied primarily to siting shelters, cluster maintenance facilities, missile assembly buildings, and rocket stage storage areas.

Electrical power generation and distribution facilities are avoided because electrical and electronic equipment is susceptible to electromagnetic interference (EMI) to some degree. Therefore the minimum separation distances included in the criteria are intended to prevent EMI due to electrical power generation and distribution facilities from adversely impacting the M-X system. These minimum distances may be reduced by providing adequate shielding to reduce EMI but costs of doing so would be high.

Land Areas

Areas defined as being suitable must be as contiguous as possible and of sufficient parcel size to accommodate a hexagonal or grid pattern cluster as described in Chapter 1.

Table 2.1-2. Exclusion/avoidance criteria for shelters, cluster maintenance facilities, and roads.

CRITERION	DEFINITION
Geotechnical	Depth to rock less than 50 ft. Depth to water table less than 50 ft. Surface water, including lakes, reservoirs, swamps, perennial drainages, and playas subject to flooding.
Topographical	Shelter: Nominal slope greater than 5 percent. Rolling terrain and areas where more than two 10-ft. deep drainages occur per 1,000 ft. DTN: 7 percent or greater slope. Cluster road: Nominal slope greater than 5 percent (occasional 1,000-ft. sections may be considered having up to 10 percent).
Demographic	Exclusion radii from population centers: 20 mi from cities of 25,000 or more. 3.5 mi from cities of 5,000 - 25,000. 1 mi from cities of 5,000 or less Cluster roads should avoid existing federal, state, and county roads with average daily traffic of greater than 250 vehicles per day
Explosive safety distances	Observe safety stand-off distances in accordance with AFR 127-100. Public traffic route - 1,780 ft. Inhabited buildings - 2,965 ft. Pipelines (buried) - 300 ft. Above ground POL - 1,800 ft. Above ground electrical distribution lines > 15,000 V - 1,780 ft. Radio/microwave facilities - 2,965 ft. Area support centers - 2,965 ft.
Electrical stand distance	Shelters will not be located less than prescribed distances from existing overhead power lines and power generation facilities. Power rating — Minimum distance 50 KV or less — 750 ft. 50 - 250 KV — 1,250 ft. 250 KV or more — 2,500 ft.
Land area	Sufficient suitable land must be available to space shelters in cluster pattern. Minimum spacing between adjacent shelters is 3,000 ft. Avoid state and private property if possible.
Cultural and environmental exclusions	Designated wilderness and wilderness study areas. Existing state and national parks and proposed Great Basin National Park. Existing Indian reservations. Registered historic and archaeologic properties. Designated critical habitat of federal T/E species. Existing state and national monuments. Existing and proposed national wildlife refuges. Existing and proposed national ranges and preserves. Existing state and national forests and national grassland. Military ranges, training areas, proving grounds, test sites.
Cultural and environmental exceptions (case-by-case)	Populated areas (see "demographics" above). Irrigated farmland High actual and potential economic resource and activity areas. Moapa expansion - public lands requested for withdrawal for expansion of the Moapa reservation. Duckwater expansion - public land which has been identified to the Air Force for possible reservation expansion. Habitats of significant species.

3795-2

Exclusions

Certain areas are not available for potential M-X deployment due to legal requirements or to policy commitments and have been excluded from consideration for siting M-X facilities.

Legal Exclusions

Legal exclusions are areas which are not available for potential M-X deployment due to legal requirements. Only two land categories have been identified as legally excluded: Designated Wilderness Areas and Potential Wilderness Areas (including the results of various agency reviews such as RARE II and Wilderness Study Areas).

- o Designated Wilderness Areas. By terms of the Wilderness Act (16 USC 1131 et seq.) designated wilderness areas are not available for development including roads, structures, mechanical transport, or comparable development. These areas were removed from further consideration as potential M-X deployment areas during the initial screening process.

- o Potential Wilderness Areas. Section 603(a) of the Federal Land Policy and Management Act (43 USC 1701 et seq.) requires all federal agencies to inventory public lands for wilderness suitability. Suitable lands (defined by 16 USC 11. c) must be managed in a manner to preserve their wilderness suitability until final classifications are determined (by 1991). Federal land management agencies (particularly BLM and U.S. Forest Service) have identified areas that they feel meet wilderness criteria. These processes are not complete but, for the moment, the identified areas are the best available indication of potential wilderness areas. Areas may be added or deleted during several remaining steps. These areas were not excluded during initial screening due to the unavailability of data.

Policy Exclusions

Policy exclusions result from commitments made in Air Force regulations, during establishment of initial screening criteria, during scoping for the Deployment Area Selection and Land Withdrawal/Acquisition EIS and in statements made by responsible Air Force officials. Almost all policy exclusions were also included in the set of initial screening criteria. Native American grazing allotments, officially recommended/proposed forests, parks, landmarks, Indian reservations, paleontological, archaeological, or historical sites and designated recreation areas were added during scoping. Power generating plants and transmission lines is one of the initial screening criteria, although it has not been shown on screening maps to date due to the resolution of the data.

- o Indian Reservations. The Air Force has declared as policy the exclusion of all Indian reservations and colony lands from consideration for deployment. There are over 482,000 acres of such lands in the Nevada/Utah study area which fall under Federal Trust status.

- o Federal and State Forests, Parks, and Monuments; Federal and State Wildlife Refuges, National Grasslands, Ranges and Preserves. These

areas are legally available as potential M-X sites since they have not been deprived of other uses by perpetual dedication by Congress (Reichelderger V. Quinn (1932) 287 US 315 77 L.Ed. 331, 53 S.Ct. 177; FLPMA, Title V, Sec. 501 et seq.; 16 USC 668 dd(d)(1) and others), however, the Air Force has not considered these as potential deployment areas. Subsequent to the screening process, certain national grasslands in northern Texas were identified as being potentially suitable as deployment areas. The use of these lands will be investigated during Tier 2 analyses and decisionmaking, if deployment in Texas/New Mexico is selected. Inclusion of these lands would not significantly affect the conclusions in this report.

- Indian Grazing Lands. In addition to the over 482,000 acres of reservation land in the Nevada/Utah study area, tribal governments hold an estimated 660,397 acres in BLM grazing permits. These are the Duckwater, Yomba, and Te Moak Shoshone grazing allotments. The Air Force has excluded such lands from consideration for deployment.

- Surface Waters. Executive Order 11988 directs implementation of the "United National Program for Flood Plain Management" (U.S. Water Resources Council, 1976) which recommends federal and state action to reduce the risk of flood losses through floodplain management. The floodplain is taken here to include lakes and reservoirs as well as swamps, perennial drainages, and playas which are subject to flooding, as shown on 1:62,500-scale maps. This criterion is also related to operational requirements and was applied during initial screening as well as during higher resolution analysis.

- High Potential Economic Resource and Industrial Areas. These areas were avoided by policy as part of the initial screening: oil shale deposits, uranium deposits, known geothermal resource areas, active mining areas, tank farms, and pipeline complexes. Not only are these resource areas of national significance, they are also key elements in the economic structure of the four states.

- Populated Areas. Exclusion areas have been defined based on the population of cities and communities. Criteria used during initial screening are 20 statute mile exclusion areas from cities with populations of 25,000 or more; three and one-half statute mile exclusion from cities having populations of between 5,000 and 25,000; and one statute mile from communities with population less than 5,000. In addition, isolated homes, farmhouses, and ranch houses are to be avoided to the maximum degree possible during higher resolution siting decisions.

- Officially Recommended/Proposed Forests, Parks, Landmarks, Indian Reservations, Paleontological, Archaeological, or Historical Sites. These areas are afforded even less legal protection from development than comparable designated sites. Included in this category are the proposed Great Basin National Park and a small number of sites in each state that have been found eligible for inclusion in the National Register by the State Historic Preservation Office and are awaiting a final determination by the Keeper of the National Register. Such properties have been

avoided in current layouts as an initial means of reducing project impacts.

Legal Constraints

Legal constraints represent areas that might be available for M-X deployment although use of the land will require detailed site specific analysis, fieldwork, and consultation prior to withdrawal/acquisition. Cabinet or congressional level review and approval might be necessary in some cases while coordination with other governmental agencies is required in all cases.

- Federally Listed Threatened and Endangered Plants, Animals, and Fish. Endangered Species Act (P.O. 93-205) requires (Sec. 7) all federal agencies to ensure that actions they authorize do not jeopardize their existence or habitat(s). The most recent publication includes the Utah prairie dog, bald eagle, peregrine falcon and federally endangered fish (May 20, 1980 at 45 Fed Reg. 33658). There are no federally listed threatened and endangered plant species in the Nevada/Utah study area. The Beaver Dam Slope desert tortoise population in southwestern Utah has recently (Aug. 20, 1980) been designated a federally listed threatened species with critical habitat.

- State Listed Threatened and Endangered Plants, Animals, and Fish. The states have recognized the potential value and rarity of a number of plant, animal, and fish species by listing them. These occupy severe or unusual habitats and are therefore likely candidates for (a) having medicinal or other value to man, (b) being sensitive indicators to ecosystem health for this particular region, and (c) unique gene pools. There are a number of examples of both phenomena. The desert tortoise is listed by Nevada state law as a rare animal (the state equivalent of a federal listing of threatened). The gila monster, also listed by Nevada as a rare animal, is a large reptile often collected for resale. One of only two venomous lizards in the world, it has declined in number throughout its range.

- Federally Recommended Threatened and Endangered Plants, Animals, and Fish. The population levels of these organisms are very low and current land use threatens their continued existence. The nine most clearly threatened plants species of the area have been listed on the Federal Register and appear very likely to be incorporated in the federal list of endangered species according to the regional Fish and Wildlife Service biologist. They will then be afforded the same status as listed species. Guliani's dune scarab beetle was listed (1978) as proposed for endangered species designation, known to exist only on Big Dune near the Nevada/California border, and highly susceptible to human disturbance.

- Registered Archaeological and Historic Properties. Properties listed in the National Register of Historic Places are protected by federal legislation (National Historic Preservation Act, Executive Order 11593, NEPA) and such sites have been avoided as an initial means of reducing impacts. It is recognized that additional National Register eligible properties will be discovered as intensive archaeological surveys are continued in the study area. These will also be avoided to the maximum degree reasonable.

- Air Quality Nonattainment Areas. Section 107(a) of the 1977 Clean Air Act Amendments (CAAA) mandates each state to submit to EPA a list of those air quality control regions, or portions thereof, which do not meet any national primary or secondary air quality standards. Section 110 requires each state to submit a plan which provides for implementation, maintenance, and enforcement of any primary and secondary standards in each air quality control region (or portion thereof) within each state.

  Several areas within Nevada and Utah do not meet one or more of the air quality standards, especially as a result of urbanization or mining operations. M-X siting decisions within these areas will have to meet more stringent pollutant control measures consistent with an EPA approved state implementation plan.

- Class I Air Quality. In Section 169A. of the 1977 Clean Air Act Amendments (CAAA), Congress declared a national goal to prevent any future and to remedy any existing impairment of visibility and to prevent any reduction in air quality related values in mandatory Class I areas. Section 162 established certain mandatory Class I areas (all international parks, national wilderness areas larger than 5,000 acres, national memorial parks larger than 5,000 acres, and all national parks larger than 6,000 acres) while Section 164(d) required federal land managers to review all national monuments, primitive areas, and national preserves for redesignation as Class I where air quality related values are important attributes. Three Class I areas exist in Utah to the east of potential siting areas. If potential wilderness areas become designated wilderness areas they will be afforded Class I protective status thus acting as a potential constraint on M-X siting decisions.

- Prime and Unique Farmlands. By memorandum, the CEQ has clarified the inclusion of highly productive farmlands within the NEPA policy of preserving important historic, cultural, and natural aspects of the national heritage. Prime and unique farmlands should not be used for any purpose other than agriculture unless other national interests override the importance of preservation of prime or unique farmlands. These lands are identified by the Soil Conservation Service and have soil, water, and climatic conditions that make them capable of prime crop production or able to produce unique crops.

- Paleontological Resource Areas. Utah is the only state in the nation with a law mandating the preservation of paleontologic resources (State Antiquities Act, 1977 Utah Code Annotated, Chapter 163, Sections 63-18-18 to 31). Some protection is also afforded under the Federal Antiquities Act. Areas identified as having a high value, primarily vertebrate fossils but also other key or well preserved fossils, would be avoided or mitigated by collection and preservation.

- Designated Groundwater Basin. In New Mexico and Nevada, the state engineer, either by petition from 40 percent of the appropriators on record in a designated area, or on his own motion, may exercise supervision of a groundwater basin in a designated area. In order to protect vested water rights, and to provide a means for ensuring that

water will be dedicated to its most beneficial use, Utah employs an application and permit system similar in design to that in use in Nevada.

Policy Constraints

Policy constraints are areas in addition to legal constraints where the Air Force has promised to minimize direct impacts to the maximum degree consistent with achieving project objectives.

- o Private and State-Owned Lands, Agricultural Land. These land ownership and use categories are concentrated in Texas and New Mexico and relatively rare in the Nevada/Utah study area where, except for locating the operating base, almost all of these lands should be avoidable with minimal impact on deployment. However, avoidance of state land is difficult in New Mexico and Utah where state owned land is in each township. Sitings near Beryl, Milford, or Delta, Utah, or Dalhart, Texas, and especially Clovis, New Mexico are surrounded by private agricultural lands and avoidance of direct conflicts does not appear possible. To the degree possible, it is Air Force policy to avoid or reduce direct impacts to private and state owned lands or to agricultural lands.

- o Roads and Highways. Various criteria for co-use, standoff, and exclusion of roads are being utilized in system layouts. The criteria generally vary with the project feature and with current average daily traffic (ADT) on the roads. Cluster roads cannot coexist with or cross federal, state or county roads with ADT of greater than 250 vehicles per day. The designated transportation network (DTN) will not coexist with federal, state, or county road unless terrain such as mountain passes dictate the need to coexist, or when it is economically impractical to do otherwise.

Environmental Constraints

Environmental constraint areas are available for M-X deployment although available data indicate important environmental resources interact with potential project features. Several of these features are widespread and complete avoidance is not practical. These interactions are further discussed in this EIS.

- o Pronghorn Antelope Range. Although overall range and distribution is consonant with key habitat, pronghorn antelope range is ranked lower than key habitat and migration routes because they contain smaller populations.

- o Mule Deer Migration Routes. Mule deer migration routes tend to occur in passes between valleys which are likely to be used by the DTN. At times of migration (rut and fawning) the animals are the most sensitive and are located in these natural funnels.

- o Mule Deer and Elk Key Habitat. Mule deer key habitat or winter range typically represents the lowest elevational extremes of the year-long range and is generally less than 2 percent of the annual range. On these winter ranges (key habitats) competition for forage resources is most acute, the animals are the most sensitive to disturbance, and the highest

mortality occurs. These ranges are generally directly abutting geotechnically suitable areas. Recent research (Lyons, 1980; McNamara, Berwick, and Hillyer, 1980) has shown extreme and deleterious reactions by elk to human presence.

- o Significant Research Areas. Significant research areas are areas where natural processes are allowed to predominate for purposes of research and education. These areas may include (a) typical or unusual faunistic and/or floristic types, associations, or other biotic phenomena, (b) characteristic or outstanding geologic or aquatic features or processes.

- o Natural Areas. Natural area is a pre FLPMA (Federal Land Policy and Management Act, 1976) term for federally managed reserves representing the nation's natural land and water ecosystems. These were categorized, according to intended use, into research, outstanding, or primitive areas. With the passage of FLPMA in 1976, it became necessary to reevaluate these lands for wilderness characteristics according to the new land management regulations. The 22 natural areas in the Nevada/Utah siting region failed to meet wilderness standards but have retained their natural area designation.

- o Zeolite Deposits. Zeolites are minerals formed by alteration of pyroclastic volcanic rocks. Certain types of zeolites, those with fibrous crystalline habit similar to asbestos, are suspected of being cancer-causing. Identified areas of zeolite occurrence could require avoidance, special dust prevention measures, or personnel protection devices (face masks).

Application of Criteria (2.1.2.2)

Figures 2.1-3 through 2.1-5 show the step-by-step application of exclusions and constraints to the Nevada/Utah deployment area. Figures 2.1-6 and 2.1-7 show system layouts for Nevada/Utah and Texas/New Mexico, respectively. There is more suitable land available than is required for system deployment. Therefore, judgments had to be made as to which portion of the suitability zones should be selected for potential siting. Some of the fundamental guidelines used to select the deployment areas were that they had to be compact, supportable from nearby operating bases, and deployed in at least two states:

- o Compactness. A compact deployment area is desirable, because the road network would be shorter. Cost of roads, amount of disturbed area, number of field facilities, and the number of people to operate and maintain the system would be minimized. A compact deployment area also contributes to improved security, better maintenance and a higher in-commission rate due to shorter travel distances for missiles and personnel. Another benefit of deploying a small area is that SAL verification by satellites is facilitated and would be a worthwhile precedent to establish should the Soviets deploy a similar mobile missile system.

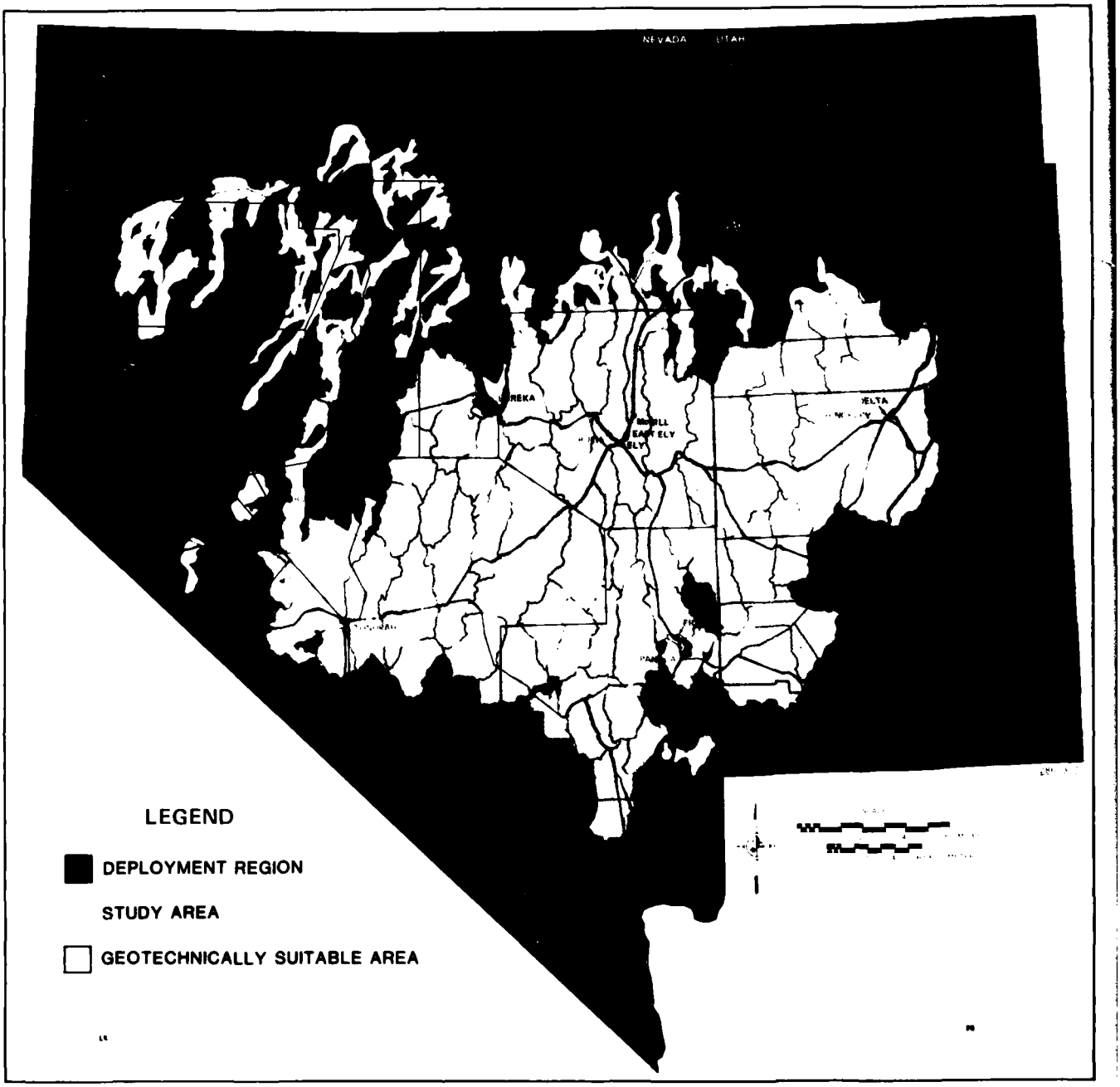


Figure 2.1-3. The Nevada/Utah study area.

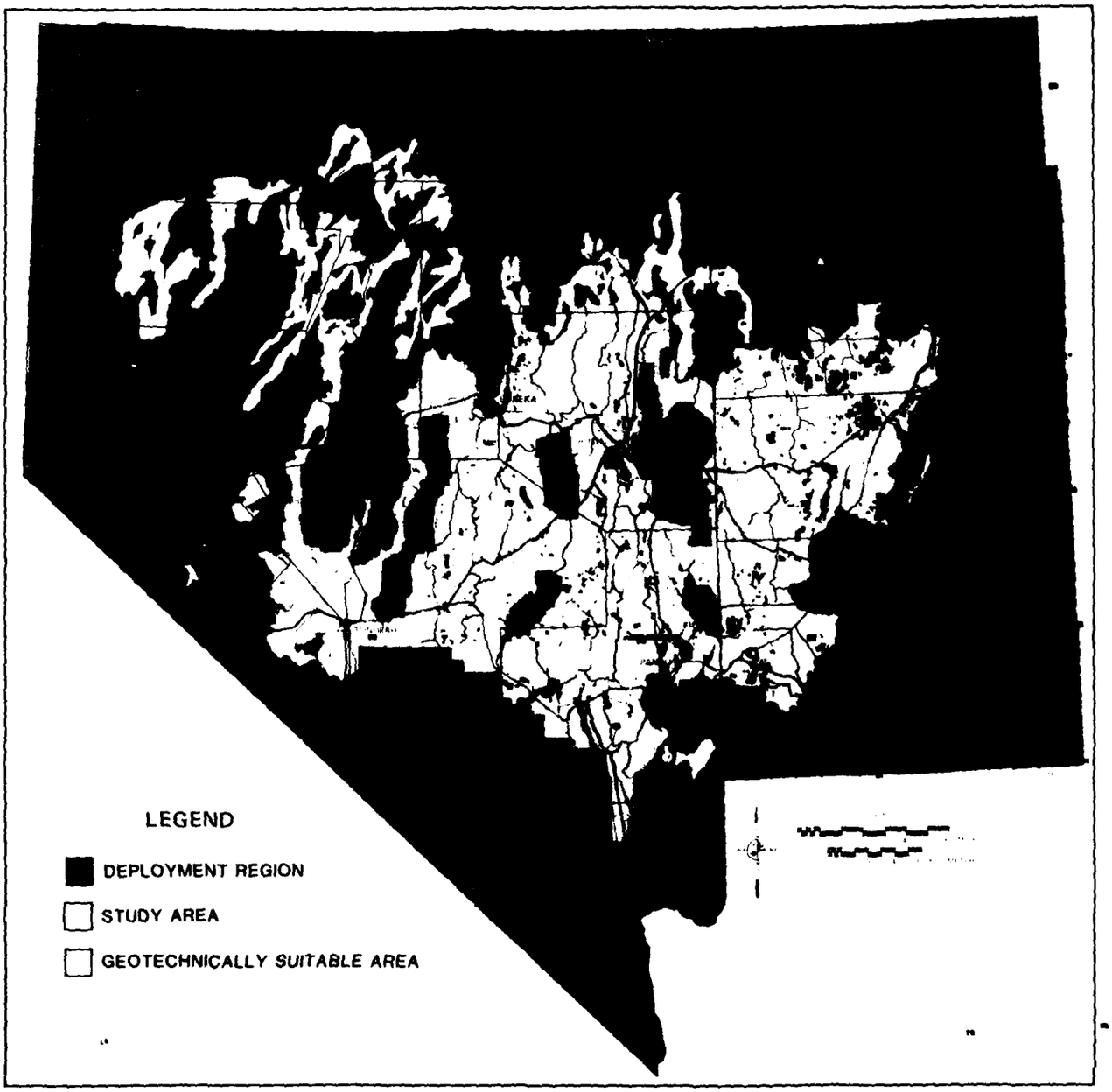


Figure 2.1-4. Legal exclusions in the Nevada/Utah deployment area. (red)

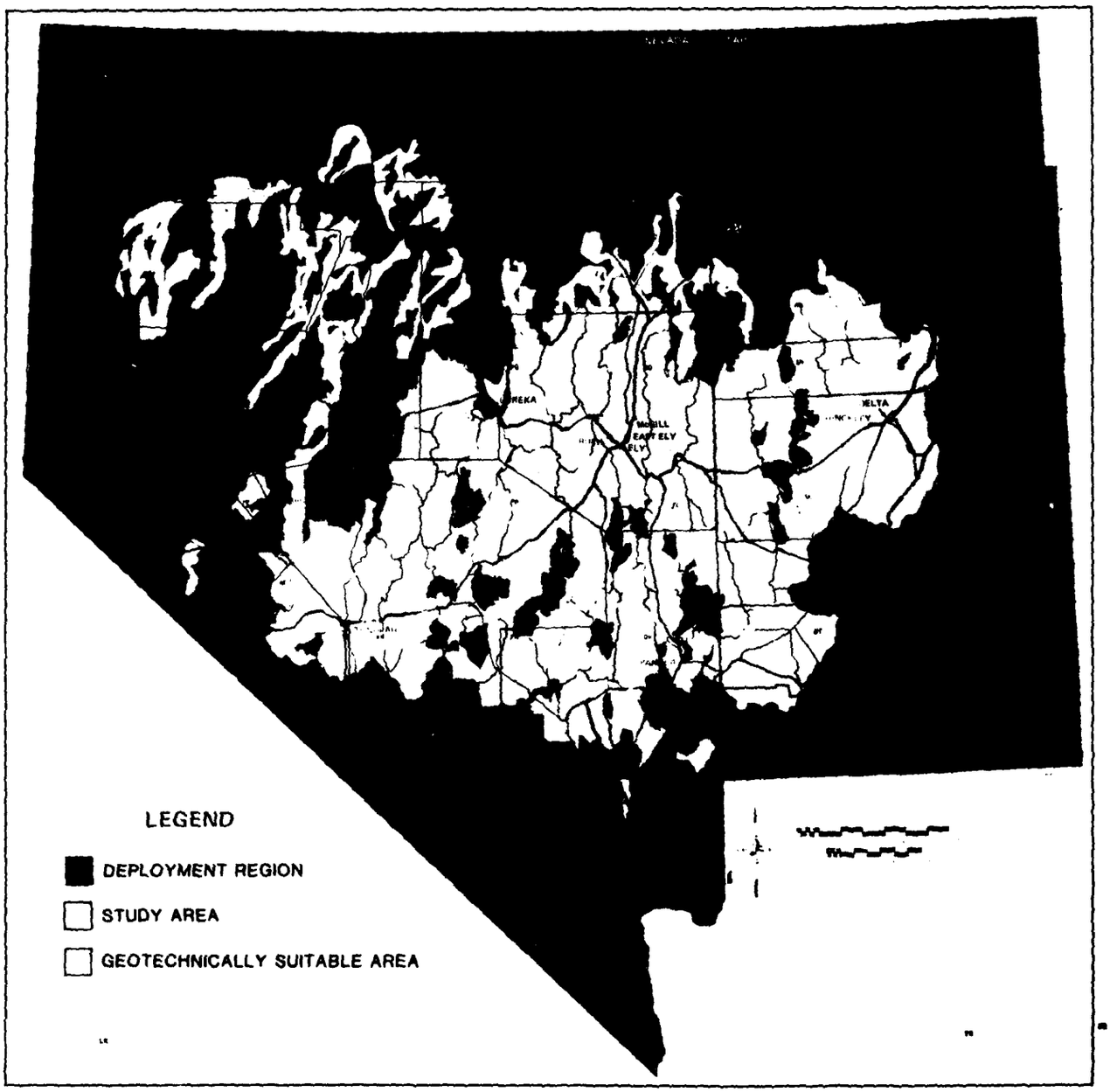
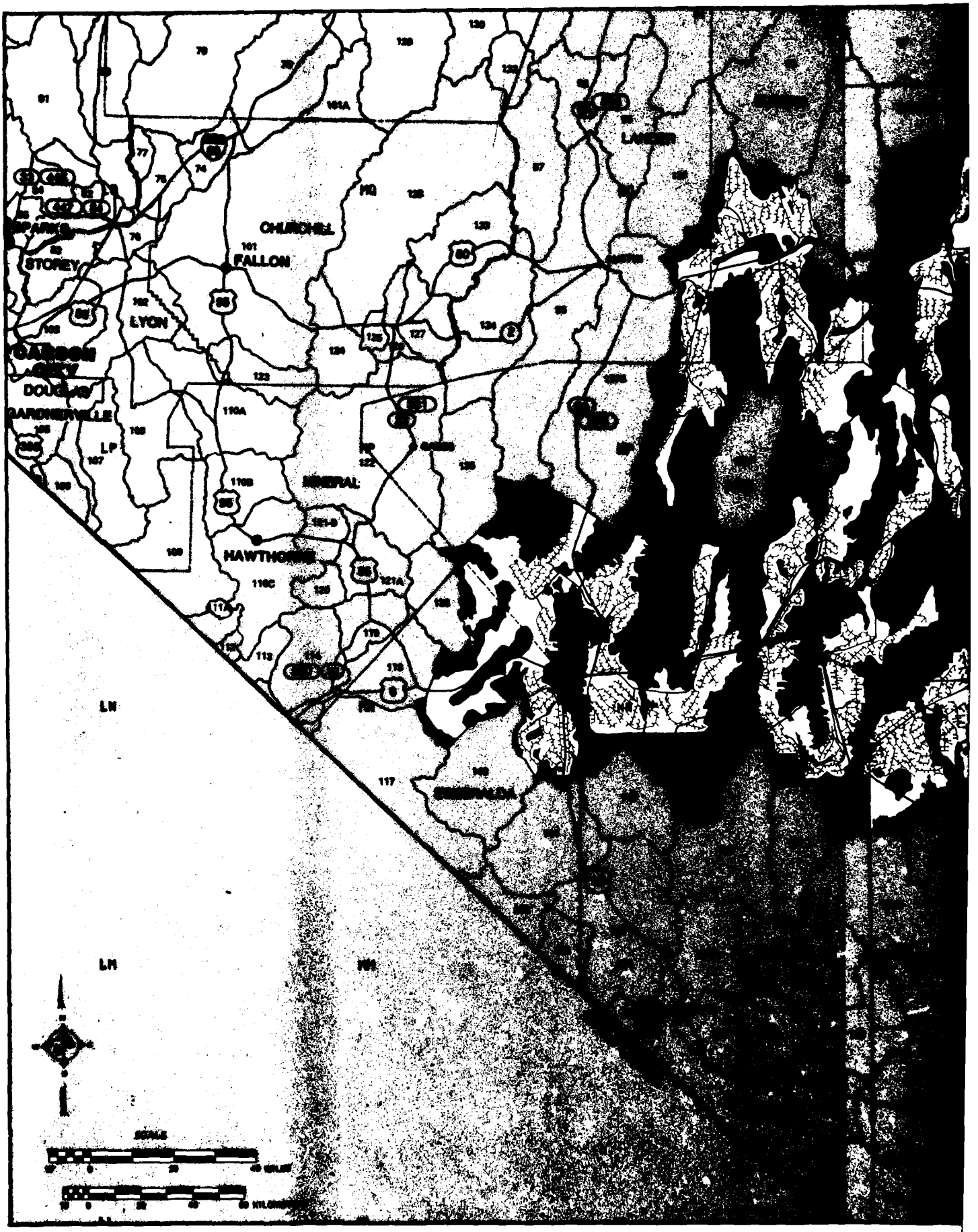


Figure 2.1-5. Policy exclusions (red) overlaid on legal (black) exclusions in the Nevada/Utah deployment area.


CHURCHILL
FALLON
STOREY
LYON
MINERAL
HAWTHORNE
LANDER
LP
LH
HQ

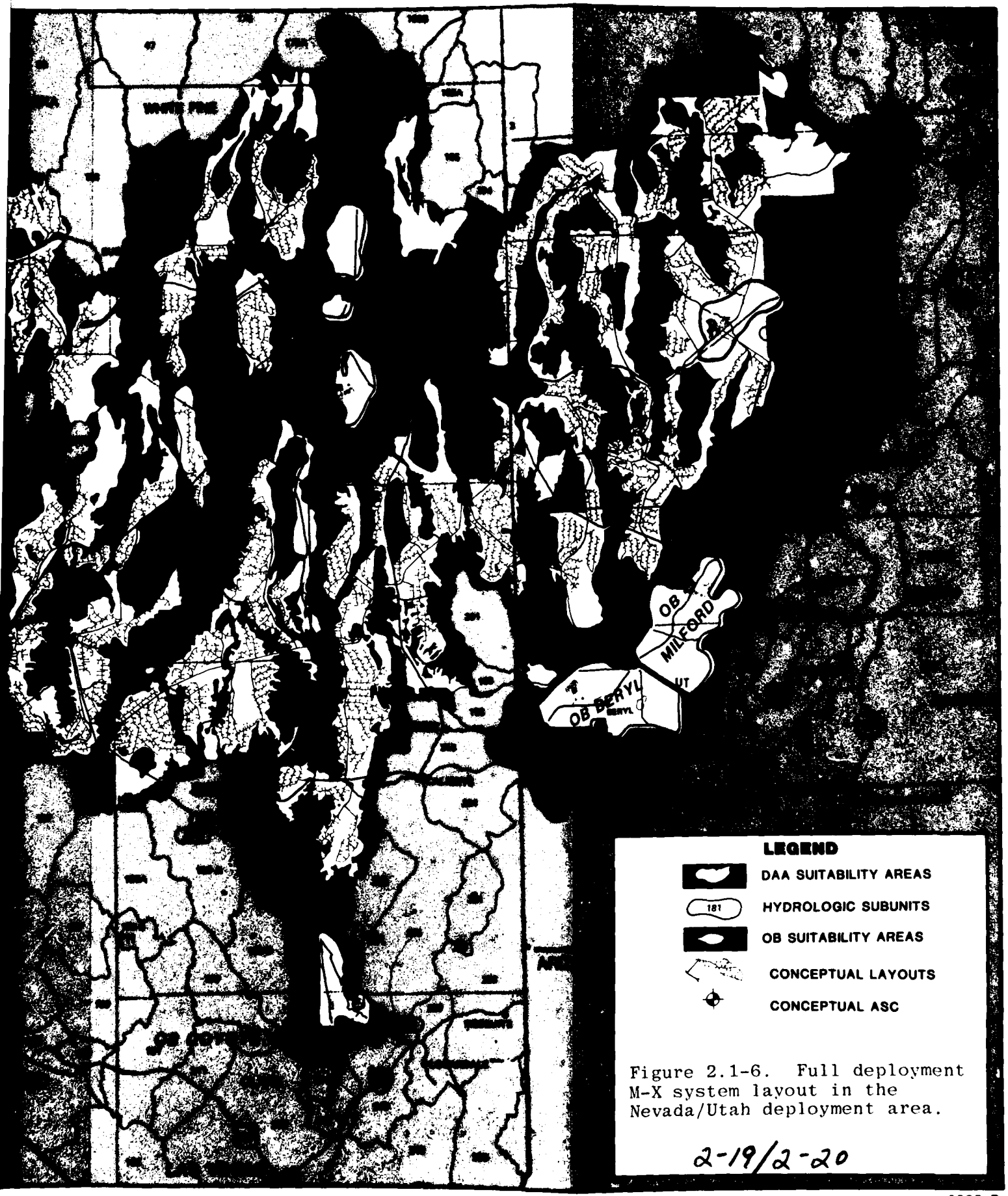
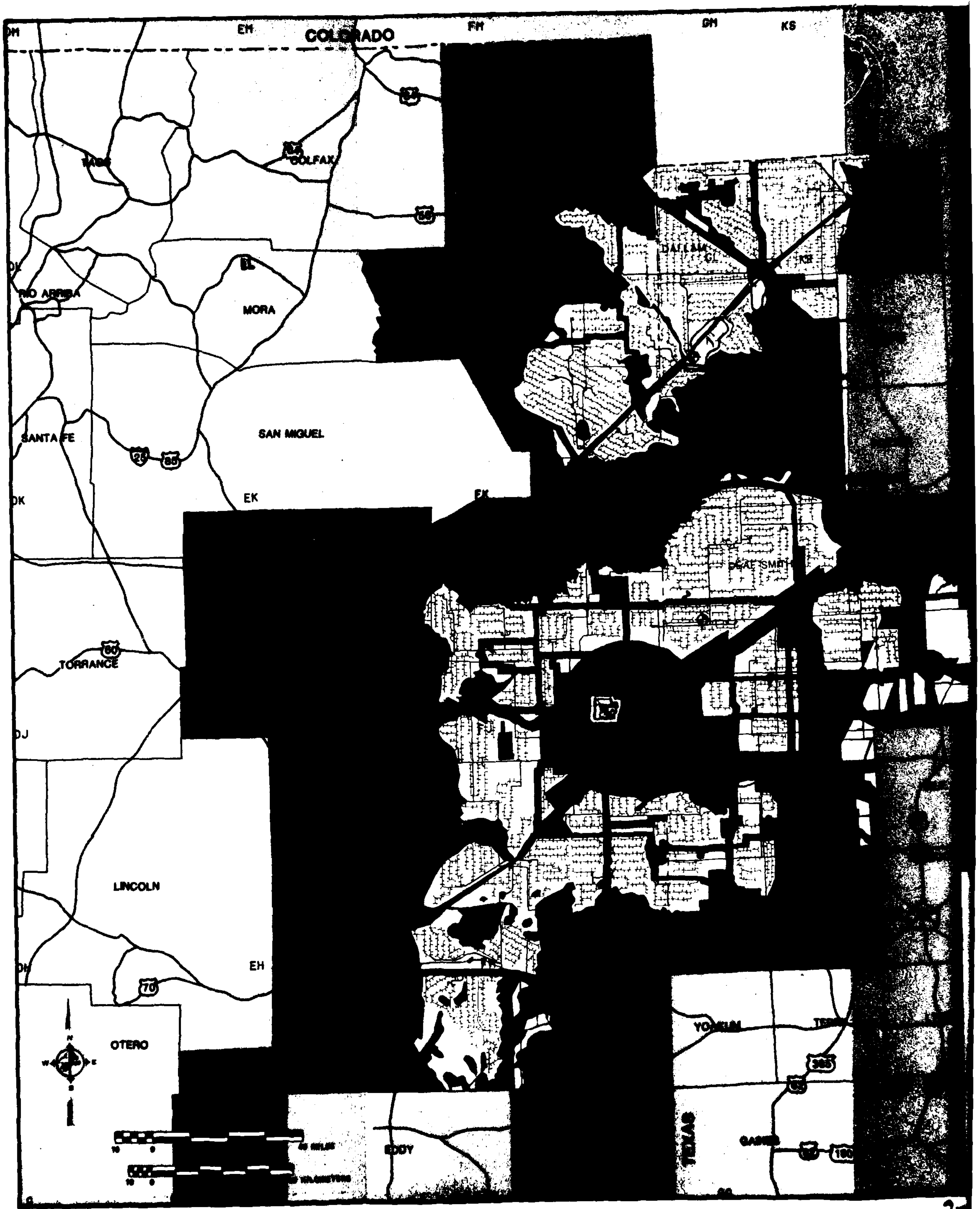


Figure 2.1-6. Full deployment M-X system layout in the Nevada/Utah deployment area.

2-19/2-20

3222-D


COLORADO
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SAN MIGUEL
SANTA FE
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2

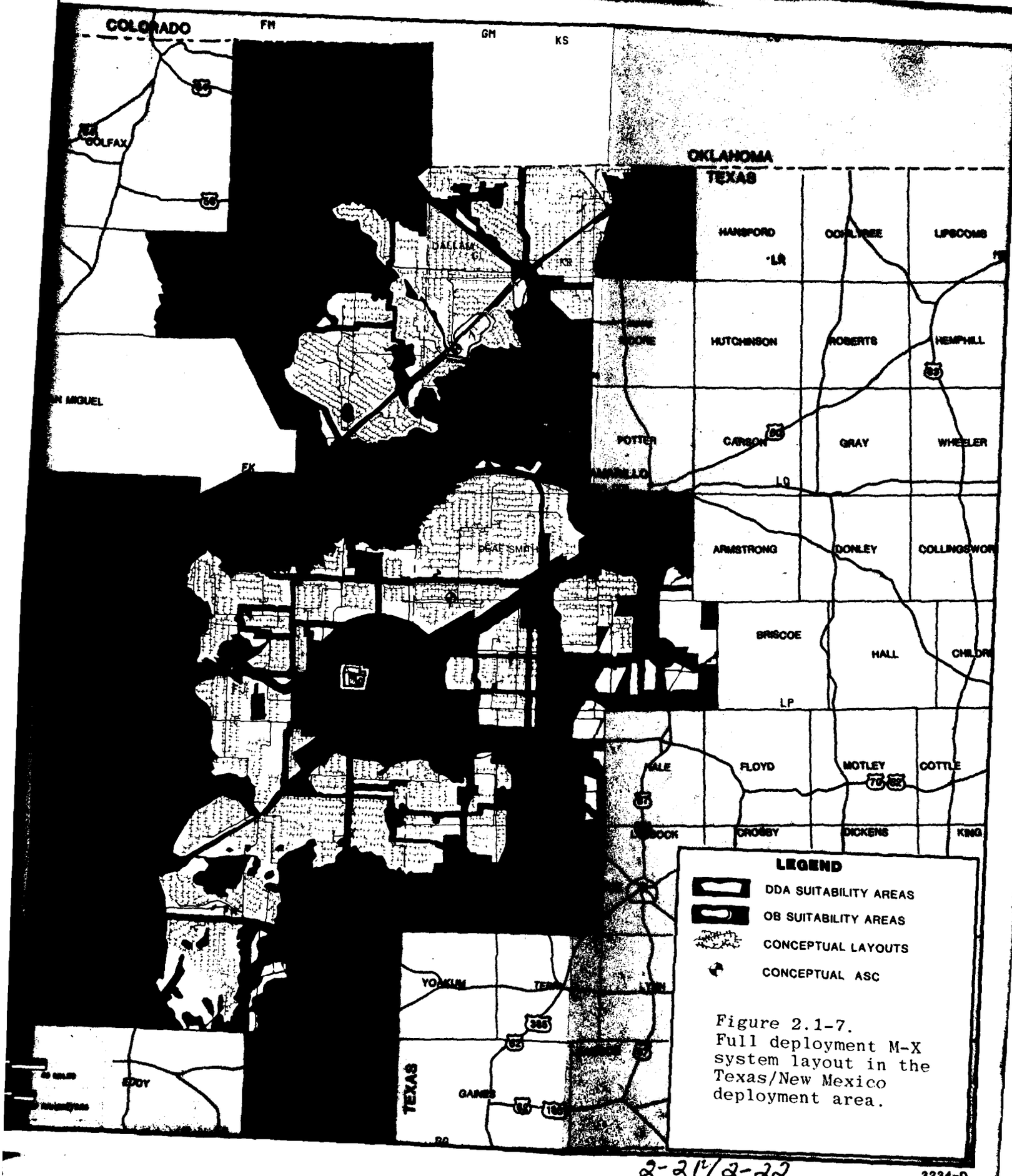


Figure 2.1-7.
Full deployment M-X system layout in the Texas/New Mexico deployment area.

2-21/2-22

3234-D

- o Supportability. The deployment area should be supported by nearby operating bases if possible. Selection of suitable operating base locations is an integral part of system deployment (Section 2.1.3).

- o Deployment in Multiple States. Congress, federal, state, and local leaders have suggested that the system be dispersed into more than one state as a possible mitigation to the rapid influx of large numbers of people into a single area. No single state would receive the entire system of 200 missiles. The two required operating bases would be located in different states.

The conceptual system layouts analyzed in this EIS use the mitigation-through-avoidance technique to minimize impact to highly sensitive lands, and environmental features. System layout preparation proceeded in five steps:

- o Preliminary Screening. This phase of activity consisted of identifying and excluding all federal and state parks, monuments, forests, grassland, Indian reservations, historic or natural areas. In addition, oil and gas fields, known strippable coal, oil shale and uranium deposits, geothermal resource areas, pipelines, buried or surface electrical and communication lines, state and federal paved highways, military bases, and cities were avoided by from 1 to 18 mi. These avoidance criteria were designated to reduce the competition for resources, or constraints upon local future opportunities resulting from M-X system deployment or operation.

- o Disturbed Area Identification. Within the screened area, roadways with an existing average daily traffic volume of less than 250 vehicles were identified and mapped. This included many section roads in Texas/New Mexico and typical dirt roads and jeep trails in Nevada/Utah which crisscross the potential valleys. Use of existing low volume roadways reduces disturbed areas by as much as 20 percent in some locations.

- o Preliminary System Layout. The M-X system clusters and roadways were laid out in the designated deployment area (DDA) to minimize dispersion and reduce the total number of valleys impacted. Shelters and clusters were first laid out in the areas remaining following preliminary screening. Typically, these large areas were in the southcenter and southeast of Nevada/Utah and in the central area around Clovis in the Texas/New Mexico region.

- o Identification of Environmental Characteristics. Mappable sensitive environmental and land use features were avoided by routing the DDA system features around these areas. The features avoided were: all wilderness areas (including BLM designated and proposed study areas, Forest Service Rare II wilderness recommendations, administratively endorsed wilderness proposals, and designated wilderness areas), playas, the preferred site of the Great Basin National Park, registered national landmarks and archaeological sites, the newly established range of the Utah prairie dog, the known location of rare plants, and the locations of protected aquatic species.

- o Refined System Layouts. The known environmentally sensitive areas were overlaid upon the preliminary system layouts; and specific shelters, roads, and clusters were moved to avoid conflict and potential impact. The refined layout was designed to reduce overall impacts.

The application of the mitigation-by-avoidance reduces site-specific impacts and disturbances to known sensitive areas. This reduction of impacts has associated with it two monetary costs: the system expands on the periphery into additional hydrologic subunits resulting in higher initial costs, and the expanded distances increase Air Force operational costs for both security and maintenance.

The designated deployment area (DDA) selected for analysis in the Nevada/Utah region is located in the hydrologic units indicated in Figure 2.1-8. Hydrological units are shown because they are the basis of comparative environmental analysis in this EIS. The northwestern portion of Nevada was not selected as an alternative, because it would increase DDA area road network, personnel requirements, and construction/operations costs.

Figure 2.1-9 shows the DDA selected for analysis in Texas/New Mexico. It was derived in a manner similar to that used for Nevada/Utah. Counties are the basic unit for environmental analysis in Texas/New Mexico.

The conceptual layouts discussed above have been for deployment of the full system in each region - either Nevada/Utah or Texas/New Mexico. Another viable alternative, though of higher monetary cost, is split basing, which could possibly mitigate impacts. Therefore, a split basing alternative was developed for analysis as shown in Figures 2.1-10 and 2.1-11.

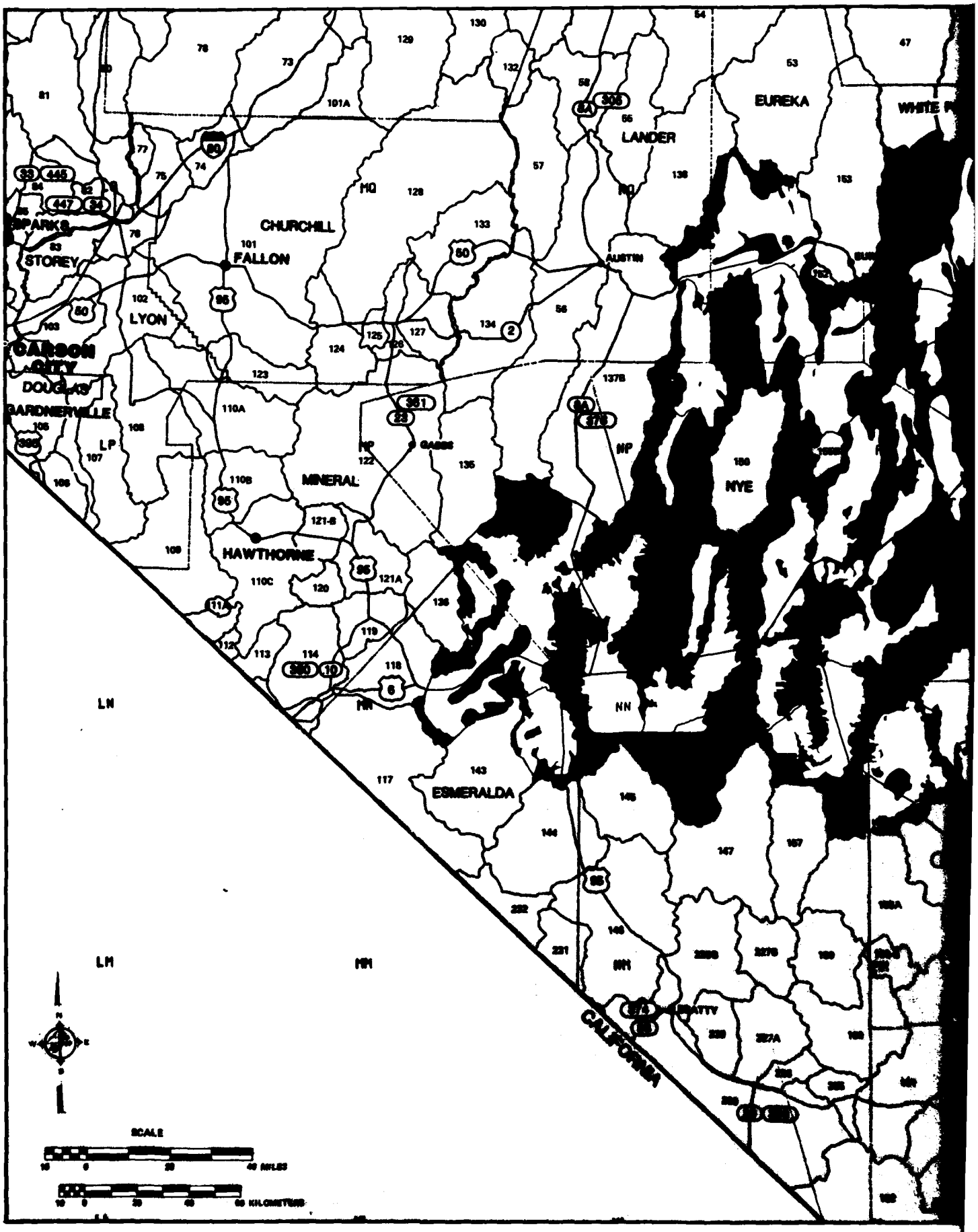
For split basing alternative, 100 missiles would be deployed in each of the two regions with approximately 70 missile clusters in Nevada, 30 in Utah, 65 in New Mexico, and 35 in Texas. For Nevada/Utah, the number of missiles in each state was halved in comparison to options that would locate 200 missiles in that region. The intent was to provide equal mitigation to each state. For Texas and New Mexico, the split-basing deployment area was derived principally by maximum avoidance of irrigated cropland and inhabitable dwellings to minimize adverse impacts for the region.

Results (2.1.2.3)

Application of the criteria outlined above results in suitability zones as shown in Figures 2.1-8 through 2.1-11 for Nevada/Utah, Texas/New Mexico, and split basing. The suitability zones are shown in white; with exclusions and case-by-case exceptions annotated separately to show their range and extent in the deployment area.

SUITABLE OPERATING BASE LOCATIONS (2.1.3)

This section discusses the methodology used to identify potential operating base (OB) locations. The OB locations are linked to the location of the DDA; therefore, the analysis for the location of the OB begins by considering only


EUREKA
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STOREY
SPARKS
LYON
CARSON CITY
DOUGLAS
GARDNERVILLE
MINERAL
HAWTHORNE
ESMERALDA
NYE
AUSTIN
GABBS
CALIFORNIA
SCALE

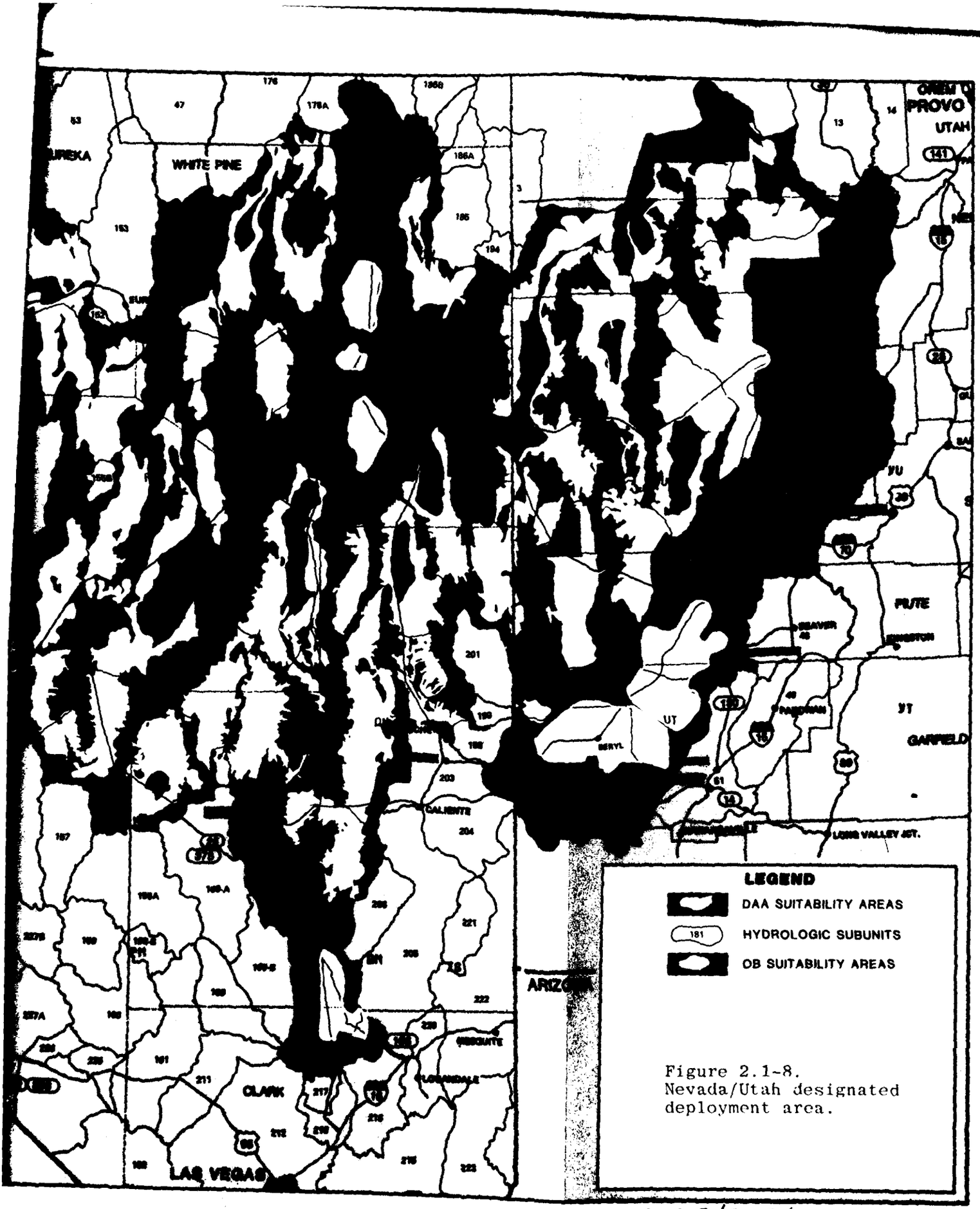

Figure 2.1-8.
Nevada/Utah designated deployment area.

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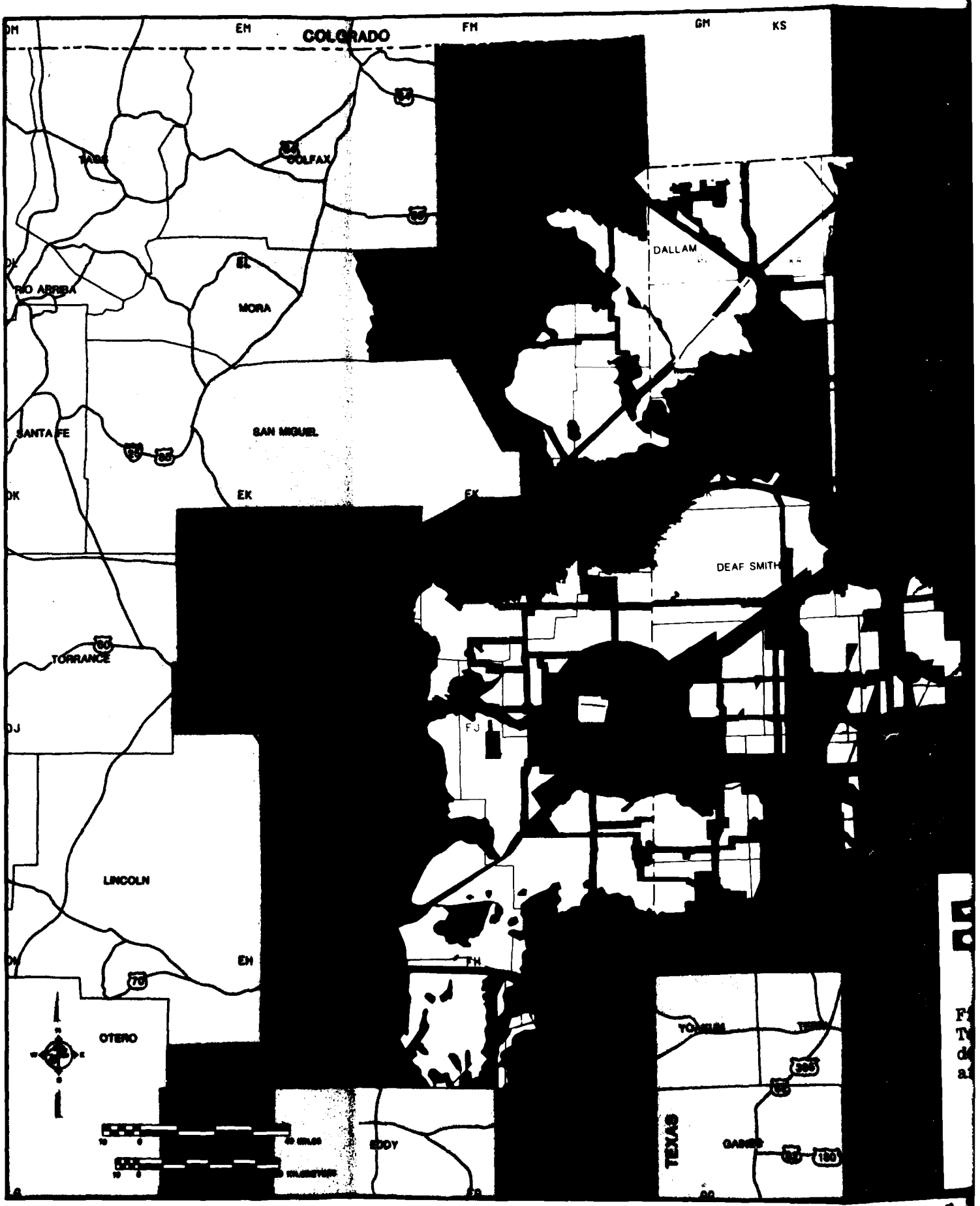
3222-D


COLORADO
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LINCOLN
OTERO
EDDY
TEXAS

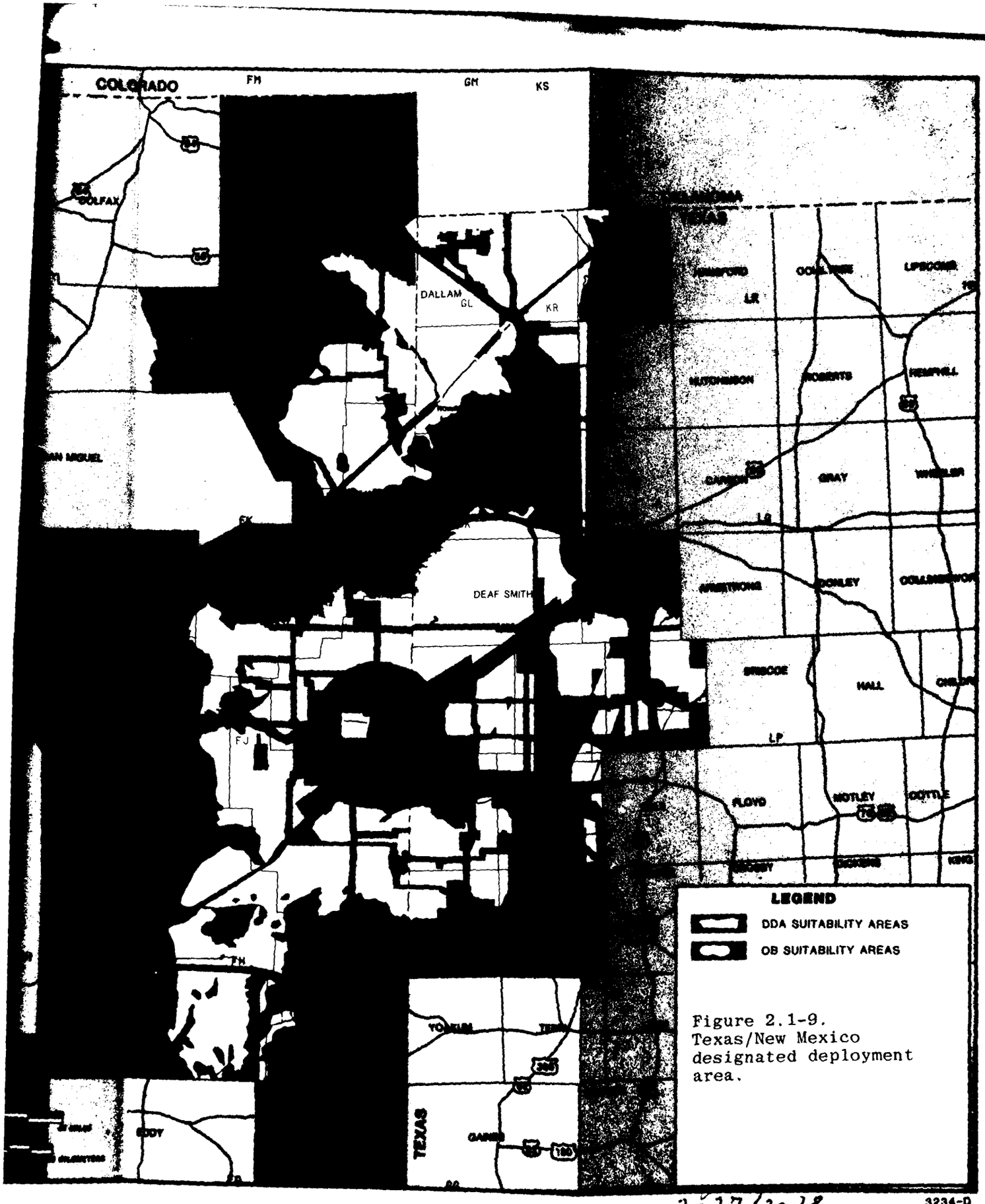

Figure 2.1-9.
Texas/New Mexico
designated deployment
area.

2-27/2-28

3234-D

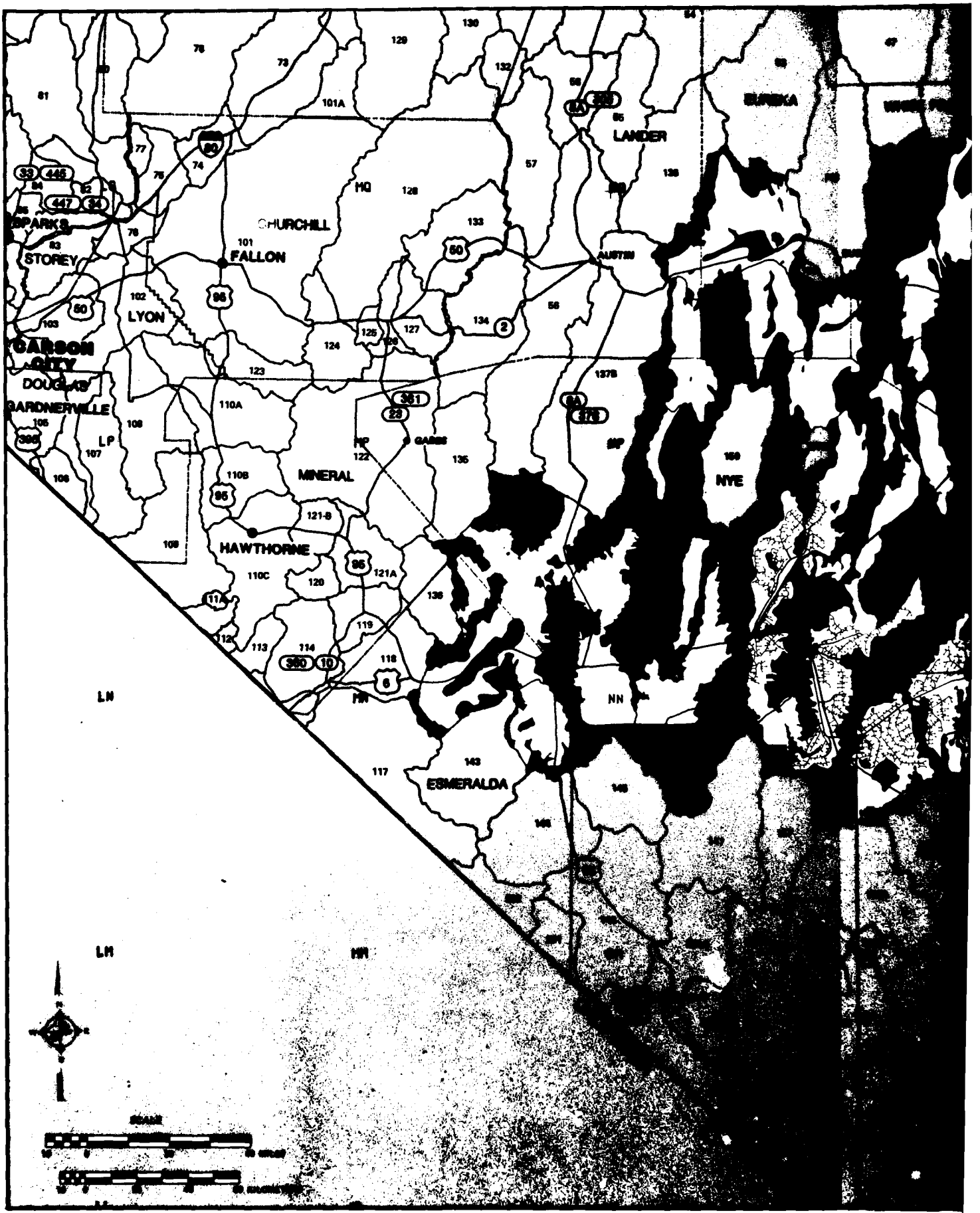
EUREKA
LANDER
CHURCHILL
FALLON
STOREY
SPARKS
LYON
CARSON CITY
DOUGLAS
GARDNERVILLE
MINERAL
HAWTHORNE
NYE
ESMERALDA
AUSTIN
LM
NN

Figure 2.1-10.
M-X system layou
Nevada/Utah depl


COLORADO
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DEAF SMITH
LINCOLN
OTERO

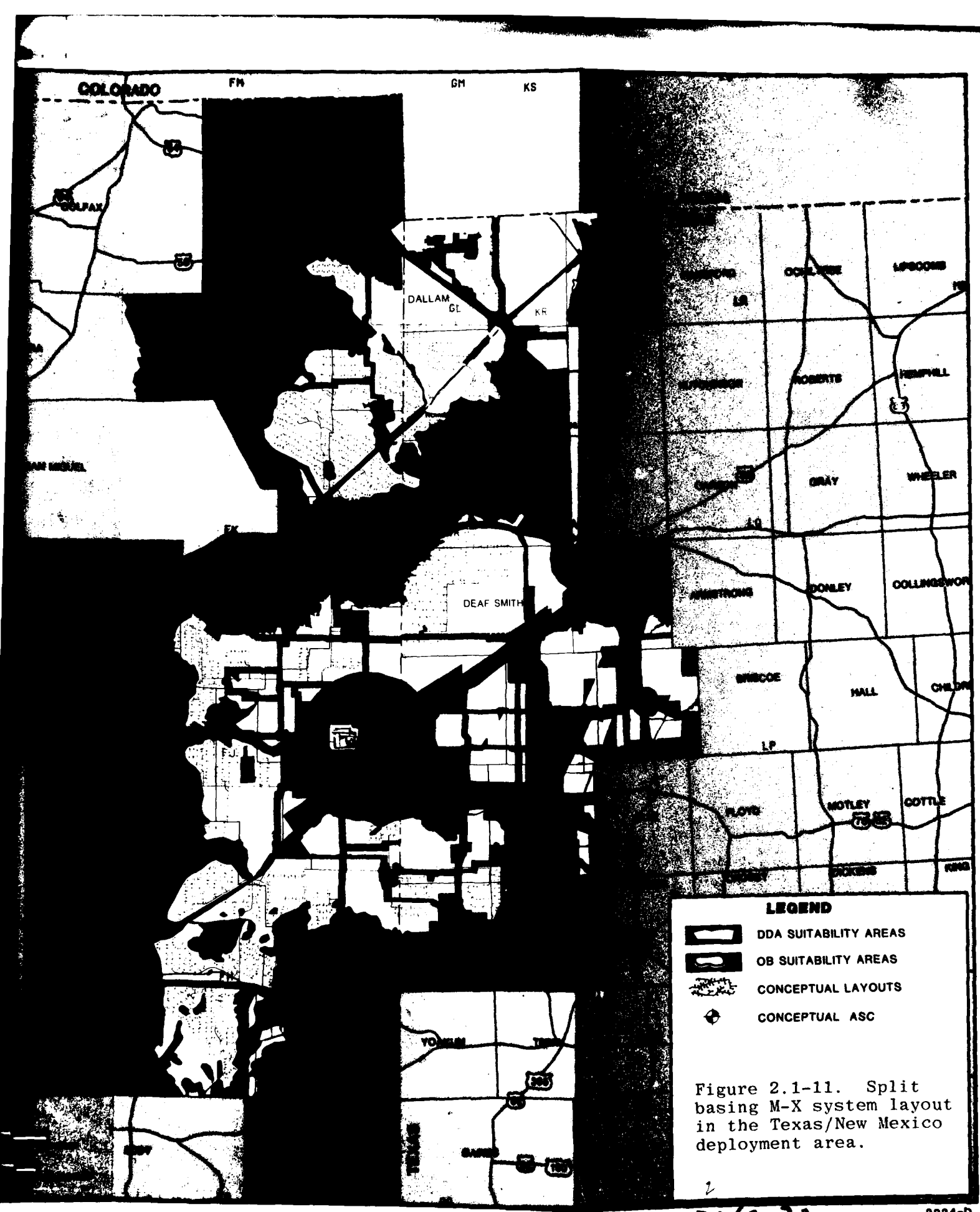


Figure 2.1-11. Split basing M-X system layout in the Texas/New Mexico deployment area.

2-31/2-32

3234-D

vicinities in the general areas which have been identified as suitable for the DDA (Figures 2.1-8 and 2.1-9). Starting with these general areas, the candidate locations for an OB were identified using a combination of operational and geotechnical criteria as well as cultural and environmental exclusions and exceptions.

Criteria (2.1.3.1)

As in the case of DDA selection, a multistage screening process was used to identify suitable OB locations. The first level of screening considered the following six general criteria:

- The OB locations had to be in the same states as the deployment areas.
- Possible use of existing military bases.
- Sufficient suitable land area available for the OB.
- Considering the verification requirements of the Strategic Arms Limitation the Operating Base/DAA should be located outside the deployment area. The area around the perimeter of the suitable deployment areas therefore received the most intensive evaluation.
- The OB requires railroad and road access.
- The OB must have convenient access to the DDA.

When these initial screening criteria were applied to the two suitable deployment regions, 27 vicinities were identified for further evaluation (Figures 2.1-12 and 2.1-13).

More detailed criteria were applied to the 27 candidate vicinities. These criteria evolved from operational considerations, desirable site characteristics as well as cultural and environmental exclusions and exceptions. The more important factors applied to the candidate OB locations under consideration are presented in Table 2.1-3.

Application of Criteria (2.1.3.2)

From this analysis, seven community vicinities were identified as being suitable for OB locations and further in-depth evaluation. These vicinity locations are:

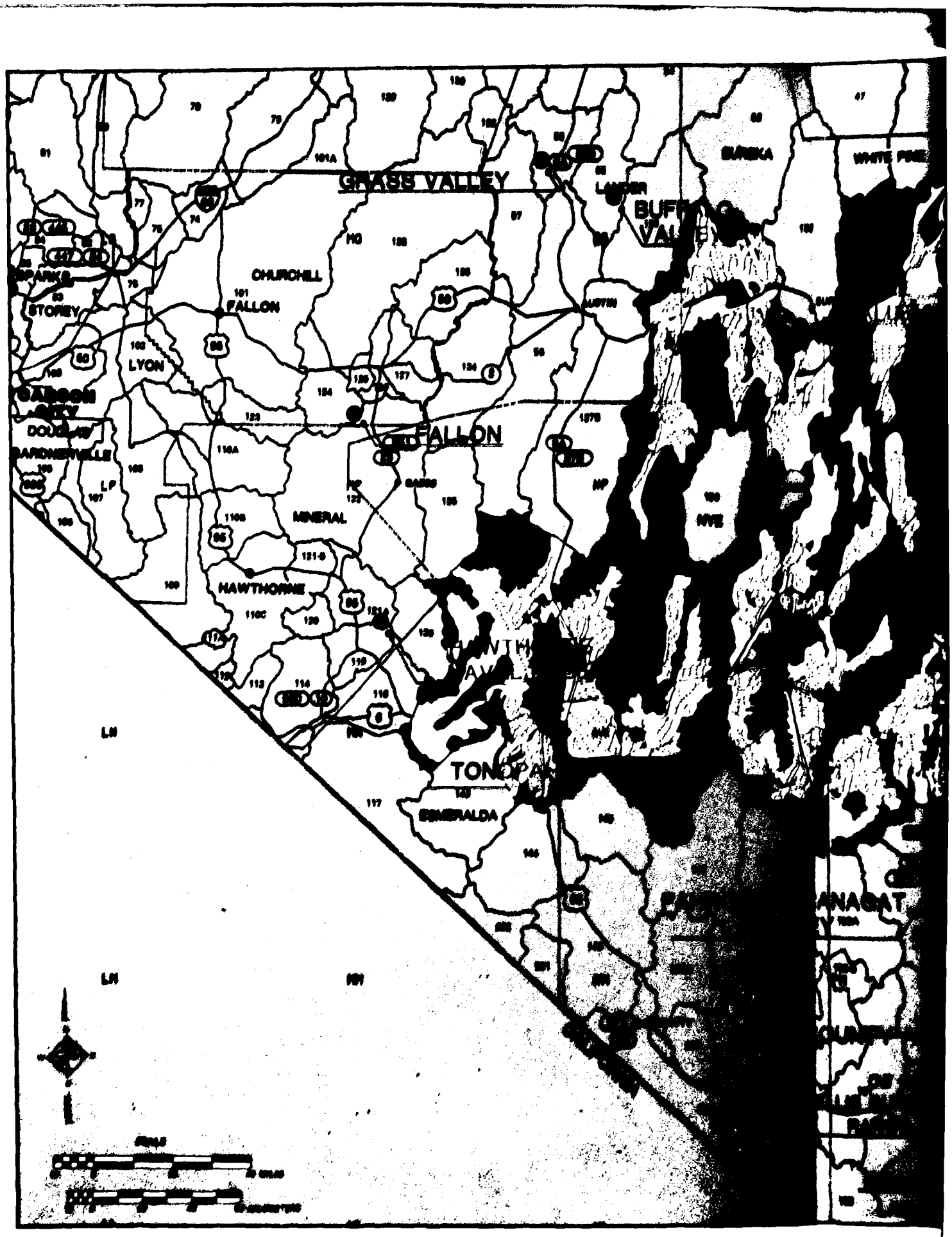
Nevada
- Coyote Spring (Clark County)*
- Ely

Utah
- Beryl*
- Delta
- Milford*

Texas
- Dalhart

New Mexico
- Cannon AFB (Clovis)*

*In the event that an OB is located at any of these vicinities, the OB location is suitable as either a first or second OB location.


GRASS VALLEY
EUREKA
WHITE PINE
CHURCHILL
FALLON
STOREY
LYON
MINERAL
HAWTHORNE
TONOPAH
ESMERALDA
NYE

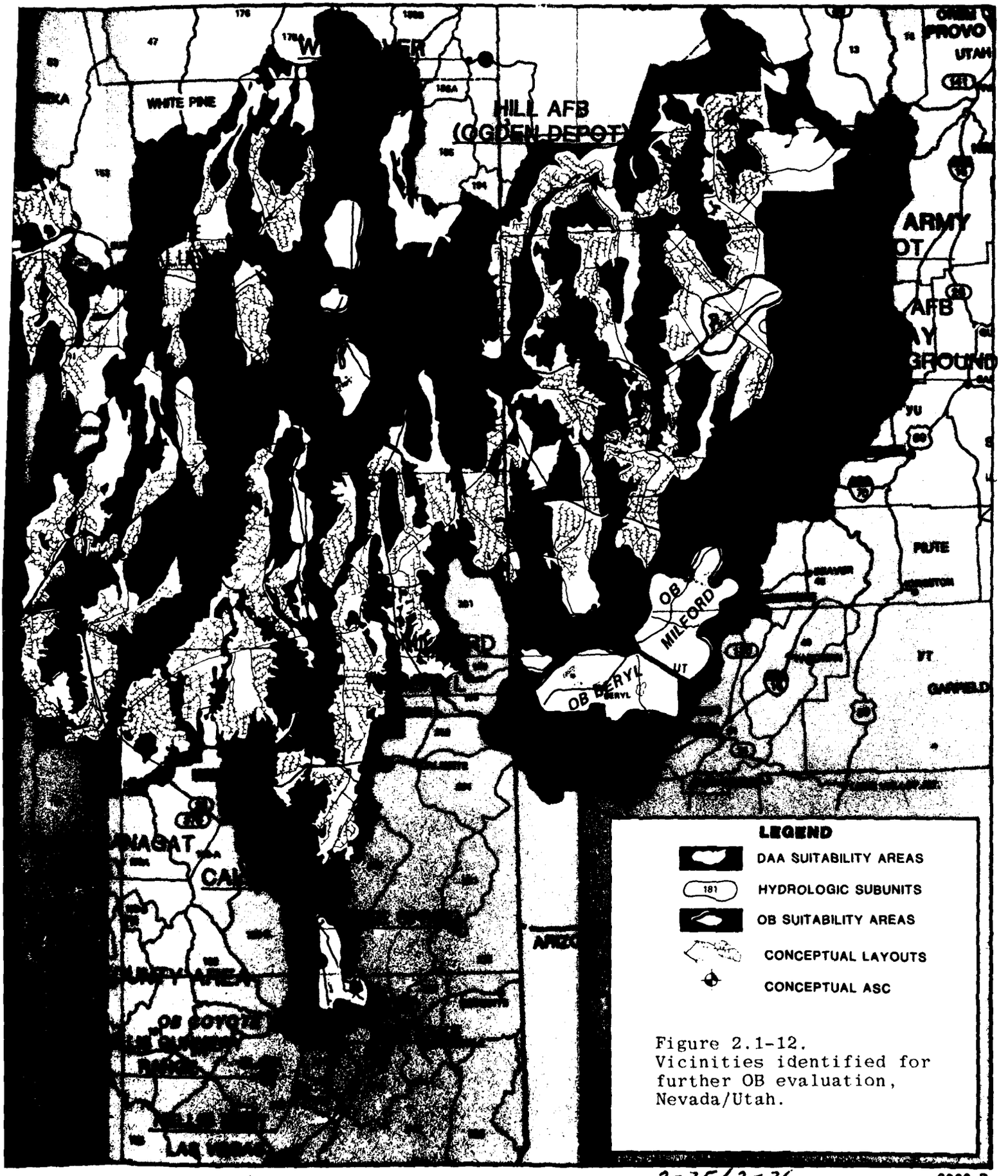
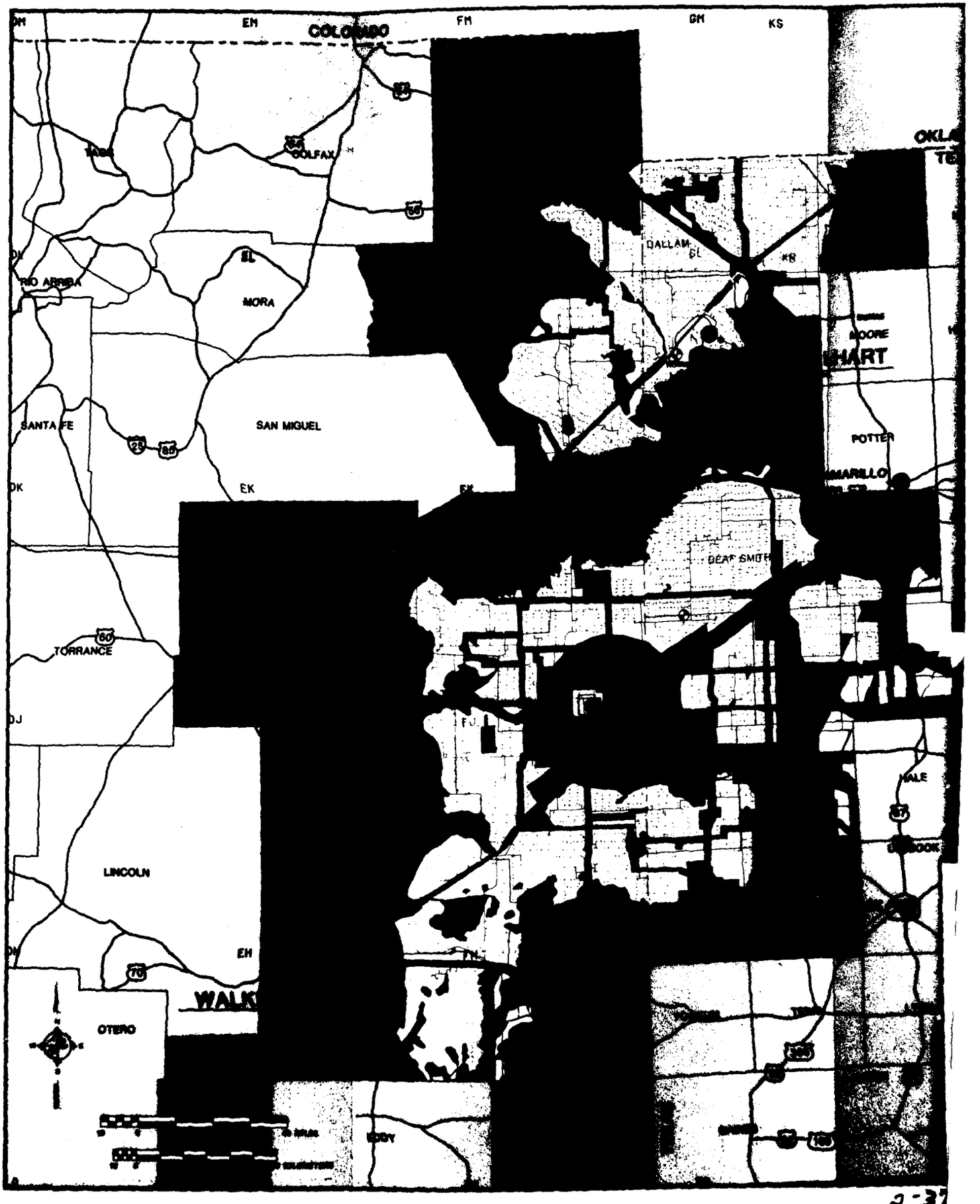


Figure 2.1-12.
Vicinities identified for further OB evaluation, Nevada/Utah.

2-35/2-36

3222-D


COLFAX
RIO ARRIBA
MORA
SAN MIGUEL
SANTA FE
TORRANCE
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WICHITA
CLAY
MOORE
POTTER
DEAF SMITH
HALE
LUBBOCK

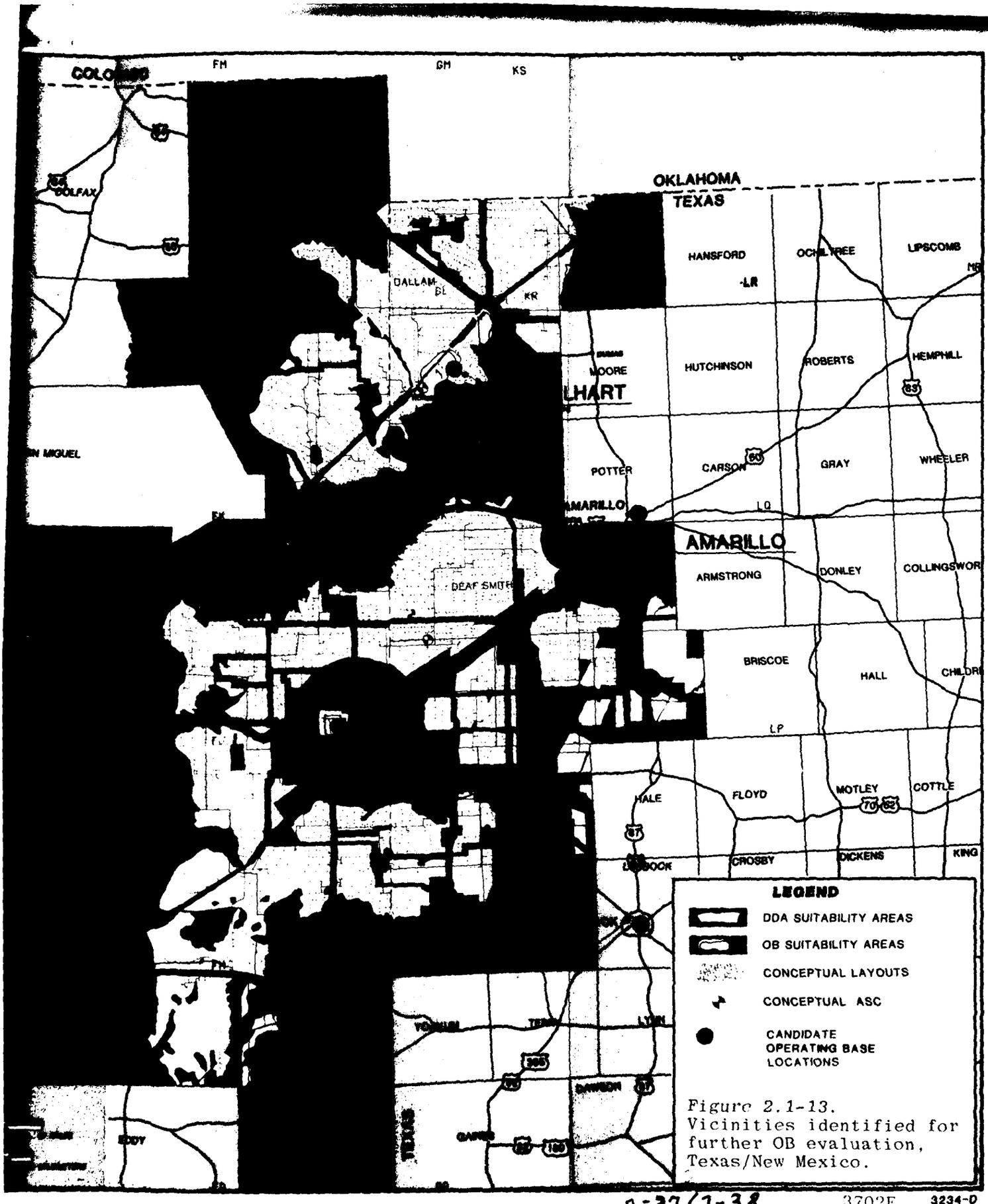


Figure 2.1-13.
Vicinities identified for further OB evaluation, Texas/New Mexico.

Table 2.1-3. Criteria for determining suitable OB locations.

CRITERION	DEFINITION
Suitable land for OB facilities	Large, relatively flat areas separated by grades of more than 10 percent for major OB facilities. Sufficient land for 12,000-foot long airfield which complies with clearance requirements. (AFM-86-8) Sufficient land for development of anticipated off-base civilian support community.
Proximity to road and railroad network	Required to move personnel and material to and from DDA. Should be accessible to Class I rail with on-off loading capacity. Should be accessible to a major highway route.
DTN Access	DTN from DAA to first cluster should not exceed 7 percent grade. Should provide reasonable access. Should consider cost and construction schedule. Should consider distance to OBTS and first cluster.
Availability of Water	Sufficent water required locally or within a reasonable distance. Should consider effect of OB water demand will have on surrounding area.
Operational Factors	Minimize travel times for operational, security, and maintenance requirements. Consider factors such as physical security, safety, electromagnetic compatibility, and AICUZ.
Strategic Arms Limitations	Desirable for OB to be outside DDA. First OB should be about 90 minutes from nearest cluster. Avoid existing large facilities.
Topographic and Geotechnical Features	Suitable soil characteristics required for construction. Active seismic fault zones, water drainage problems, etc. should be avoided. Housing areas should be located on south to southeast slopes to optimize solar design. Avoid surface water, and areas with high water table. Avoid flood plains, arroyos, and playas.
Desirable Site Characteristics	Reasonably near established economic base with varied cultural activities. Near recreational areas.
Cultural and Environmental Exclusions and Exceptions	See Table 2.1-1.

3897-2

Generally, elimination of a candidate vicinity was related to a particular critical issue or criteria which was not satisfied. The primary reasons for the elimination of 20 candidate vicinities from further consideration as OB locations are presented in Table 2.1-4.

Results (2.1.3.3)

Each of the seven vicinities determined to be suitable for an OB location were then evaluated in additional detail to designate a suitability zone at each vicinity within which an OB could be precisely located after subsequent site specific studies in Tier 2. Within each suitability zone an OB was conceptually located to demonstrate the ability to satisfy the various criteria for airfield operation, required land area, geotechnical suitability, and desirable site characteristics. However, this tentative OB location is illustrated only to demonstrate at least one potential OB location, which satisfies the OB siting criteria. Other potential OB locations exist in each suitability zone. The conceptual layout also identifies the major components of the potential OB; however, there are many potential base development patterns. Each zone avoided cultural and environmental exclusions.

Within each suitability zone there are numerous potential sites for an OB location; however, until the necessary planning, architectural, engineering and site-specific (Tier 2) environmental studies are conducted, the optimum site cannot be determined. The size, shape, and number of the suitability zones varies at each of the seven alternative OB vicinities.

The Tier 2 level of analysis will involve development of an operating base comprehensive plan (BCP) which includes input from, and coordination with, state and local planning agencies. During the development process of the BCP, a specific site for the operating base within the suitability zone will be selected. The boundary of the base and the base development pattern, including the airfield, work center, community center, housing, recreation areas, road network, etc. will also be defined. The actual OB site selection process and OB layout will be based on these further planning and environmental field studies, operational and support requirements, avoidance of known highly sensitive environmental areas, and optimum use of desirable site characteristics. While there is no location which precisely meets all of the ideal criteria of an OB location, the BCP development process will select a site within the suitability zone which optimizes the criteria and specific site characteristics.

Community development will occur offbase in response to the increase in M-X-related employment and population growth both in the short and long term. During the development process of the BCP, recommendation will be made as to where the development of a civilian support community might best be encouraged. However, if an orderly, "planned" growth for any specific community or area is to occur, state and local planning agencies will have to work closely with private developers. This EIS only identifies various locations that appear to have the potential for the development of a civilian support community. Other areas may be identified during subsequent studies.

Following is a description of the suitability zones designated for each vicinity suitable for an OB location. In each suitability zone there are features, such as water drainage systems, active seismic fault zones, sand dunes, etc., which would

Table 2.1-4. Candidate OB vicinities eliminated from further evaluation.

CANDIDATE LOCATION	PRIMARY REASONS FOR ELIMINATION
Battle Mountain, NV (Buffalo Valley)	Over 100 miles from nearest cluster, 300 miles from DDA centroid. DTN access would exceed 7 percent grade.
Caliente/Panaca/Pioche, NV	Does not satisfy airfield criteria.
Dry Lake, NV	Proposed site for Harry Allen Power Plant
Nellis Small Arms Range, NV	Unexploded and buried explosive ordnance. Proposed 5,000 acre range expansion.
Nellis East, NV	Would require elimination of existing road network and weapons storage area.
Fallon NAS, NV	Over 100 miles from nearest cluster, and 290 miles from DDA centroid. DTN access would exceed 7 percent grade. Area has high water table.
Grass Valley, NV (Winnemucca)	About 180 miles to nearest cluster and 340 miles to DDA centroid. DTN access would exceed 7 percent grade.
Hawthorne Navy Depot, NV	Over 70 miles from nearest cluster and 250 miles to DDA centroid. Fully utilized by Navy.
Pahroc/Pahranagat Valleys, NV	Does not satisfy airfield criteria. Pahroc Valley included in DDA.
Pine Valley, NV	Does not satisfy airfield criteria.
Tonopah, NV	About 70 miles from nearest railroad network. Water supply insufficient. Water in three closest hydrologic subunits also insufficient. Considerable water resource competition from existing and proposed mining activity.
Dugway Proving Ground, UT	Present facilities moderate. Required area for expansion is contaminated.
Hill AFB, UT (Ogden Depot)	Over 180 miles from nearest cluster and about 380 miles from DDA centroid. DTN would be routed through existing communities and conflict with existing roads and railroad network.
Tooele Army Depot, UT	About 300 miles from DDA centroid. Present facilities inadequate. Required area for expansion used for explosive and chemical storage.
Wendover Bombing Range, UT	Over 150 miles from nearest cluster and about 240 miles from DDA centroid.
Amarillo AFB, TX	Base has been sold and is being used commercially.
Reese AFB, TX (Lubbock)	About 130 miles from DDA centroid. Fully utilized as USAF pilot training base.
Webb AFB, TX (Big Springs)	Base has been sold and is being used commercially.
Tucumcari, NM	Use of Cannon AFB facilities more cost effective. Cannon AFB is more centrally located for either first or second OB. High water table.
Walker AFB, NM (Roswell)	Base has been sold and is being used commercially.

3898-3

likely be avoided in response to planning, architectural, engineering, and economic considerations.

Coyote Spring, Nevada

Figures 2.1-14 and 2.1-15 illustrate the suitability zone for either a first or second OB located in the vicinity of Coyote Spring Valley, Nevada. A conceptual location of an OB within the suitability zone is identified and the criteria which determined the shape, or boundary, of the suitability zone are annotated along its perimeter. There are other features within the suitability zone which will influence the specific site selection process during development of the BCP. For instance, this suitability zone includes water drainage systems which will likely be avoided in response to specific engineering and economic considerations; however, there are several areas within the suitability zone where an OB might be located. A conceptual layout of the OB with the major components of the OB/DAA identified is also illustrated and areas of potential development for offbase civilian support communities identified. There is the potential conflict at Coyote Spring between portions of the Wilderness Study Area west of Highway 93 and the potential land area requirements for the Operating Base.

The IPP transmission corridor traverses the proposed Coyote Springs OB sensitivity zone. This approved corridor represents a potential constraint in siting facilities, especially the runway, and a possible conflict between the Proposed Action and the objectives of other federal agencies. Base comprehensive planning will incorporate existing and proposed conflicts into the detailing of facilities' locations.

Ely, Nevada

Figures 2.1-16 and 2.1-17 illustrate three suitability zones for a second operating base located in the vicinity of Ely, Nevada; one to the south of Ely, one considering the potential expansion of and co-utilization of Yelland Airfield facilities, and one just north of McGill. The criteria which determined the boundary of each zone are annotated along their perimeters. The conceptual OB location is illustrated in the suitability zone to the south of Ely; however, there are several areas in each zone where an OB could be located. A conceptual layout of the OB with the major components of the OB identified is also illustrated and areas of potential development for offbase civilian support communities identified.

Beryl, Utah

Figures 2.1-18 and 2.1-19 illustrate the suitability zone for either a first or second OB located in the vicinity of Beryl, Utah. A conceptual location of an OB within the suitability zone is identified and the criteria which determined the boundary of the suitability zone are annotated along its perimeter. A conceptual layout of the OB with the major components of the OB/DAA identified is also illustrated and areas of potential development for offbase civilian support communities identified.

Delta, Utah

Figures 2.1-20 and 2.1-21 illustrate the suitability zone for a second OB located in the vicinity of Delta, Utah. A conceptual location of an OB within the

Figure 2.1-14. Operating base location at Coyote Spring, Nevada.

suitability zone is identified and the criteria that determined the boundary of the suitability zone are annotated along its perimeter. A conceptual layout of the OB with the major components is illustrated, and areas of potential development of an offbase civilian support community are identified.

Milford, Utah

Figures 2.1-22 and 2.1-23 illustrate the suitability zone for either a first or second OB located in the vicinity of Milford, Utah, with a conceptual location of the OB within the suitability zone, and annotate the criteria which determined the boundary along its perimeter. A conceptual layout of the OB with the major components of the OB identified is also illustrated as are areas of potential development for an offbase civilian support community.

Dalhart, Texas

Figures 2.1-24 and 2.1-25 illustrate two suitability zones for a second OB in the vicinity of Dalhart, Texas, a conceptual location of an OB within one zone, and annotate the criteria which determined the boundaries along their perimeters. The potential expansion and co-utilization of airfield facilities at the municipal airport resulted in identification of the second zone. A conceptual layout of the OB with the major components identified is also illustrated and areas of potential development for an offbase civilian support community identified.

Clovis, New Mexico

Figures 2.1-26 and 2.1-27 illustrate the suitability zone for either a first or second OB located in the vicinity of Clovis, New Mexico, a conceptual expansion of Cannon AFB, and annotate the criteria that determined the boundary along its perimeter. In any potential OB location for this vicinity, the existing Cannon AFB airfield facilities will be used, and the potential expansion of existing work centers, community center, housing areas, etc. would influence the specific site development process during development of the BCP. Additionally, existing accident potential zones and high aircraft noise areas would be avoided. A conceptual layout of the OB with the major components of the expansion of Cannon AFB is illustrated with areas of potential development for offbase civilian support communities identified.

Figure 2.1-15. Coyote Spring OB suitability zone superimposed over LANDSAT color infrared image.

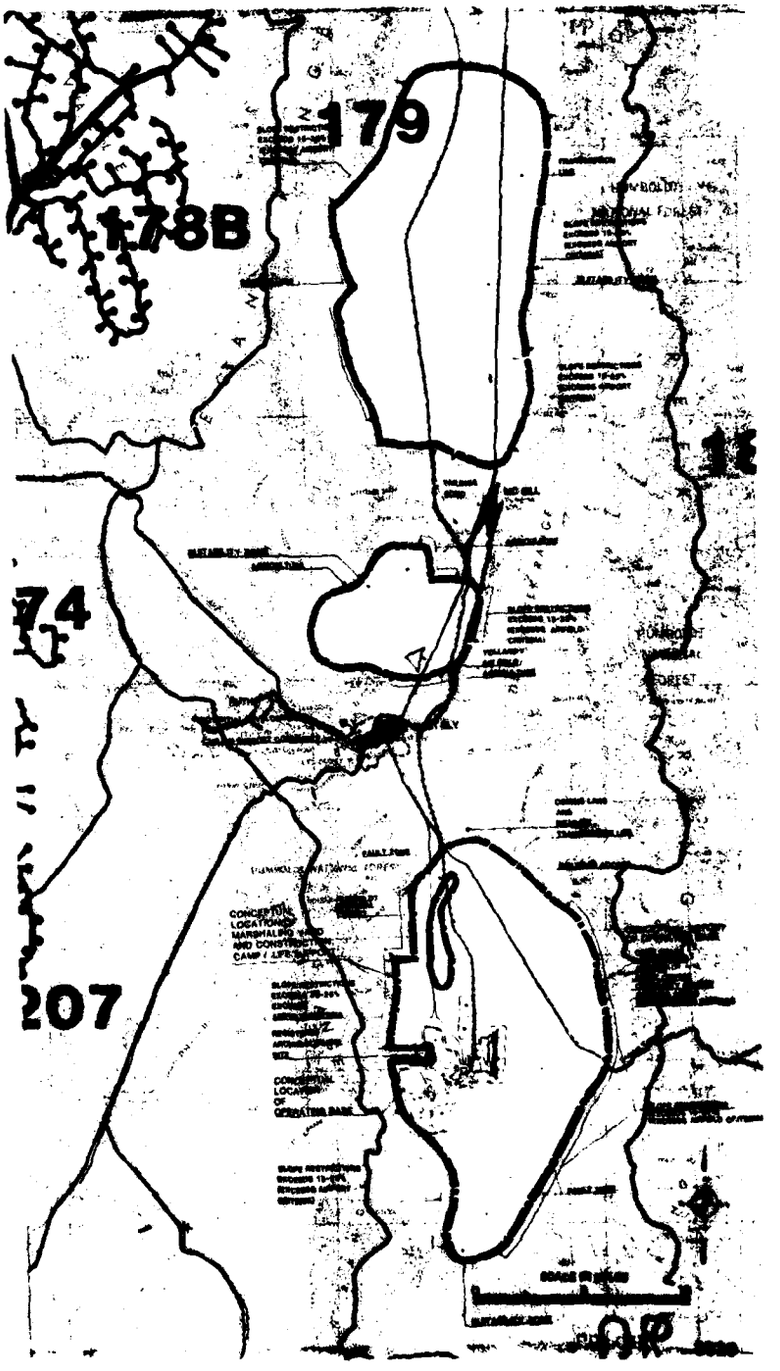


Figure 2.1-16. Operating base location at Ely, Nevada.

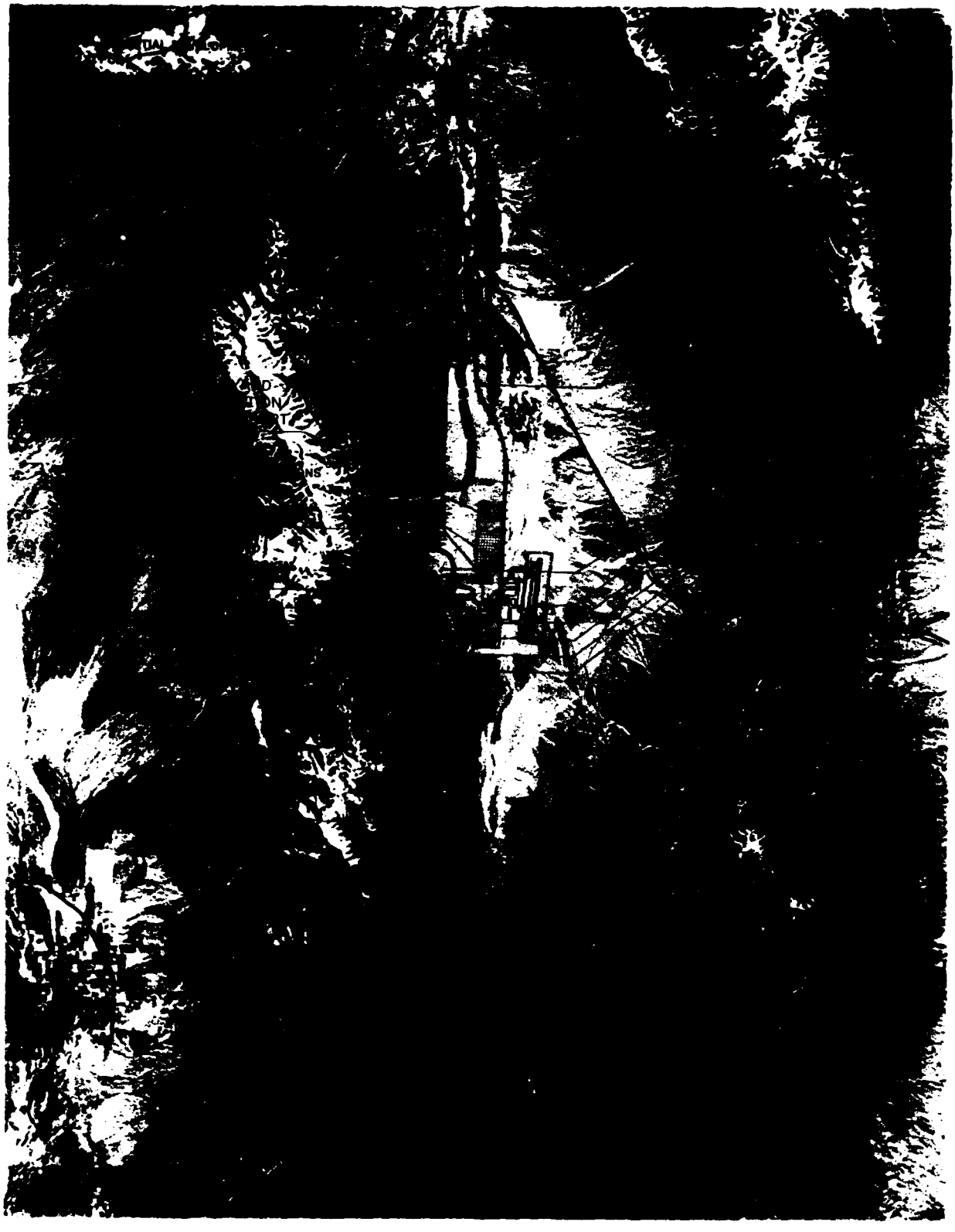


Figure 2.1-17A. Ely OB suitability zone superimposed over LANDSAT color infrared image.

Figure 2.1-17B. Ely OB suitability zone superimposed over LANDSAT color infrared image.

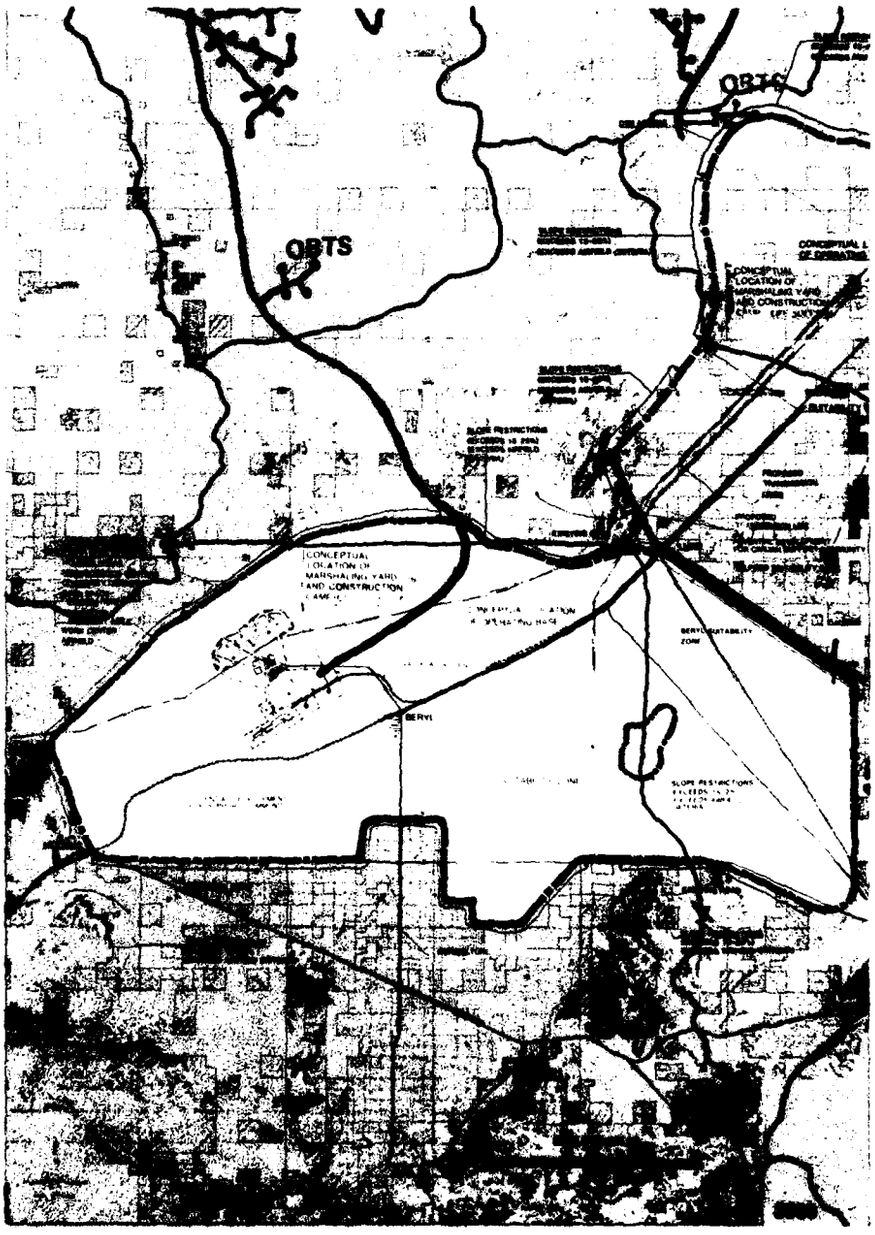


Figure 2.1-18. Operating base location at Beryl, Utah.

Figure 2.1-19. Beryl OB suitability zone superimposed over LANDSAT color infrared image.

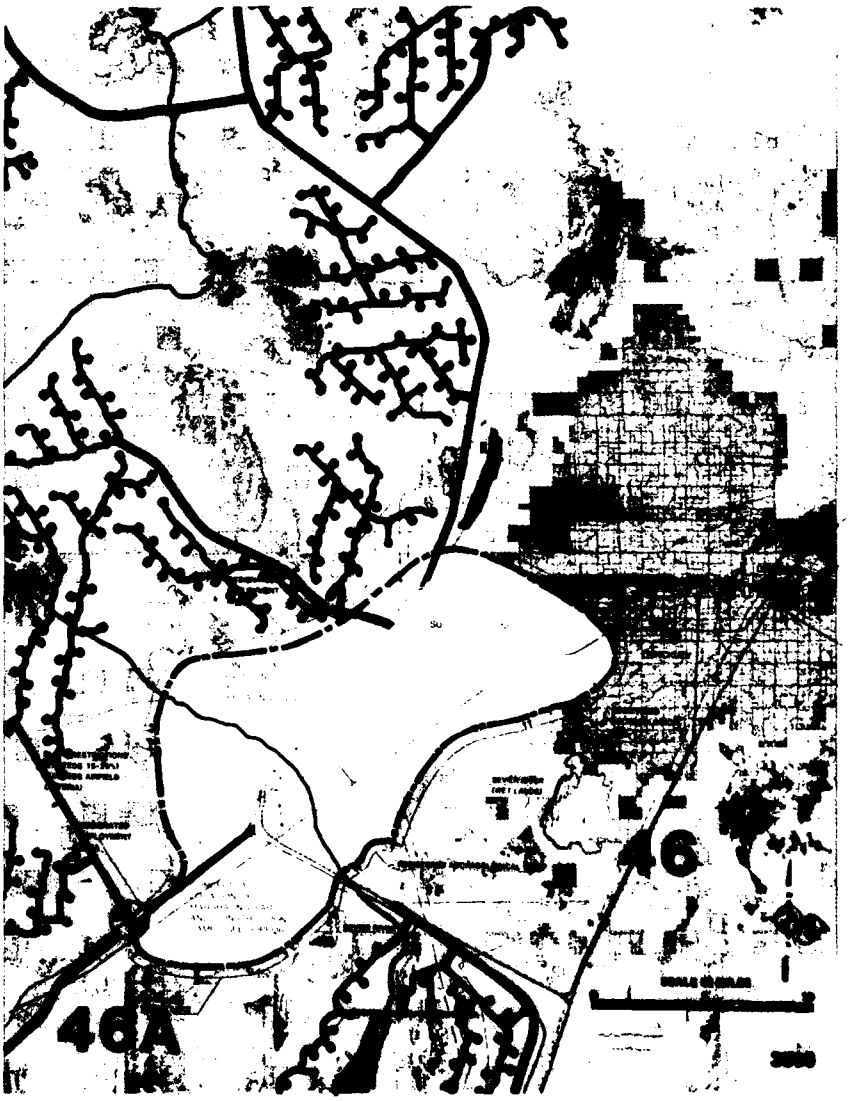


Figure 2.1-20. Operating base location at Delta, Utah.

Figure 2.1-21. Delta OB suitability zone superimposed over LANDSAT color infrared image.

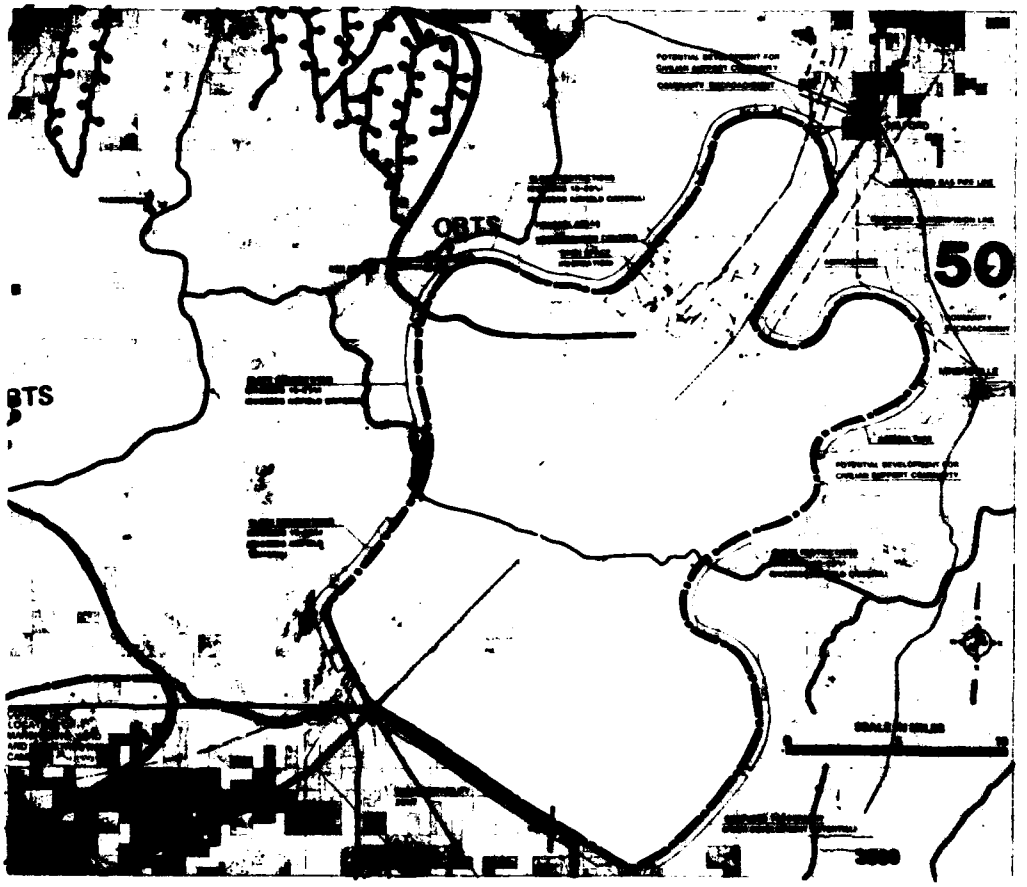


Figure 2.1-22. Operating base location at Milford, Utah.

Figure 2.1-23. Milford OB suitability zone superimposed over LANDSAT color infrared image.

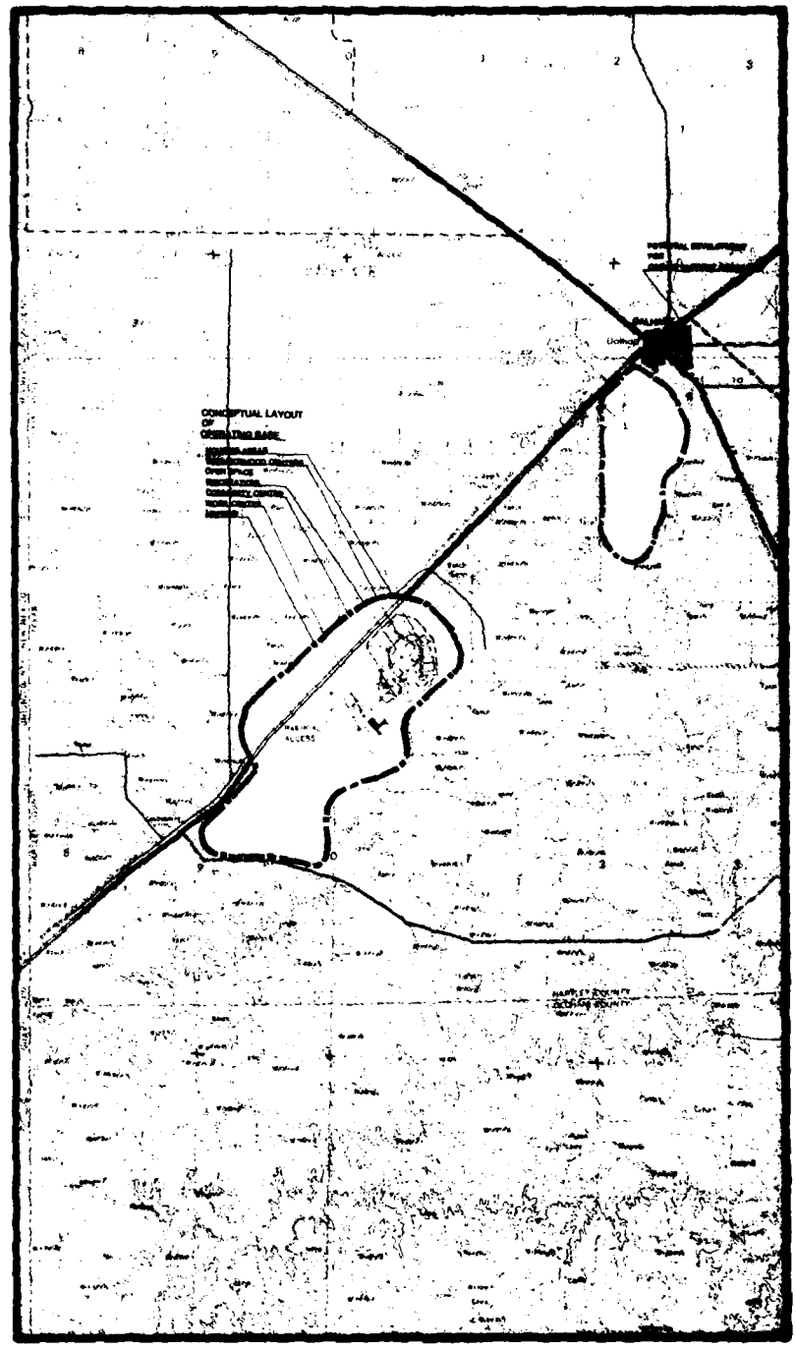


FIgure 2.1-24. Operating base in the vicinity of Dalhart, Texas.

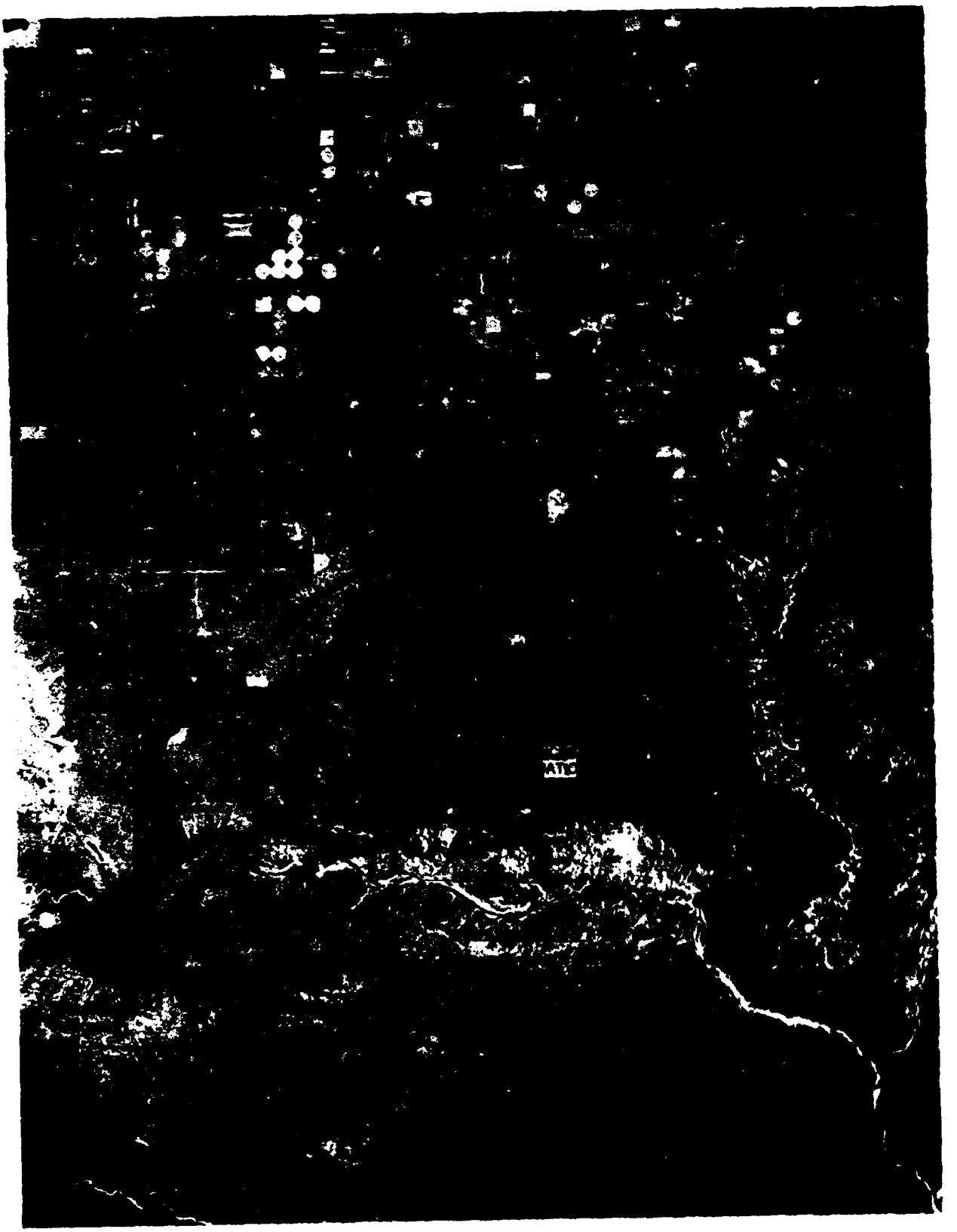


Figure 2.1-25. Dalhart OB suitability zone superimposed over LANDSAT color infrared image.

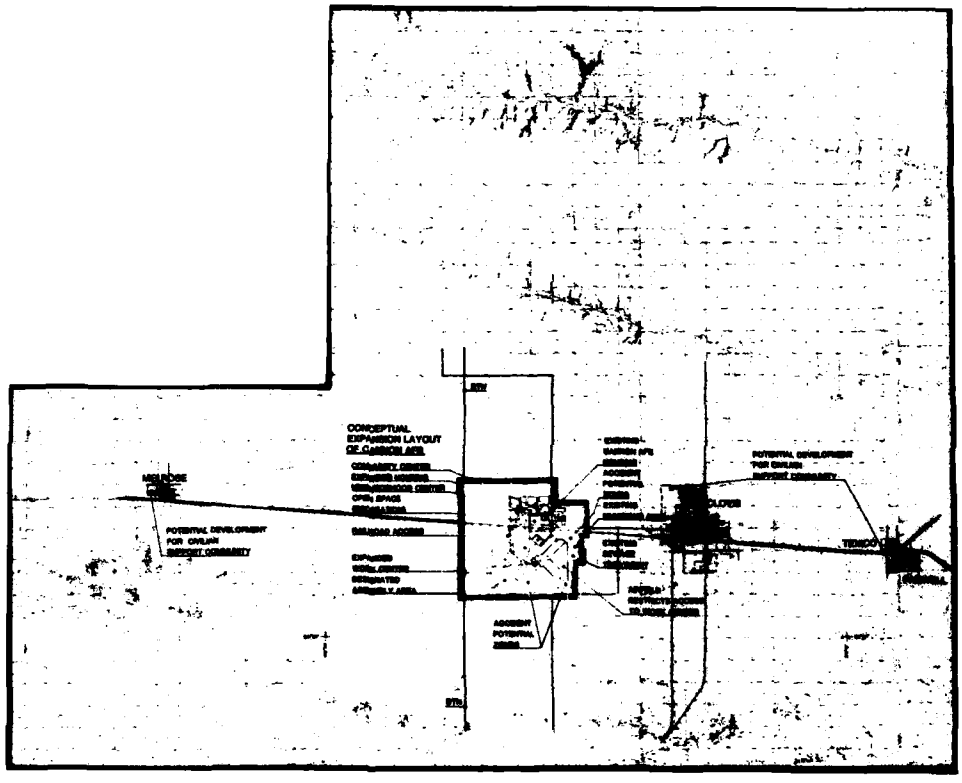


FIgure 2.1-26. Operating base in the vicinity of Clovis, New Mexico.

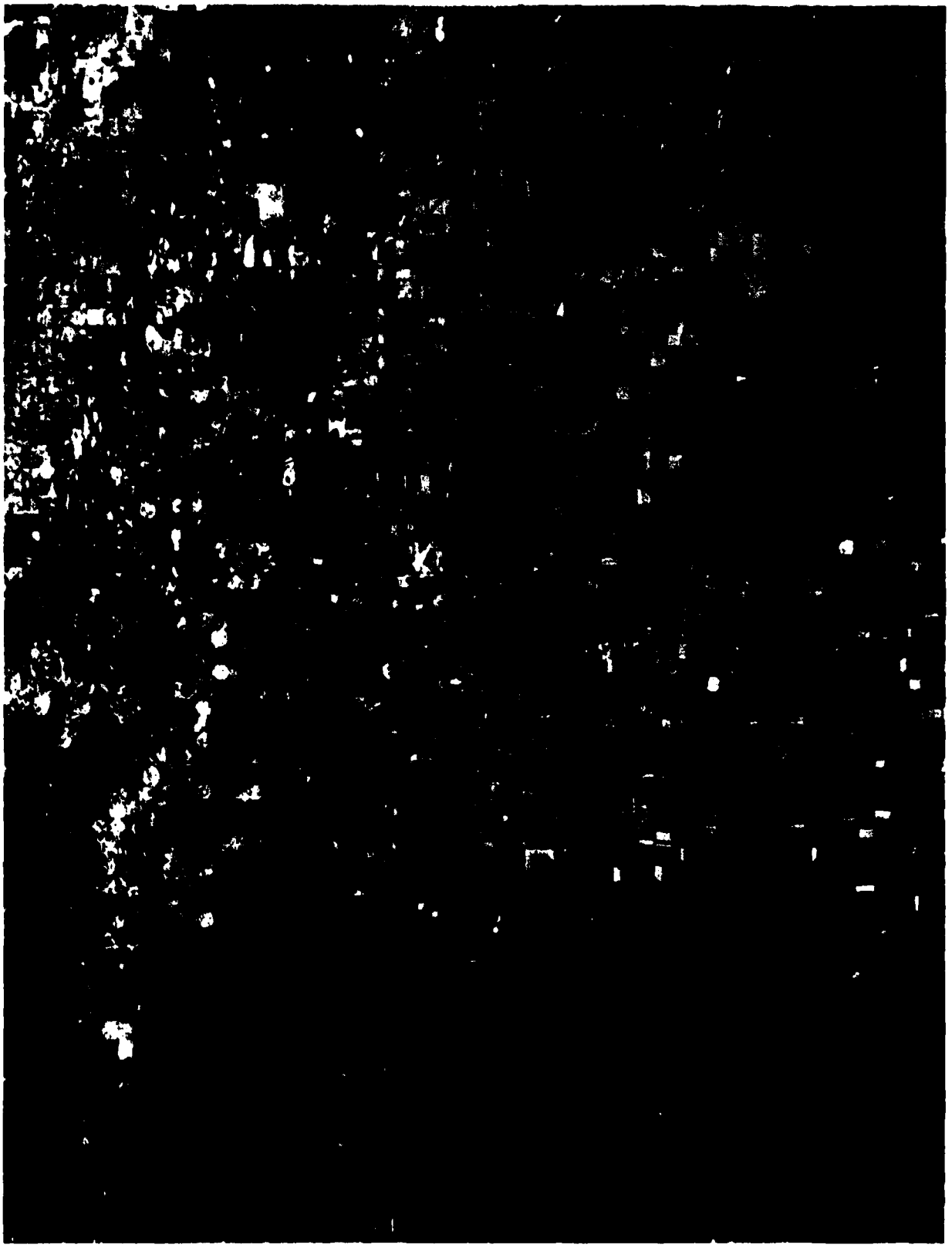
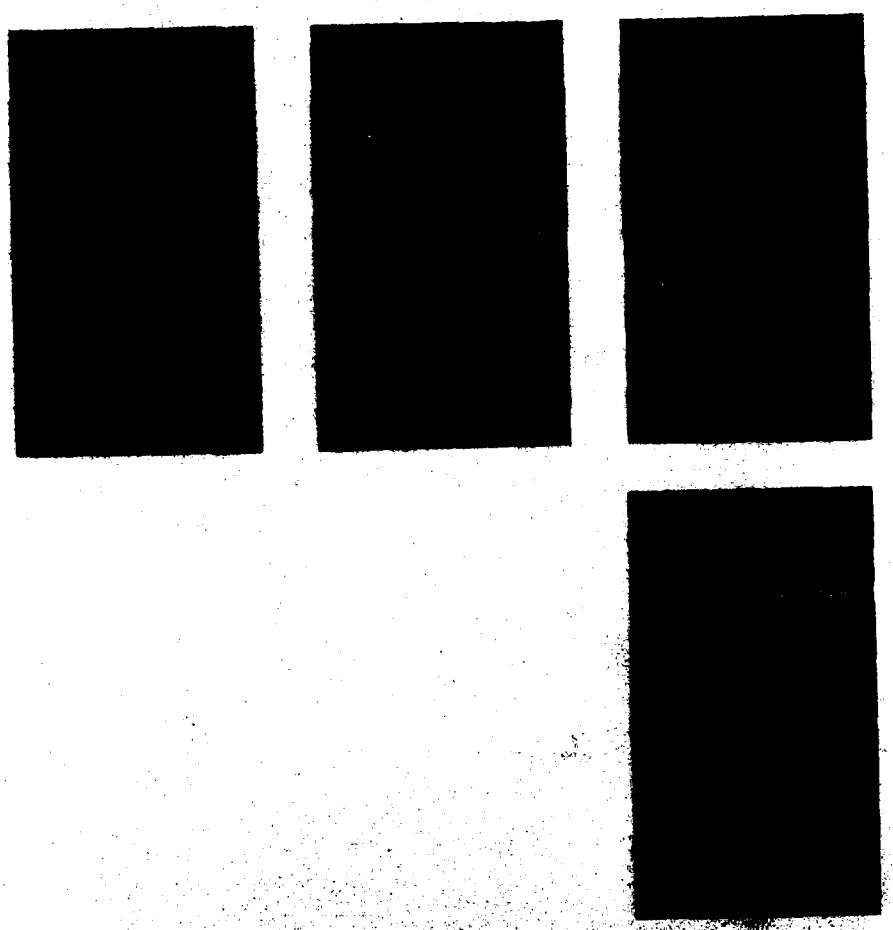


Figure 2.1-27. Clovis OB suitability zone superimposed over LANDSAT color infrared image.

Description of Proposed Action and Alternatives



DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

This section describes the Proposed Action, eight deployment alternatives, and a no action alternative. The Proposed Action calls for full deployment basing (200 missiles) in Nevada/Utah with the first operating base (OB) complex near Coyote Spring Valley, Nevada and the second OB complex near Milford, Utah. Alternatives 1 through 6 are similar to the Proposed Action using the same DDA layout, but different combinations of first/second OB complexes. Alternative 7, full deployment basing in Texas/New Mexico, has first and second OB complexes near Clovis, New Mexico and Dalhart, Texas, respectively. Alternative 8 splits the system with 100 missiles in Nevada/Utah with the first OB complex near Coyote Spring Valley, Nevada; and 100 missiles in Texas/New Mexico with the second OB complex near Clovis, New Mexico. Numbers were assigned to alternatives for reference only and no ranking of alternatives is suggested by the reference number.

Full basing in Texas/New Mexico is projected to require siting of facilities within nearly all of the areas which have been defined as geotechnically suitable. Full basing in Nevada/Utah requires from one-half to two-thirds of the geotechnically suitable areas within the two states. Therefore, greater flexibility exists for selection of a system deployment area in Nevada/Utah. Split basing would provide even greater flexibility since only one-half the system would be sited in each of the two-state regions.

Table 2.2-1 lists the Proposed Action, the alternatives, and the location of the OB complexes. Table 2.2-2 shows the distribution of protective shelters by state and county for the Proposed Action and the eight deployment alternatives. The overall land requirements include lands for operational use, both fenced and nonfenced, and those required on a temporary basis during the construction period. These land requirements are shown in Table 2.2-3. For full basing deployment, the total fenced area is approximately 25 square nautical mi (nm^2). For the split basing alternative, the total fenced area is slightly more than 28 nm^2. In split basing, a designated assembly area (DAA) is colocated with each base. In the full basing alternatives, a single DAA is required.

The road system associated with each alternative includes the designated transportation network (DTN), cluster roads, and support roads. The roads will be open to the public.

Table 2.2-1. OB complex locations and components for Proposed Action and alternatives.

PROPOSED ACTION AND ALTERNATIVES	DEPLOYMENT AREAS[1]				OPERATING BASE VICINITIES	
	NEVADA	UTAH	TEXAS	NEW MEXICO	FIRST	SECOND
Proposed Action						
Nevada/Utah, Full Deployment	← 200 →		0	0	Coyote Spring Valley, NV	Milford, UT
Full Deployment Alternatives						
1. Nevada/Utah	← 200 →		0	0	Coyote Spring Valley, NV	Beryl, UT
2. Nevada/Utah	← 200 →		0	0	Coyote Spring Valley, NV	Delta, UT
3. Nevada/Utah	← 200 →		0	0	Beryl, UT	Ely, NV
4. Nevada/Utah	← 200 →		0	0	Beryl, UT	Coyote Spring Valley, NV
5. Nevada/Utah	← 200 →		0	0	Milford, UT	Ely, NV
6. Nevada/Utah	← 200 →		0	0	Milford, UT	Coyote Spring Valley, NV
7. Texas/New Mexico	0	0	← 200 →		Clovis, NM	Dalhart, TX
Split Basing Alternative						
8. Nevada/Utah-Texas/New Mexico	← 100 →		← 100 →		Coyote Spring Valley, NV	Clovis, NM
No Action Alternative	NA			NA	NA	NA

3623-3

[1]The numbers represent missiles deployed (approximate for split basing).

Table 2.2-2. Distribution of protective shelters by state and county for Proposed Action (PA) and alternatives.

STATE/COUNTY	ALTERNATIVE		
	PA, 1-6	7	8
Nevada			
Esmeralda	138	—	—
Eureka	323	—	—
Lander	84	—	—
Lincoln	953	—	920
Nye	1,324	—	629
White Pine	437	—	36
Subtotal	3,259	—	1,585
Utah			
Beaver	189	—	188
Juab	314	—	17
Millard	754	—	510
Tooele	84	—	—
Subtotal	1,341	—	715
Region Total	4,600	—	2,300
Texas			
Bailey	—	126	14
Castro	—	137	—
Cochran	—	61	51
Dallam	—	690	190
Deaf Smith	—	574	242
Hartley	—	354	250
Hockley	—	16	14
Lamb	—	42	9
Oldham	—	74	41
Parmer	—	246	1
Randall	—	55	—
Sherman	—	39	—
Swisher	—	26	—
Subtotal	—	2,440	812
New Mexico			
Chaves	—	481	474
Curry	—	196	43
De Baca	—	137	115
Guadalupe	—	6	6
Harding	—	215	202
Lea	—	16	17
Quay	—	342	312
Roosevelt	—	542	164
Union	—	225	155
Subtotal	—	2,160	1,488
Region Total	—	4,600	2,300
TOTAL	4,600	4,600	4,600

2604- 5

Table 2.2-3. M-X system facilities land requirements (acres).

DESCRIPTION	NUMBER	CONSTRUCTION	OPERATIONS	
			FENCED[1]	TOTAL
Operating Base Complexes				
First OB	1	6,140	3,740	6,140
Second OB	1[2]	4,240-6,140	2,740-3,740	4,240-6,140
OBTS	1	250	30	90
DAA	1-2[2]	1,950-3,900	1,950-3,900	1,950-3,900
Subtotal		12,580-16,430	8,460-11,410	12,420-16,270
DDA Facilities				
Shelters	4,600	34,500	11,500	11,500
DTN	1,260-1,460[3]	15,300-17,700	na[4]	11,500-13,300
Cluster Road	5,900-6,200[3]	72,000-75,200	na	54,000-56,400
Support Road	1,320[3]	8,100	na	8,100
CMF	200	1,040	800	800
Antenna	4,600	850	na	850
ASC	3-4	165-220	60-80	165-220
RSS	200	70	50	50
Construction Camps	15-18	375-450	na	na
Concrete Plants	100-200	500-1,000	na	na
Material Source Points	15-18	150-180	na	na
Water Wells	150-310	150-310	na	na
Marshalling Yards	3-5	1,950-3,250	na	na
Construction Roads	250-350[3]	3,000-4,200	na	na
Subtotal		138,150-147,070	12,410-12,430	86,965-91,220
Total		150,700-163,500	20,900-23,900	99,400-107,500

3666-4

[1]20,900 acres = 24.7 sq.nm. (Proposed Action and Alternatives 1 through 7).

[2]High end of range reflects split basing (Alternative 8).

[3]Statute Miles

[4]Not applicable = na.

This section also identifies resources required for the construction and operation of M-X for each alternative. The magnitude, location, and schedule of construction resources have been estimated for each alternative by the following procedure:

- Resources have been identified and their magnitude determined by analysis of a conventional cast-in-place concrete construction technique for protective shelters.
- A conceptual construction plan has been prepared for each alternative system layout to locate construction camps, temporary personnel and facilities, and to estimate the timing of construction. The construction plan incorporated into this environmental analysis is for planning information only. Additional studies are underway which will be combined with this EIS to determine the most cost effective sequence.
- Scenarios have been developed using representative OB complex locations for each alternative to define system effects.

For this environmental analysis, each alternative was divided into construction groups in the DDA, with each group containing a concrete plant and a construction camp. The DDA camp would be a headquarters for a group construction activity and would include material yards and temporary housing and other life support facilities for construction personnel. The major activities within a DDA group are protective shelter and road construction. Each construction group size varies in the representative system layouts used for analysis. Each OB complex has a construction camp, which contains a concrete plant, marshalling and material yards. Life support facilities may also be required at each OB site.

PROPOSED ACTION (2.2.1)

Description (2.2.1.1)

The Proposed Action calls for full basing deployment in the southern and east-central parts of the Nevada/Utah siting region, with the first OB complex located near Coyote Spring Valley, Nevada, and a second OB complex near Milford, Utah (Figure 2.1-6).

The system ranges east-west from Tonopah, Nevada, to Delta, Utah; and north-south from approximately Eureka to Caliente, Nevada. Other communities in the general vicinity of the DDA include Austin, Ely, Pioche, and Panaca, Nevada; and Hinckley and Milford, Utah.

Major highways in the area include Federal Aid Primary Routes U.S. 50, 6, and 93. State highways include 8A, 25, and 38 in Nevada; and 121 and 257 in Utah. Although not in the immediate area, Interstate 80 from Reno, Nevada to Salt Lake City, Utah; and Interstate 15 from Las Vegas, Nevada to Salt Lake City provide important means of access to the region.

Roughly paralleling the above Interstate routes are the Union Pacific Railroad east-west mainline to San Francisco, California; and another line from Salt Lake City, Utah to Las Vegas, Nevada and Los Angeles, California. Also, a spur line runs south from the east-west mainline to Ely, Nevada.

For the Proposed Action, the DTN begins at the first OB complex near Coyote Spring Valley, Nevada and proceeds north to Dry Lake Valley, where it splits to the east and west. The eastern branch continues through Nevada to Utah, where it terminates in Sevier Desert Valley, north of Delta. The western branch continues to Railroad Valley, where it splits again; one portion continuing west to Big Smoky Valley and the other going north to Newark Valley, both in Nevada. This northern portion separates in Newark Valley with one branch proceeding west and terminating in Monitor Valley and the second branch going east and ending in Butte Valley. The total length of DTN is approximately 1,460 mi. About 6,200 mi of cluster roads are needed.

Construction Scenario (2.2.1.2)

The construction plan used in the analysis of the full basing system deployed in Nevada/Utah (Proposed Action) is shown in Figure 2.2-1. Six to ten concrete plants would be moved to a total of 20 different locations. Colocated with these plants would be construction camps, marshalling yards/staging areas, and life support facilities. The exact locations for these plants/camps will be determined based primarily on the following criteria: water availability, aggregate availability, and minimum haul distances.

OB Complex Construction

A construction camp will be established at each of the two OB complexes. The major construction item originating from these two camps is building construction, such as concrete and concrete block structures, metal structures, and wood frame structures.

When the scheduling for the OB complexes was established, it was intended that construction would begin at the first OB complex in 1982 and would be complete by 1986. Construction of the second OB complex would begin in 1985 and end in 1989. There are studies in progress which may change this preliminary scheduling.

For the Proposed Action the first OB complex is near Coyote Spring Valley, Nevada. Most of the construction in the first year will be concentrated in the DAA, OBTS, and at the airfield. A portion of the DTN connecting the DAA to the DDA will also be constructed from the camp in the OB complex. Construction in the OBTS and at the airfield should be completed by 1984, with the rest of the construction years devoted to the remainder of the DAA and the OB. All technical facilities at the first OB complex must be complete by the end of 1985 to meet IOC (initial operating capability) in 1986.

The second OB complex for the Proposed Action is near Milford, Utah. Since this complex does not have to be operational for IOC, construction will not be as accelerated as the first OB. All construction activity will be at the OB and airfield, since there is no DAA or OBTS associated with the second OB complex.

DDA Construction

The key construction items originating from the DDA plants/camps are DTN roads, cluster roads, and protective shelters. The range of DTN road mileage

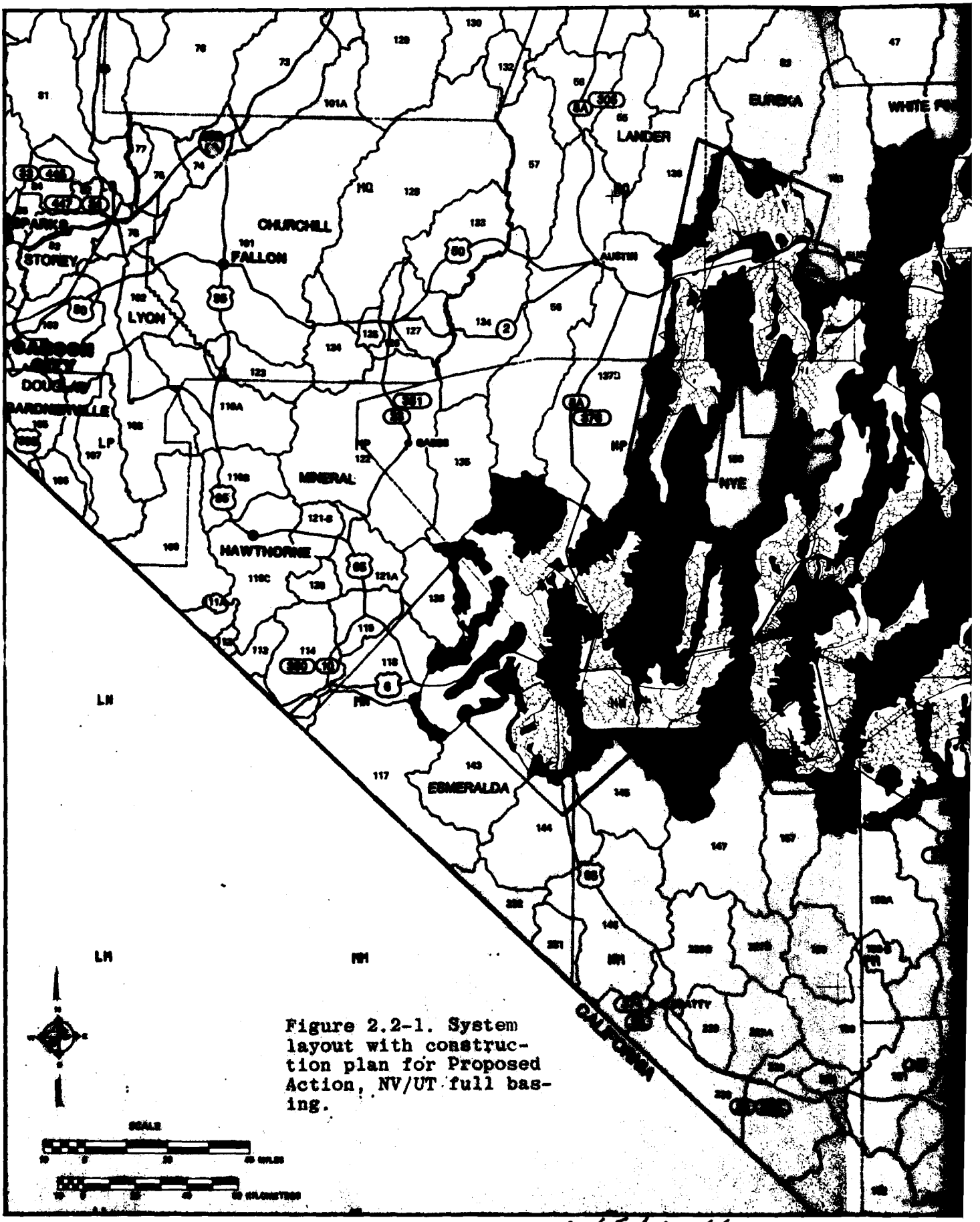
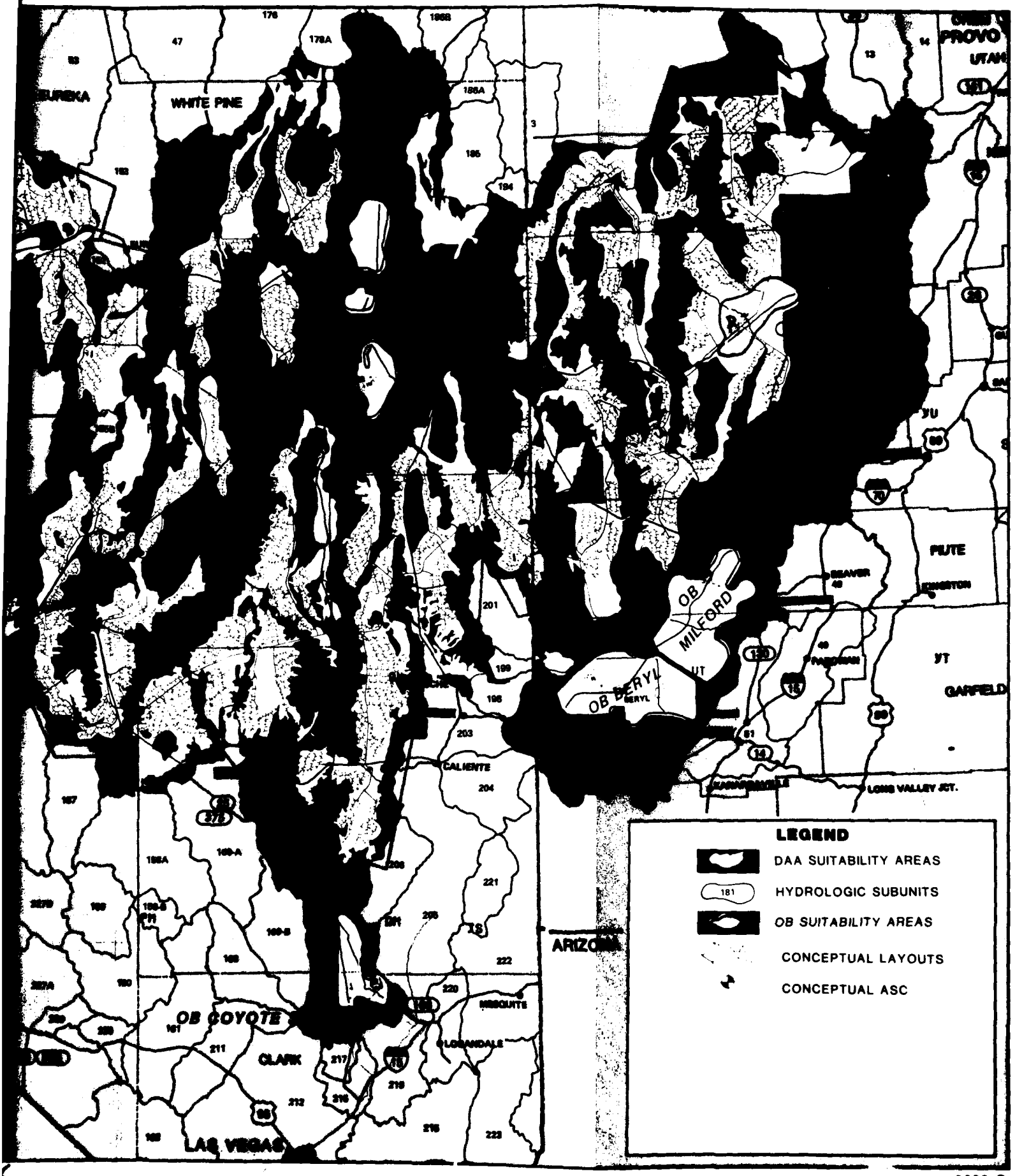


Figure 2.2-1. System layout with construction plan for Proposed Action, NV/UT full basing.

2-65/2-66


EUREKA
WHITE PINE
PROVO
UTAH
PIUTE
GARFIELD
OB MILFORD
UT
OB BERYL
BERYL
CALIENTE
LOWS VALLEY JCT.
ARIZONA
OB COYOTE
CLARK
LOGANDALE
LAS VEGAS
LEGEND
DAA SUITABILITY AREAS
181
HYDROLOGIC SUBUNITS
OB SUITABILITY AREAS
CONCEPTUAL LAYOUTS
CONCEPTUAL ASC

3222-D

constructed from any one plant/camp is between 50 and 150 mi. Between 100 and 500 mi of cluster roads can be constructed from a plant/camp. The number of protective shelters built from a plant/camp ranges from 100 to 450. These construction ranges occur because no constant construction rates were used for each group.

Eighteen construction groups were used for conceptual scheduling. Each group contains from 6 to 19 clusters. The construction groups were combined to form six general regions. To meet schedules and minimize the total personnel in any area at a given time, construction operations would be conducted concurrently in the six regions, as indicated by the construction path arrows. These construction operations will be pursued in accordance with the schedule shown in Figure 2.2-2.

The conceptual construction sequence used in this environmental analysis has work beginning at Coyote Spring Valley and proceeding north to Dry Lake and Delamar valleys, then through Utah and Nevada, and ending in Sand Springs Valley. By late 1984, construction would be occurring simultaneously in all six regions. Construction will peak in 1986. This sequence is planned to permit Intermountain Power Project (IPP) construction to sequentially follow local M-X construction and, thus, turn the cumulative impacts of both projects in the immediate region into a lower peak over a longer period. An attempt has been made to integrate the M-X construction with planned major projects. Schedule changes for specif construction groups likely could result from Tier 2 planning studies.

Construction Resource Requirements (2.2.1.3)

Table 2.2-4 shows the average direct personnel required for any given year. This table includes construction, assembly and checkout (A&CO), and operations personnel. The peak year for construction personnel occurs in 1986 with approximately 17,000 required. A&CO personnel requirements peak over a three-year span, 1986-1988. The peak for operations personnel will occur at final operational capability (FOC) in 1989, and remain constant thereafter. This number will be approximately 13,000.

The total construction resources for the Proposed Action are shown in Table 2.2-5. Generally, the peak year requirement for most of the construction resources occurs in 1987. Except for personnel, incremental and cumulative quantities are shown for each resource. The personnel numbers represent average direct construction personnel only. No water for revegetation was included. The disturbed area includes OB complex, protective shelter, and road construction; but does not include the areas associated with temporary construction facilities, such as marshalling yards, water wells, aggregate pits, etc. Reinforcing steel and steel shapes comprise the total steel quantities. Quantities for aggregate include road construction only.

OB Complexes

Table 2.2-6 shows the estimated total construction resources for both OB complexes as of August, 1980. There is no one peak year for all of the construction resources. This does not occur for several reasons. The two OB complexes are generally constructed during different years, with only the two middle years of the total eight-year span having a construction overlap. The two OB complexes are very different in size and makeup (see Tables 2.2-1 through 2.2-4).

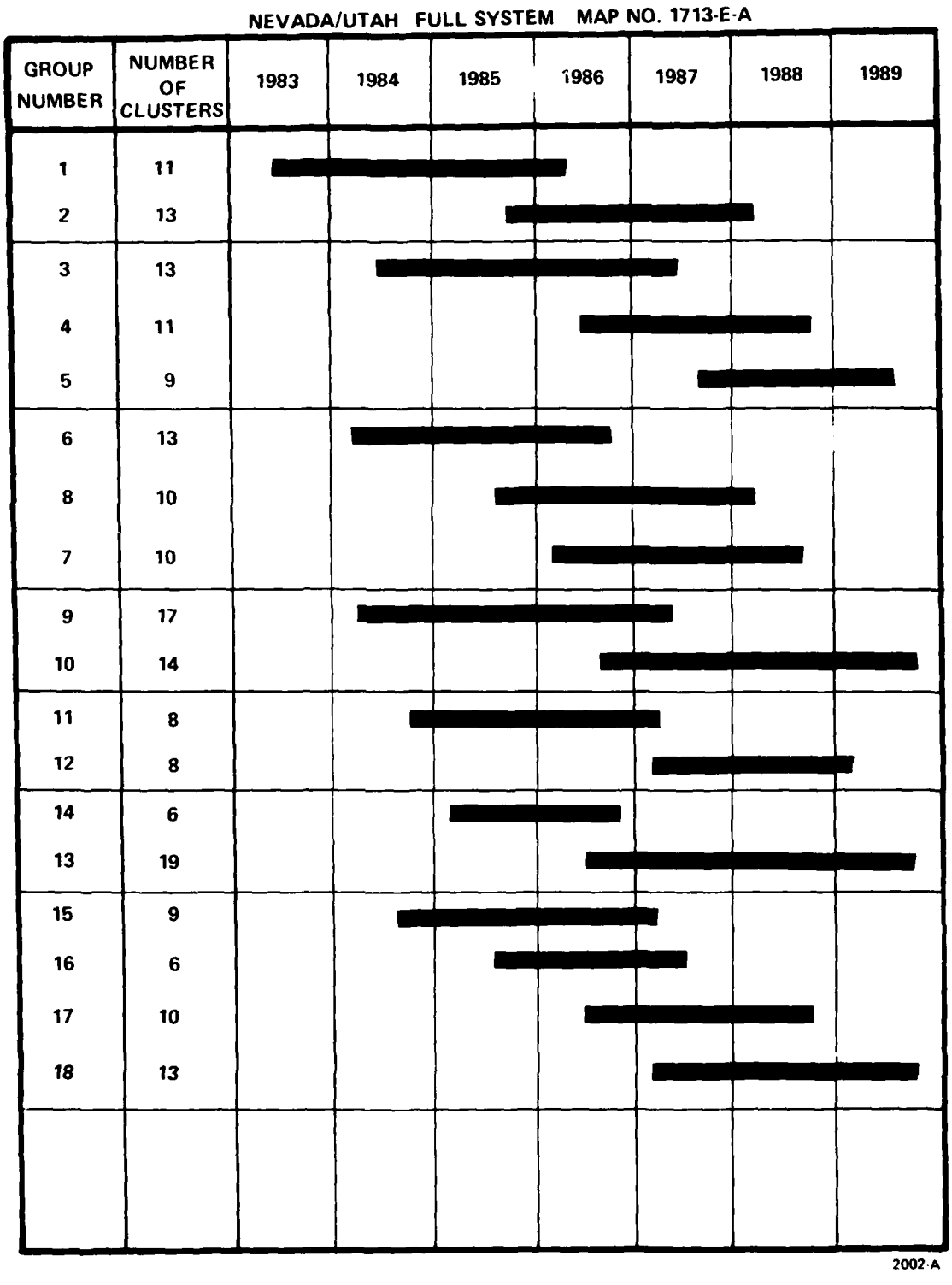


Figure 2.2-2. DDA construction schedule for Proposed Action, Nevada/Utah full basing.

Table 2.2-4. Average direct personnel requirements for Proposed Action, Nevada/Utah full basing.

DESCRIPTION	PERSONNEL									
	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Construction										
DDA[1]		100	2,150	8,400	14,500	13,400	11,600	4,050		
First OB Complex[2]	1,150	1,900	2,300	2,000	1,200					
Second OB Complex[3]				400	1,350	2,050	1,450	750		
Subtotal	1,150	2,000	4,450	10,800	17,050	15,450	13,050	4,800		
A & CO										
DDA[1]		50	100	1,750	3,150	3,150	3,100	3,100	50	
First OB Complex[2]		350	900	1,800	2,850	2,850	2,800	2,650	50	
Second OB Complex[3]										
Subtotal		400	1,000	3,550	6,000	6,000	5,900	5,750	100	
Operations										
First OB Complex[2]			1,250	2,500	3,750	5,000	6,250	7,500	7,500	7,500
Second OB Complex[3]					1,400	2,800	4,250	5,700	5,700	5,700
Subtotal			1,250	2,000	5,150	7,800	10,500	13,200	13,200	13,200
TOTAL	1,150	2,400	6,700	16,850	28,200	29,250	29,450	23,750	13,300	13,200

2165-3

[1]Designated deployment area (DDA) includes protective shelters (PS), area support centers (ASC), designated transportation network (DTN), cluster maintenance facilities (CMF), remote surveillance sites (RSS), and cluster roads (CR).

[2]First OB complex includes operating base (OB), designated assembly area (DAA), operational base test site (OBTS), and airfield.

[3]Second OB complex includes OB and airfield.

Table 2.2-5. Total construction resources for Proposed Action, Nevada/Utah full basing.

CONSTRUCTION RESOURCES	QUANTITY PER YEAR							
	1982	1983	1984	1985	1986	1987	1988	1989
Personnel [1]	1,150	1,992	4,400	10,722	17,075	15,303	13,017	4,821
Water (AF)								
Incremental	380	890	6,133	18,376	20,669	23,075	14,295	3,207
Cumulative	380	1,270	7,403	25,779	46,448	69,523	83,818	87,025
Disturbed Area (Acres)								
Incremental	1,740	3,317	10,907	26,566	32,631	36,461	22,926	5,484
cumulative	1,740	5,057	15,964	42,530	75,161	111,622	134,548	140,032
Materials								
Steel (Tons)								
Incremental		850	3,539	30,112	121,399	82,982	107,242	50,068
Cumulative		850	4,389	34,501	155,900	238,882	346,124	396,192
Concrete (CY*1,000)								
Incremental		150	189	365	1,094	794	924	436
Cumulative		150	339	704	1,798	2,592	3,516	3,952
Asphalt (TNS*1,000)								
Incremental		121	1,491	1,836	1,979	2,035	397	100
Cumulative		121	1,612	3,448	5,427	7,462	7,859	7,959
Aggregate (CY*1,000)								
Incremental	140	363	3,659	11,921	10,395	13,630	6,988	649
Cumulative	140	503	4,162	16,083	26,478	40,108	47,096	47,745
Prime Coat (TNS)								
Incremental		444	6,725	7,816	7,898	8,864	2,438	850
Cumulative		444	7,169	14,985	22,883	31,747	34,185	35,035
Fencing (LF*1,000)								
Incremental			45	505	1,938	1,308	1,727	807
Cumulative			45	550	2,488	3,796	5,523	6,330

[1] Personnel numbers are yearly averages.

Table 2.2-6. Total OB complex construction resources for Proposed Action, Nevada/Utah full basing.

CONSTRUCTION RESOURCES	QUANTITY PER YEAR							
	1982	1983	1984	1985	1986	1987	1988	1989
Personnel[1]	1,150	1,900	2,300	2,400	2,550	2,050	1,450	750
Water (AF)								
Incremental	380	620	750	820	940	800	570	280
Cumulative	380	1,000	1,750	2,570	3,510	4,310	4,880	5,160
Disturbed Area (Acres)								
Incremental	1,740	3,000	3,600	470	1,530	2,240		
cumulative	1,740	4,740	8,340	8,810	10,340	12,580		
Materials								
Steel (Tons)								
Incremental		850	1,000	380	990	720	500	250
Cumulative		850	1,850	2,730	3,720	4,440	4,940	5,190
Concrete (CY*1,000)								
Incremental		150	170	150	210	190	140	70
Cumulative		150	320	470	680	870	1,010	1,080
Asphalt (TNS*1,000)								
Incremental			280	240	150	240	170	100
Cumulative			280	520	670	910	1,080	1,180
Aggregate (CY*1,000)								
Incremental	140	220	260	290	330	290	210	100
Cumulative	140	360	620	910	1,240	1,530	1,740	1,840
Prime Coat (TNS)								
Incremental			2,300	1,980	1,210	2,300	1,610	850
Cumulative			2,300	4,280	5,490	7,790	9,400	10,250
Fencing (LF*1,000)								
Incremental			5	40	23	0	29	15
Cumulative			5	45	68	68	97	112

[1]Personnel numbers are yearly averages.

3311-2

DDA

The total resource requirements associated with construction of the DDA for the Proposed Action are shown in Table 2.2-7. Incremental and cumulative quantities are shown for each item except personnel. Water quantities are for concrete, dust suppression, compaction, and construction personnel use. It does not include water required for revegetation. The disturbed areas are the result of construction of protective shelters and roads. Disturbed areas associated with construction of temporary facilities such as marshalling yards, wells, aggregate pits, etc., are not included. The steel quantites presented include both reinforcing and plate steel. The quantities shown for aggregate are for road construction only.

Operations Resource Requirements (2.2.1.4)

Except for personnel, water, and disturbed area, the resources required for operations will be used for maintenance of the M-X system. In comparison with the construction resources, these operations, or maintenance resources will be quite small, quantitatively. Personnel required for operations will reach a peak in 1989 and remain constant thereafter at approximately 13,000 (Table 2.2-4). Generally, once the system is built and in operation, there will be no new disturbed areas. The water required for operations will be predominantly for domestic purposes at the OB complexes including household use, car washing, swimming pools, etc. As in the case with the maintenance type operations resources, the operational water requirements are small when compared to the construction water requirements. However, these water requirements for operations may have a significant impact on the local existing water supply (Section 4.3.1).

ALTERNATIVES 1 THROUGH 6 (2.2.2)

Description (2.2.2.1)

These alternatives to the Proposed Action described above include the same basic DDA layout but different OB complex locations (Figure 2.1-6). Therefore, analysis of these alternatives emphasizes adjustments in the sequence of construction to reflect OB complex locations, the environmental differences in OB complex site areas, and the cumulative differences in selection of one pair of OB complexes over another.

Alternatives 1 and 2 are the same as the Proposed Action in that they all have the same location for the first OB complex, near Coyote Spring Valley, Nevada. However, they do have different sites for the second OB complex. Alternative 1 has the second OB complex near Beryl, Utah; and Alternative 2, near Delta, Utah. Alternatives 3, 4, 5, and 6 are different in that the first OB complex is located in Utah with the second OB complex in Nevada. A site near Beryl, Utah is the location for the first OB complex for Alternatives 3 and 4, while Alternatives 5 and 6 use a location near Milford, Utah. Alternatives 3 and 5 employ the same second OB complex site, near Ely, Nevada; and Alternatives 4 and 6 also use the same second OB complex location, near Coyote Spring Valley, Nevada. Table 2.2-1 and Figure 2.1-6 show the various combinations for the first/second OB complexes for these alternatives.

Table 2.2-7. Total DDA construction resources for Proposed Action, Nevada/Utah full basing.

CONSTRUCTION RESOURCES	QUANTITY PER YEAR						
	1983	1984	1985	1986	1987	1988	1989
Personnel [1]	92	2,100	8,322	14,525	13,252	11,567	4,071
Water (AF)							
Incremental	270	5,383	17,556	19,729	22,275	13,725	2,927
Cumulative	270	5,653	23,209	42,937	65,212	78,938	81,865
Disturbed Area (Acres)							
Incremental	317	7,307	26,096	31,101	34,221	22,926	5,484
Cumulative	317	7,624	33,720		99,042	121,968	127,452
Steel (TNS)							
Incremental		2,539	29,232	120,409	182,262	106,742	49,818
Cumulative		2,539	31,770	152,179	234,441	341,182	391,000
Concrete (CY 1,000)							
Incremental		19	215	884	604	784	366
Cumulative		19	233	1,117	1,721	2,505	2,870
Asphalt (TNS 1,000)							
Incremental	121	1,211	1,596	1,829	1,795	227	
Cumulative	121	1,332	2,928	4,758	6,553	6,780	
Aggregate (CY 1,000)							
Incremental	143	3,399	11,631	10,065	13,340	6,778	549
Cumulative	143	3,542	15,173	25,238	38,578	45,356	45,905
Prime Coat (TNS)							
Incremental	444	4,425	5,836	6,688	6,564	820	
Cumulative	444	4,870	10,706	17,394	23,958		
Fencing (LF (1,000)							
Incremental		40	465	1,915	1,308	1,698	792
Cumulative		40	505	2,421	3,729	5,427	6,219
Protective Shelters							
Incremental		30	344	1,417	968	1,256	586
Cumulative		30	374	1,790	2,758	4,014	4,600
Miles of DTN Roads							
Incremental	26	260	343	393	386	49	
Cumulative	26	286	630	1,023	1,409	1,458	
Miles of Cluster Roads							
Incremental		323	1,594	1,294	1,835	1,064	90
Cumulative		323	1,917	3,211	5,046	6,110	6,200

4004-1

[1]Personnel numbers are yearly averages.

Construction Scenario (2.2.2.2)

The conceptual construction plan used for alternatives 1 through 6 is almost identical to the plan for the Proposed Action, as shown in Figure 2.2-1. The same number of concrete plants, construction camps, marshalling yards/staging areas, and life support facilities are required. Minor adjustments are needed because of the alternate OB complex locations.

The construction scenario described in Section 2.2.1.2 for the OB complexes for the Proposed Action is also valid for alternatives 1 through 6. The only variation is the location for each of the OB complexes. Since the DDA is identical for the Proposed Action and alternatives 1 through 6, there is no significant change to the construction plan for the DDA. Selection of different clusters for IOC could revise the construction schedule shown in Figure 2.2-2.

Construction Resource Requirements (2.2.2.3)

Tables 2.2-1 through 2.2-4 apply to alternatives 1 through 6, as well as the Proposed Action. See Section 2.2.1.3 for the discussion of the construction resource requirements for the Proposed Action.

Operations Resource Requirements (2.2.2.4)

There is no difference in the requirements for operations resources for either the Proposed Action or alternatives 1 through 6. See Section 2.2.1.4 for this discussion for the Proposed Action.

ALTERNATIVE 7 (2.2.3)

Description (2.2.3.1)

Alternative 7, full basing deployment in Texas/New Mexico, has the first OB complex near Clovis, New Mexico, and the second OB complex near Dalhart, Texas (Figure 2.1-7). In Texas/New Mexico, the full basing deployment area is bounded by Roswell, New Mexico, on the southwest to approximately Dalhart, Texas, on the northeast. Other major cities in the area include Amarillo and Lubbock, Texas. Counties in Texas where the system is proposed include Dallam, Sherman, Hartley, Randall, Oldham, Deaf Smith, Parmer, Castro, Swisher, Bailey, Lamb, Cochran, and Hockley. New Mexico counties include Union, Harding, Quay, De Baca, Roosevelt, Curry, Chaves, Guadalupe, and Lea.

Interstate 40, between Albuquerque, New Mexico and Amarillo, Texas essentially bisects the system. Major Federal Aid Primary Routes include U.S. 54, 60, 70, 84,380, and 385.

The DTN branches from the first OB complex to the DDA in two directions. A northerly branch parallels much of the existing road system and separates frequently to access clusters in Texas and New Mexico. The southerly extension picks up clusters in New Mexico and then turns east to provide access to the remaining clusters in Texas.

The DTN is approximately 1,260 mi long. About 5,940 mi of cluster roads are required. Much of the Texas/New Mexico siting region contains section roads at one

mi intervals. Where they are available they are used as cluster roads to minimize road construction and environmental impact. Approximately 1,300 mi of cluster roads will coexist with the present road system. The total road network for Alternative 7 is approximately six percent less than that for the Proposed Action.

Construction Scenario (2.2.3.2)

The conceptual construction plan for full basing deployment in Texas/New Mexico (Alternative 7) with operating base complexes near Clovis, New Mexico and Dalhart, Texas is shown in Figure 2.2-3. It is estimated that between four and seven concrete plants would be required in a total of 16 different locations. Construction camps would be colocated with the concrete plants. Water availability, aggregate availability, and minimum haul distances will be the final determining factors in the exact locations for these plants/camps.

The need for construction camps at the OB complexes for the full basing deployment in Texas/New Mexico is not the same as in the Nevada/Utah region. The first OB complex near Clovis will require a construction camp, but the second OB complex near Dalhart will not. The proximity of the DDA and its construction camp in construction group number 11 (Figure 2.2-3) to the second OB complex will allow the construction camp to be used for both the DDA and the OB complex.

The construction scheduling for the OB complexes was identical to that for the Proposed Action. The first OB complex near Clovis, would be constructed between 1982 and 1986. Construction of the second OB complex near Dalhart, will be between 1985 and 1989. Studies now in progress may change this preliminary scheduling. The construction scenario for the OB complexes for Alternative 7 also is identical with that for the Proposed Action (see Section 2.2.1.2) with the exception, as stated above, that the second OB complex will be built from the construction camp associated with the DDA in group number 11.

Protective shelters, DTN, and cluster roads are the major construction items that require the plants/camps. A range of between 150 and 400 protective shelters could be built from a plant/camp. The range of DTN road mileage built from a plant/camp is between 50 and 150 mi. Between 200 and 550 mi of cluster roads can be constructed from a plant/camp. These number ranges differ from those discussed for the Proposed Action because different construction rates were used.

Fifteen construction groups with from 8 to 19 clusters are organized into three general regions. The conceptual schedule for construction is shown in Figure 2.2-4. Construction would begin at the first operating base complex located near Clovis and progress to construction group number 5 by 1983. By 1985, construction would be occurring in all three of the regions. Detailed schedules and milestones will be established following final review of inputs and additional engineering.

Construction Resource Requirements (2.2.3.3)

Table 2.2-8 shows that the peak demand for construction, assembly and checkout (A&CO), and operations personnel occurs in 1987-1988 with approximately 30,000 persons employed. Personnel requirements for construction peak in 1987 with approximately 16,000 employees. Operations personnel will reach about 13,000 by late 1989, and remain constant thereafter.

Table 2.2-9 shows the total construction resources required for Alternative 7. Most of the construction resources reach a peak year demand in 1987. The same conditions apply to Alternative 7 as they did to the Proposed Action, as discussed in Section 2.2.1.3.

The total construction resources required for both OB complexes are shown in Table 2.2-10. As is the situation with the Proposed Action, there is no one common peak year for all the construction resources. Except for two years of over-lapping construction, the two OB complexes are constructed during different years. The total resource requirements associated with construction of the DDA for the Texas/New Mexico full basing deployment are shown in Table 2.2-11. Water requirements include water for dust suppression, concrete, and direct employees, but not for revegetation. The disturbed areas include construction of protective shelters and roads but not temporary facilities, such as aggregate pits.

Operations Resource Requirements (2.2.3.4)

There are no differences between the operations resource requirements for Alternative 7 and the Proposed Action (Section 2.2.1.4).

ALTERNATIVE 8 (2.2.4)

Description (2.2.4.1)

Alternative 8, split basing, proposes a first OB complex near Coyote Spring Valley, Nevada, with a second OB complex near Clovis, New Mexico.

Split basing denotes dividing the required 200 clusters into several deployment regions. The alternative under consideration will distribute the clusters among the four states of Nevada, Utah, Texas, and New Mexico. This alternative is shown in Figures 2.1-10 and 2.1-11.

The Nevada/Utah portion of the system extends from Moapa, Nevada, on the south, to Delta, Utah on the north. Other cities in the area include Caliente, Pioche, and Panaca, Nevada; and Beryl, Milford, Delta, and Hinckley, Utah. White Pine, Nye, and Lincoln counties in Nevada; and Juab, Millard, and Beaver counties in Utah are affected by this alternative. This portion of the system is contained in an approximate area of 6,500 sq mi.

The Texas/New Mexico portion extends from southern Chaves County, New Mexico to northern Dallam County, Texas. Other affected counties include Guadalupe, Harding, Lea, Roosevelt, Union, Quay, De Baca, and Curry counties in New Mexico and Parmer, Bailey, Lamb, Deaf Smith, Hartley, Oldham, Cochran, and Hockley in Texas. Principal cities in the area include Clovis, New Mexico and Dalhart, Texas. Amarillo and Lubbock, Texas lie outside the area, just to the east of the DDA. The Texas/New Mexico portion of the system is contained in approximately 6,200 sq mi for a total of about 12,700 sq mi required for this alternative.

Major Federal Aid Primary highways include U.S. Routes 6, 50, and 93 in the Nevada/Utah region and 54, 87, 380, 60, 70, 84, and 385 in the Texas/New Mexico region. Combined Interstate 40 and U.S. Route 66 approximately bisects the DDA in Texas/New Mexico.

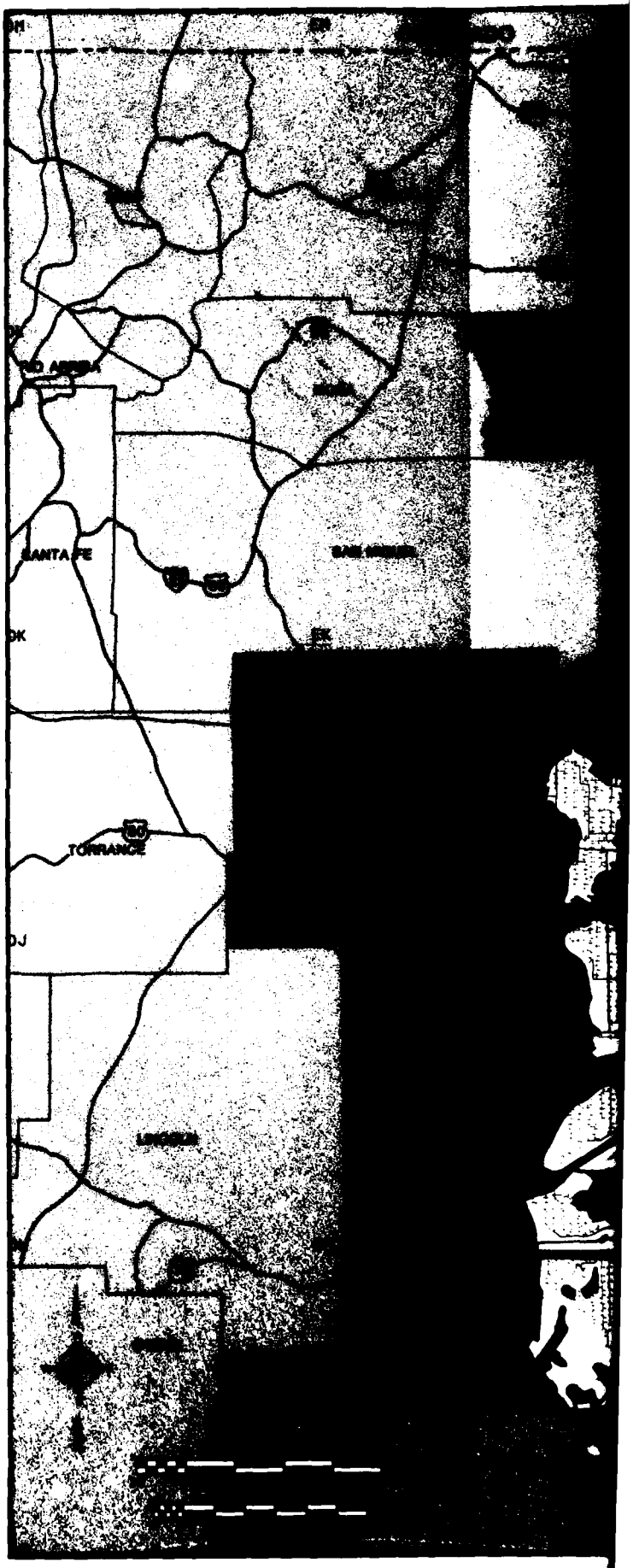
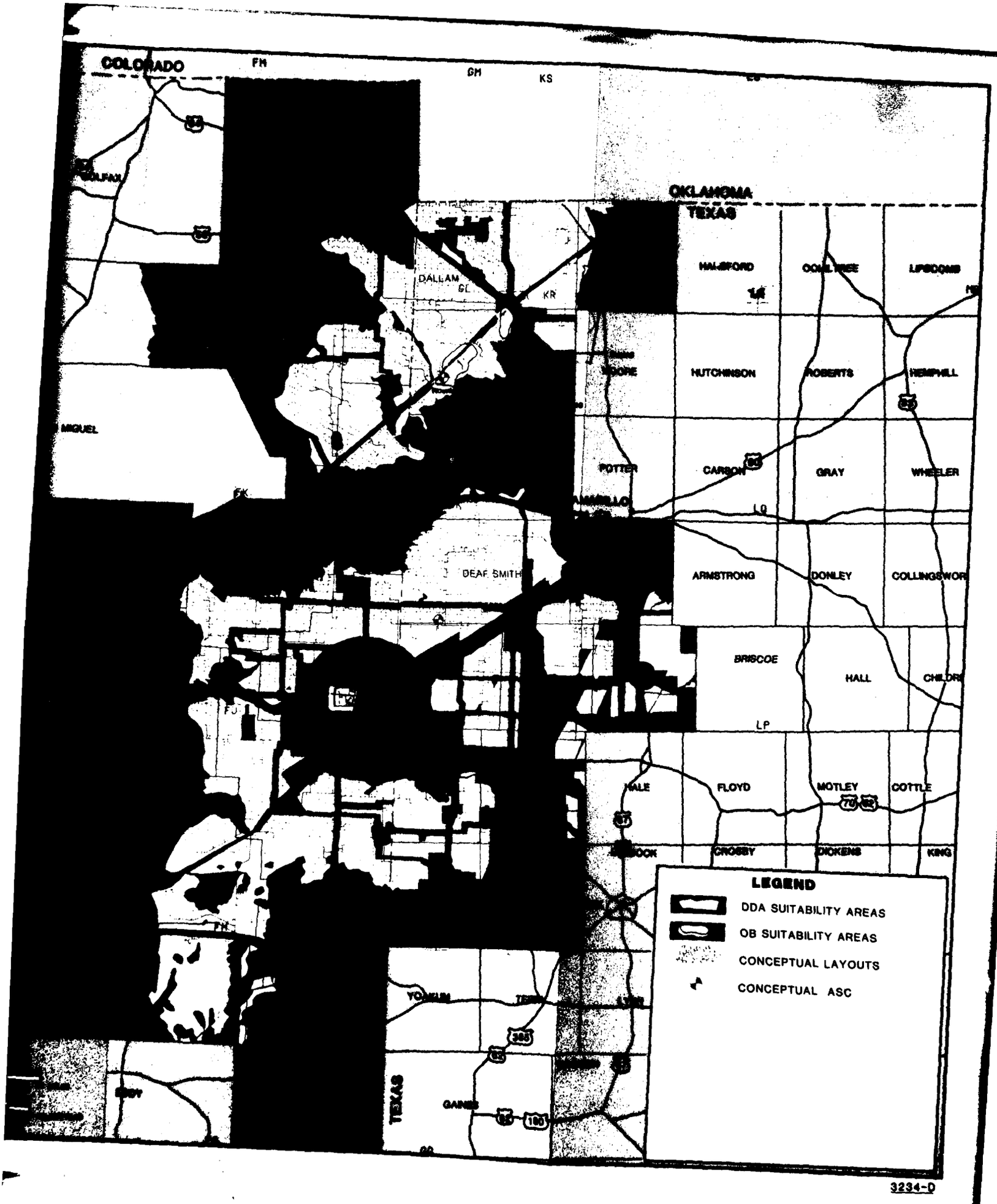


Figure 2.2-3.
System layout with construction plan for alternative 7, Texas/ New Mexico full basing.

2-77/2-78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WHEELER
ARMSTRONG
DONLEY
COLLINGSWOR
BRISCOE
HALL
CHILDR
LP
HALE
FLOYD
MOTLEY
COTTLE
CROSBY
DICKENS
KING
DALLAM
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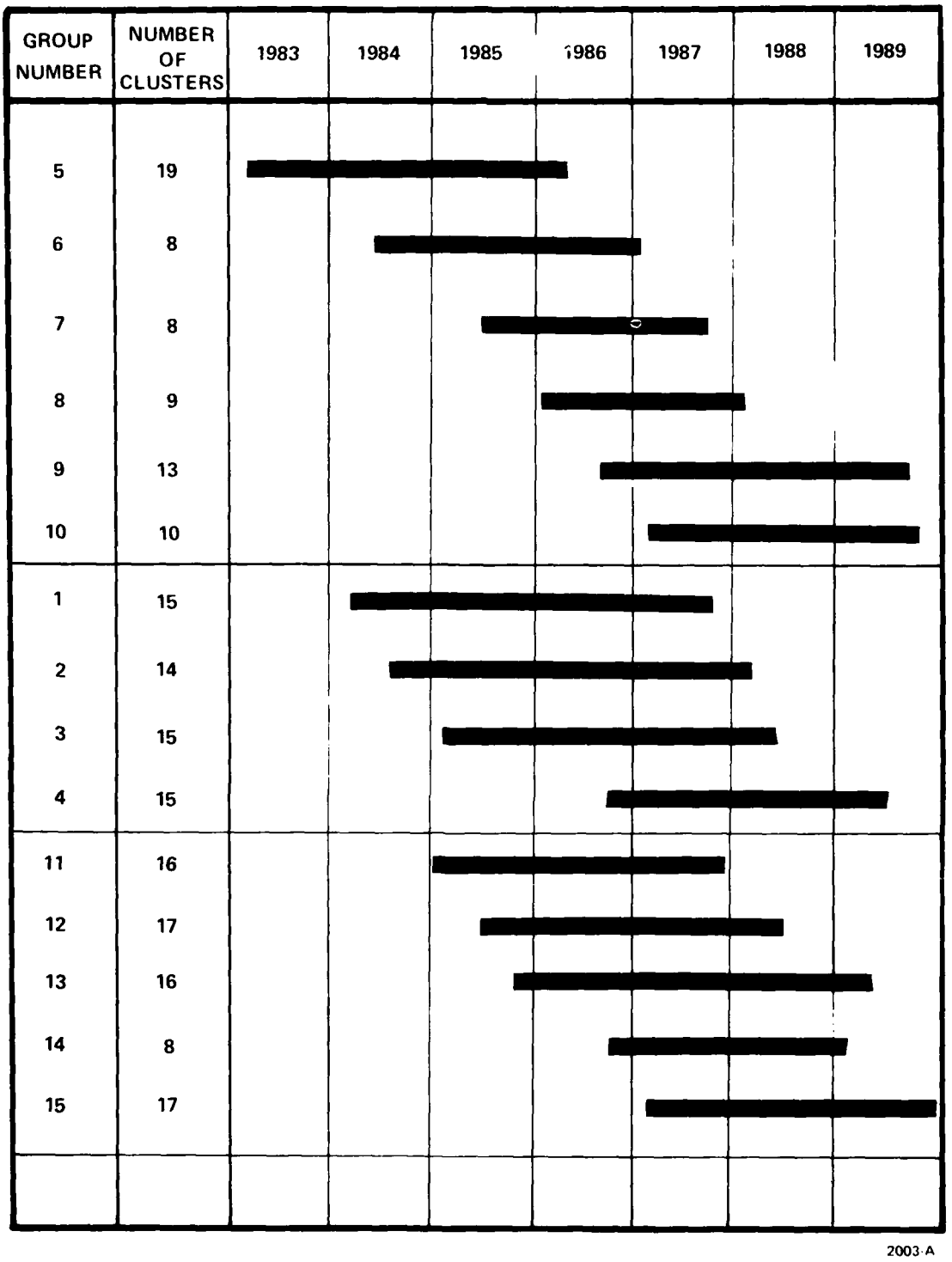

Figure 2.2-4. DDA construction schedule for Alternative 7, Texas/New Mexico full basing.

Table 2.2-8. Average direct personnel requirements for Alternative 7, Texas/New Mexico full basing.

DESCRIPTION	PERSONNEL									
	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Construction										
DDA[1]		950	2,600	8,100	12,050	13,900	11,750	3,600		
First OB Complex[2]	1,150	1,900	2,400	2,000	1,200					
Second OB Complex[3]				200	1,350	2,050	1,450	750		
Subtotal	1,150	2,850	5,000	10,300	14,600	15,950	13,200	4,350		
A & CO										
DDA[1]										
First OB Complex[2]		50	100	1,750	3,150	3,150	3,100	3,100	50	
Second OB Complex[3]		350	900	1,800	2,850	2,850	2,800	2,650	50	
Subtotal		400	1,000	3,550	6,000	6,000	5,900	5,750	100	
Operations										
First OB Complex[2]			1,250	2,500	3,750	5,000	6,250	7,500	7,500	7,500
Second OB Complex[3]					1,400	2,800	4,250	5,700	5,700	5,700
Subtotal			1,250	2,500	5,150	7,800	10,500	13,200	13,200	13,200
Total	1,150	3,250	7,250	16,350	25,750	29,750	29,600	23,300	13,300	13,200

2170-3

[1]DDA includes PS, ASC, DTN, CMF, RSS, and CR.

[2]First OB complex includes OB, DAA, OBTS, and airfield. The possibility of using the existing airfield at Clovis exists, but was not considered for this analysis.

[3]Second OB complex includes OB and airfield.

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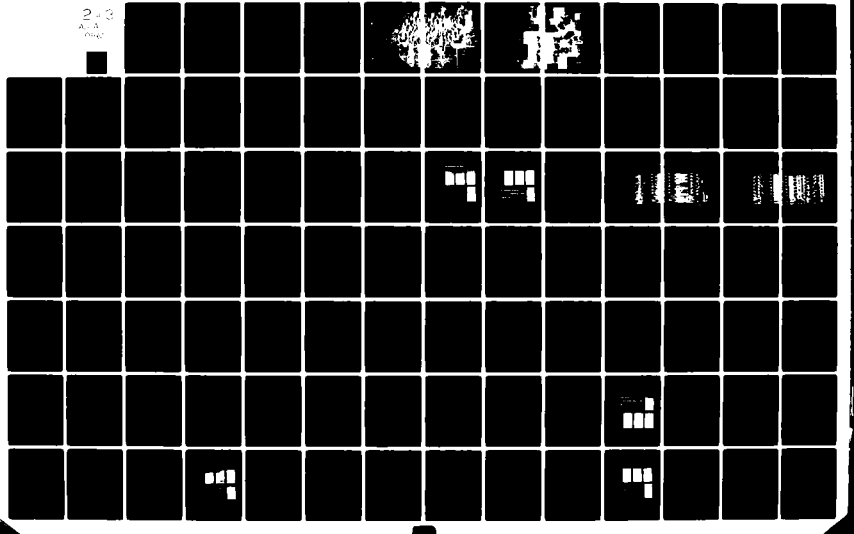

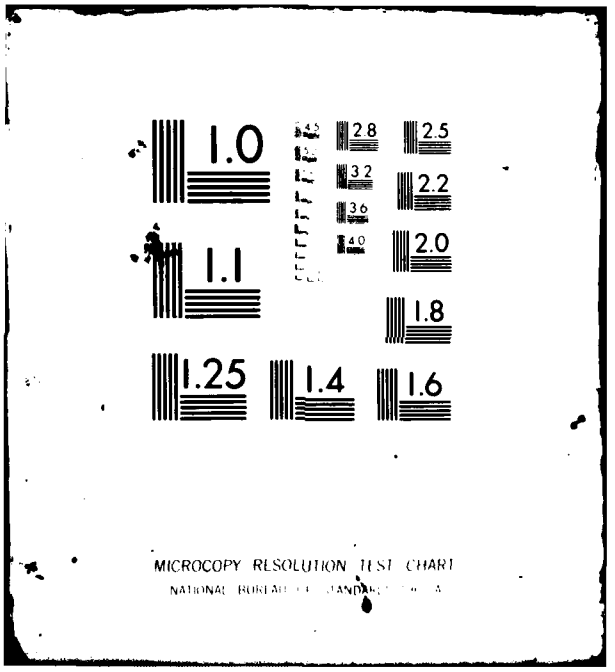
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MICROCOPY RESOLUTION TEST CHART

Table 2.2-9. Total construction resources for Alternative 7, Texas/New Mexico full basing.

CONSTRUCTION RESOURCES	QUANTITY PER YEAR							
	1982	1983	1984	1985	1986	1987	1988	1989
Personnel[1]	1,150	2,834	4,981	10,278	14,414	15,874	13,102	4,259
Water (AF)								
Incremental	380	3,217	5,922	15,554	20,494	21,225	13,636	2,503
Cumulative	380	3,597	9,519	23,073	45,567	66,792	80,428	82,931
Disturbed Area (Acres)								
Incremental	1,740	6,444	11,171	22,110	32,030	34,483	22,208	4,311
cumulative	1,740	8,184	19,355	41,465	73,495	107,978	130,186	134,497
Materials								
Steel (Tons)								
Incremental		850	12,163	45,362	76,287	103,797	112,592	45,139
Cumulative		850	13,013	58,375	134,662	238,459	351,051	396,190
Concrete (CY*1,000)								
Incremental		150	252	477	763	947	963	400
Cumulative		150	402	879	1,642	2,589	3,552	3,952
Asphalt (TNS*1,000)								
Incremental		657	968	2,443	1,198	1,508	170	100
Cumulative		657	1,625	4,068	5,266	6,774	6,944	7,044
Aggregate (CY*1,000)								
Incremental	140	1,863	3,483	8,910	12,210	11,781	6,421	277
Cumulative	140	2,003	5,486	14,396	26,606	38,387	44,808	45,085
Prime Coat (TNS)								
Incremental		2,403	4,414	10,032	5,041	6,936	1,610	850
Cumulative		2,403	7,217	17,249	22,290	29,226	30,836	31,686
Fencing (LF*1,000)								
Incremental			183	748	1,221	1,640	1,812	729
Cumulative			183	931	2,152	3,792	5,604	6,333

[1]Personnel numbers are yearly averages.

3316-3

Table 2.2-10. Total OB complex construction resources for Alternative 7, Texas/New Mexico full basing.

CONSTRUCTION RESOURCES	QUANTITY PER YEAR							
	1982	1983	1984	1985	1986	1987	1988	1989
Personnel [1]	1,150	1,900	2,400	2,200	2,550	2,050	1,450	750
Water (AF)								
Incremental	380	620	750	820	950	800	570	280
Cumulative	380	1,000	1,750	2,570	3,520	4,320	4,890	5,170
Disturbed Area (Acres)								
Incremental	1,740	3,000	3,600	470	1,530	2,240		
cumulative	1,740	4,740	8,340	8,810	10,340	12,580		
Materials								
Steel (Tons)								
Incremental		850	1,000	880	990	720	500	250
Cumulative		850	1,850	2,730	3,720	4,440	4,940	5,190
Concrete (CY*1,000)								
Incremental		150	170	150	210	190	140	70
Cumulative		150	320	470	680	870	1,010	1,080
Asphalt (TNS*1,000)								
Incremental			280	240	150	240	170	100
Cumulative			280	520	670	910	1,080	1,180
Aggregate (CY*1,000)								
Incremental	140	220	260	290	330	290	210	100
Cumulative	140	360	620	910	1,240	1,530	1,740	1,840
Prime Coat (TNS)								
Incremental			2,300	1,980	1,210	2,300	1,610	850
Cumulative			2,300	4,280	5,490	7,790	9,400	10,250
Fencing (LF*1,000)								
Incremental			5	40	23	0	29	15
Cumulative			5	45	68	68	97	112

[1]Personnel numbers are yearly averages

3312-4

Table 2.2-11. Total DDA construction resources for Alternative 7, Texas/New Mexico full basing.

CONSTRUCTION RESOURCES	QUANTITY PER YEAR						
	1983	1984	1985	1986	1987	1988	1989
Personnel[1]	934	2,581	8,078	11,864	13,824	11,652	3,509
Water (AF)							
Incremental	2,597	5,172	14,734	19,544	20,425	13,066	2,223
Cumulative	2,597	7,770	22,504	42,047	62,473	75,538	77,762
Disturbed Area (Acres)							
Incremental	3,444	7,571	21,640	30,500	32,243	22,208	4,311
Cumulative	3,444	11,015	32,655	63,155	95,398	117,606	121,917
Steel (TNS)							
Incremental		11,163	44,482	75,297	103,077	112,092	44,889
Cumulative		11,163	55,645	130,942	234,019	346,111	391,000
Concrete (CY 1,000)							
Incremental		82	327	553	757	823	330
Cumulative		82	409	961	1,718	2,541	2,870
Asphalt (TNS 1,000)							
Incremental	657	688	2,203	1,048	1,268		
Cumulative	657	1,345	3,548	4,595	5,864		
Aggregate (CY 1,000)							
Incremental	1,643	3,223	8,620	11,880	11,491	6,211	177
Cumulative	1,643	4,866	13,486	25,365	36,857	43,067	43,244
Prime Coat (TNS)							
Incremental	2,403	2,514	8,052	3,831	4,636		
Cumulative	2,403	4,917	12,969	16,801	21,437		
Fencing (LF 1,000)							
Incremental		178	708	1,198	1,640	1,783	714
Cumulative		178	885	2,083	3,722	5,505	6,219
Protective Shelters							
Incremental		131	523	886	1,213	1,319	528
Cumulative		131	655	1,540	2,753	4,072	4,600
Miles of DTN Roads							
Incremental	141	148	474	225	273		
Cumulative	141	289	763	988	1,261		
Miles of Cluster Roads							
Incremental	142	395	986	1,740	1,634	1,015	29
Cumulative	142	537	1,523	3,263	4,897	5,912	5,941

[1]Personnel numbers are yearly averages

4001-1

In the Nevada/Utah portion of the system, the DTN originates near Coyote Spring Valley, Nevada and proceeds north to Dry Lake Valley, where it branches to the east and west to access the remaining clusters. Essentially, this system duplicates a portion of the deployment area shown for the Proposed Action with approximately 70 clusters in Nevada and 30 in Utah.

Similarly, in Texas/New Mexico, the DTN follows the same alignment used in the Texas/New Mexico full basing system (Alternative 7). The DDA for Alternative 8 is a portion of the DDA for Alternative 7, with approximately 35 clusters located in Texas and 65 in New Mexico.

A total of 1,380 mi is estimated for the DTN. Cluster road construction will total about 6,070 mi.

Construction Scenario (2.2.4.2)

The construction plan used in the analysis of the portion of Alternative 8 for the Nevada/Utah region with the first OB complex near Coyote Spring Valley, Nevada, is shown in Figure 2.2-5. The construction plan for the Texas/New Mexico portion of Alternative 8, with the second OB complex near Clovis, New Mexico, is shown in Figure 2.2-6.

For the split basing deployment portion in Nevada/Utah, five to seven concrete plants would be required in a total of nine different locations. In the Texas/New Mexico portion, four to six concrete plants would be needed in a total of eight different locations. Colocated with these plants would be the construction camps, marshalling yards/staging areas, and life support facilities. The exact locations for these plants/camps will be determined based on the following criteria: water availability, aggregate availability, and minimum haul distances.

OB Complex Construction

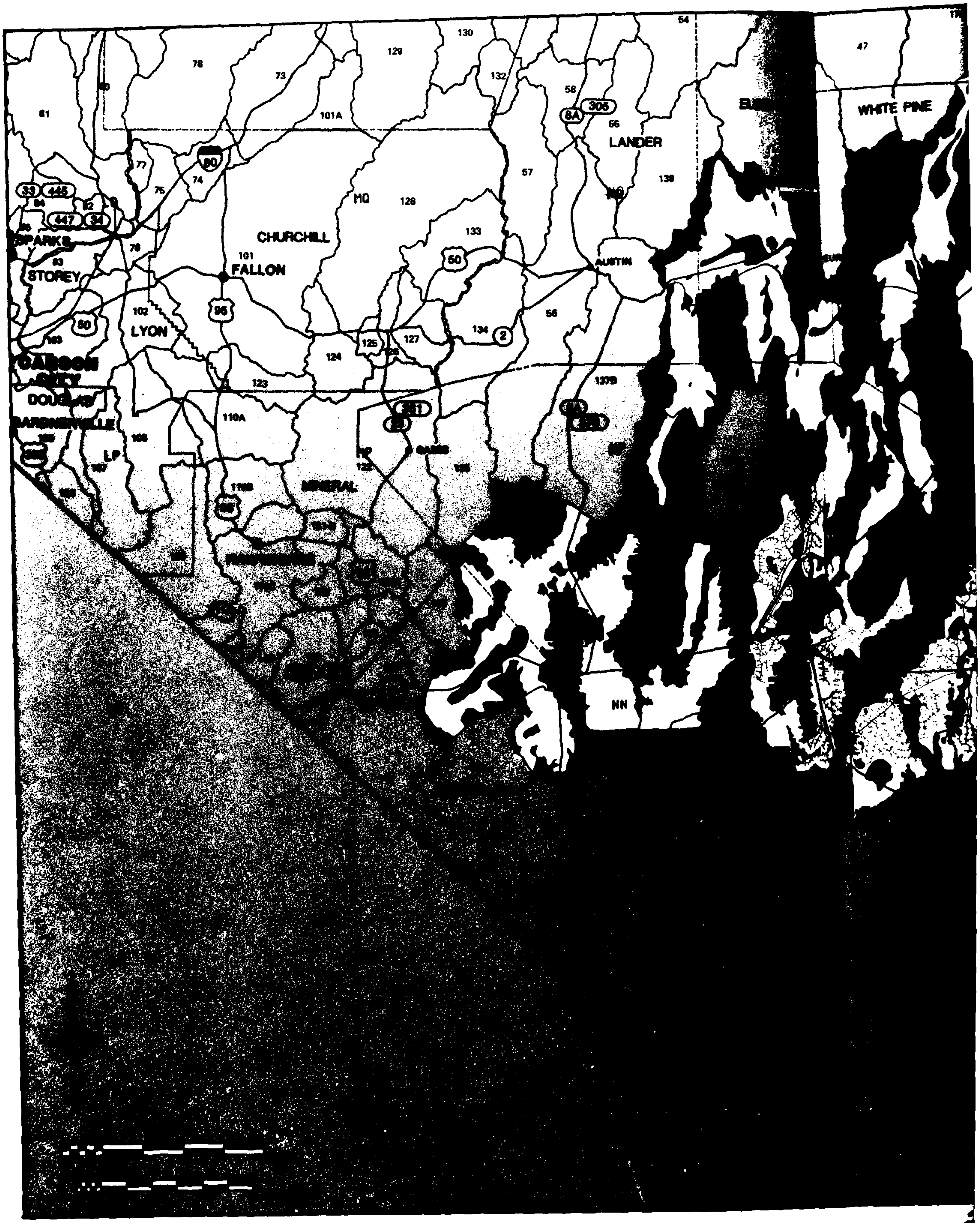
Each of the OB complexes will have a construction camp for the building construction, such as concrete and concrete block structures, metal structures, and wood frame structures.

The first OB complex, near Coyote Spring Valley, Nevada, contains an OB, DAA, OBTS, and an airfield. Construction is scheduled to start in 1982 and to be completed in time for IOC in 1986. As is the case with the Proposed Action, most of the construction in the first year will be concentrated in the DAA, OBTS, and at the airfield. A section of the DTN connecting the DAA to the DDA will also be constructed from the camp in the OB complex. Construction in the OBTS and at the airfield should be completed by 1984.

The second OB complex, near Clovis, New Mexico, contains an OB, DAA, and an airfield. Split basing is the only deployment alternative that requires a DAA in the second OB complex. Construction is scheduled to begin in 1983 and continue through to 1987. The second OB complex does not have to be operational for IOC.

DDA Construction

The key construction items originating from the DDA plants/camps are DTN roads, cluster roads, and protective shelters. The length of DTN road constructed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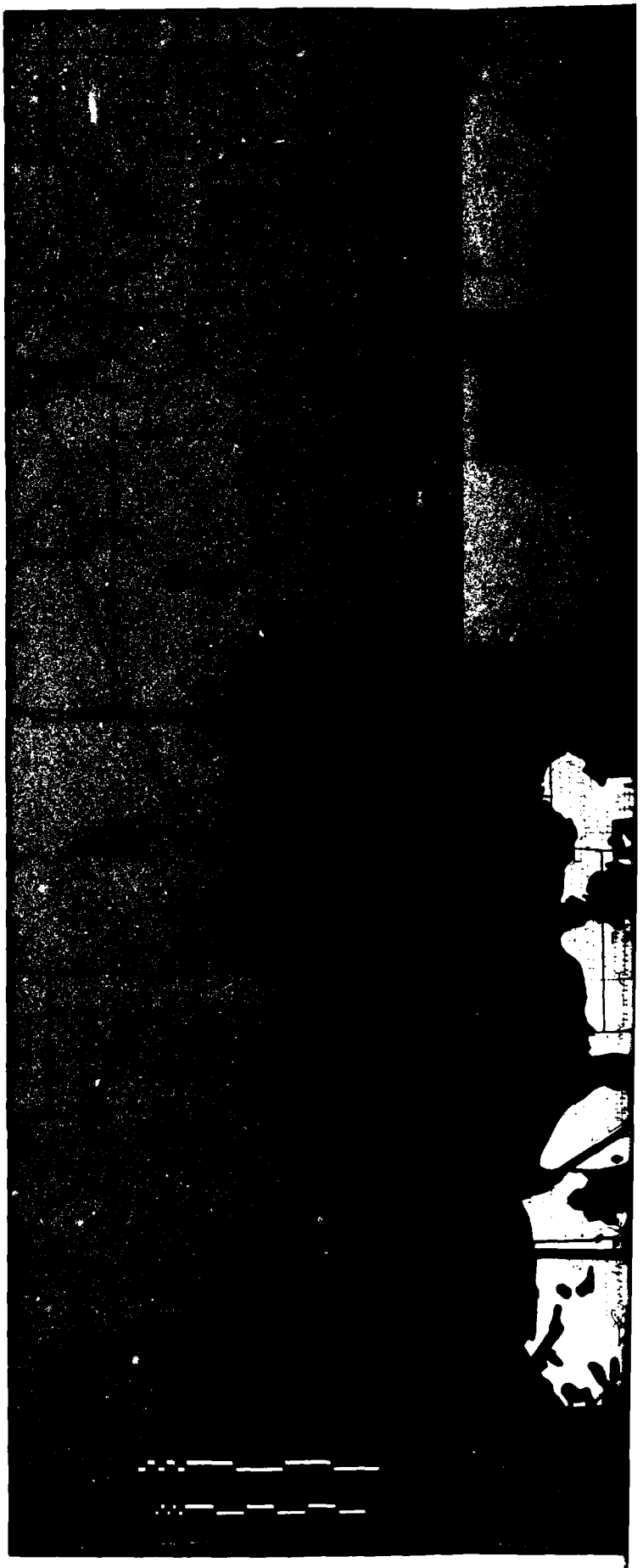

Figure 2.2-6.
System layout with construction plan for portion of alternative 8, Texas/New Mexico split basing.

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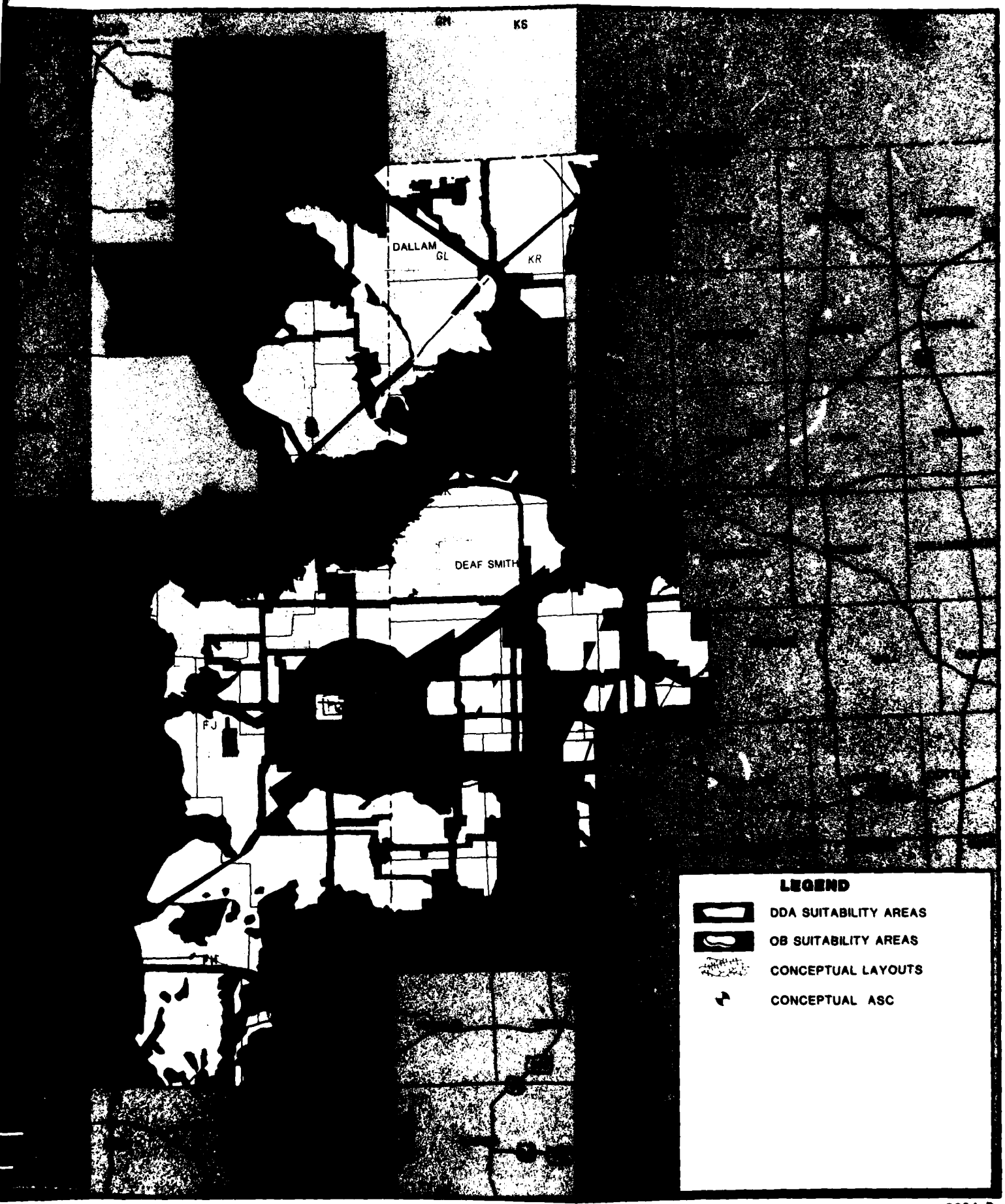
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from a plant/camp is between 50 and 200 mi. Between 300 and 750 mi of cluster roads can be constructed from a plant/camp. The number of protective shelters built from a plant/camp ranges from 200 to 400.

Eight construction groups were combined in two general regions to produce the schedule in Figure 2.2-7 for the Nevada/Utah portion of Alternative 8. Construction would begin at the first OB complex in 1982, and progress to construction group number 1 by 1983. By early 1984 construction would be occurring in both of the regions. The construction period for a group ranges from two and one-half to three years.

For the Texas/New Mexico portion of Alternative 8, seven construction groups, containing between 12 and 16 clusters were combined in two general regions. Construction operations for this representative system were analyzed in accordance with the schedule shown in Figure 2.2-8. Construction would begin at the second OB complex in 1983 and by mid-1985 would be occurring in both regions. Changes to the construction schedule could be made.

Construction Resource Requirements (2.2.4.3)

Tables 2.2-12 and 2.2-13 show the average direct personnel required for Alternative 8 for any given year in Nevada/Utah and Texas/New Mexico, respectively. The peak year for construction personnel occurs in 1985-1986, for Nevada/Utah, with approximately 8,000 workers and 1986-1987, for Texas/New Mexico, with approximately 9,000 workers. The average construction work force for split basing would peak in 1986 with approximately 17,000 personnel required.

The total construction resources for Alternative 8, split basing in Nevada/Utah and in Texas/New Mexico are shown in Tables 2.2-14 and 2.2-15, respectively. For Nevada/Utah the incremental construction resources quantities peak in a span from 1985 to 1986. The incremental quantities for construction resources for Texas/New Mexico also peak over a span of two years, 1986-1987. Generally, the cumulative construction resources requirements for Nevada/Utah/Texas/New Mexico (Alternative 8) are higher than for the Proposed Action because there is a DAA located in the second OB complex.

OB Complexes

Tables 2.2-16 and 2.2-17 show the total construction resources for the first OB complex (Nevada/Utah) and the second OB complex (Texas/New Mexico), respectively. The first OB complex is constructed between 1982 and 1986, with the peak year requirements generally occurring in 1984. The second OB complex is constructed between 1983 and 1987, with 1985 generally being the peak year for construction resources.

DDA

The total resource requirements for the DDA construction in Nevada/Utah and in Texas/New Mexico are shown in Tables 2.2-18 and 2.2-19, respectively. Except for personnel, incremental and cumulative quantities are shown for each resource. Water quantities include requirements for concrete, dust suppression, compaction, and construction personnel, but not for revegetation. Disturbed areas include

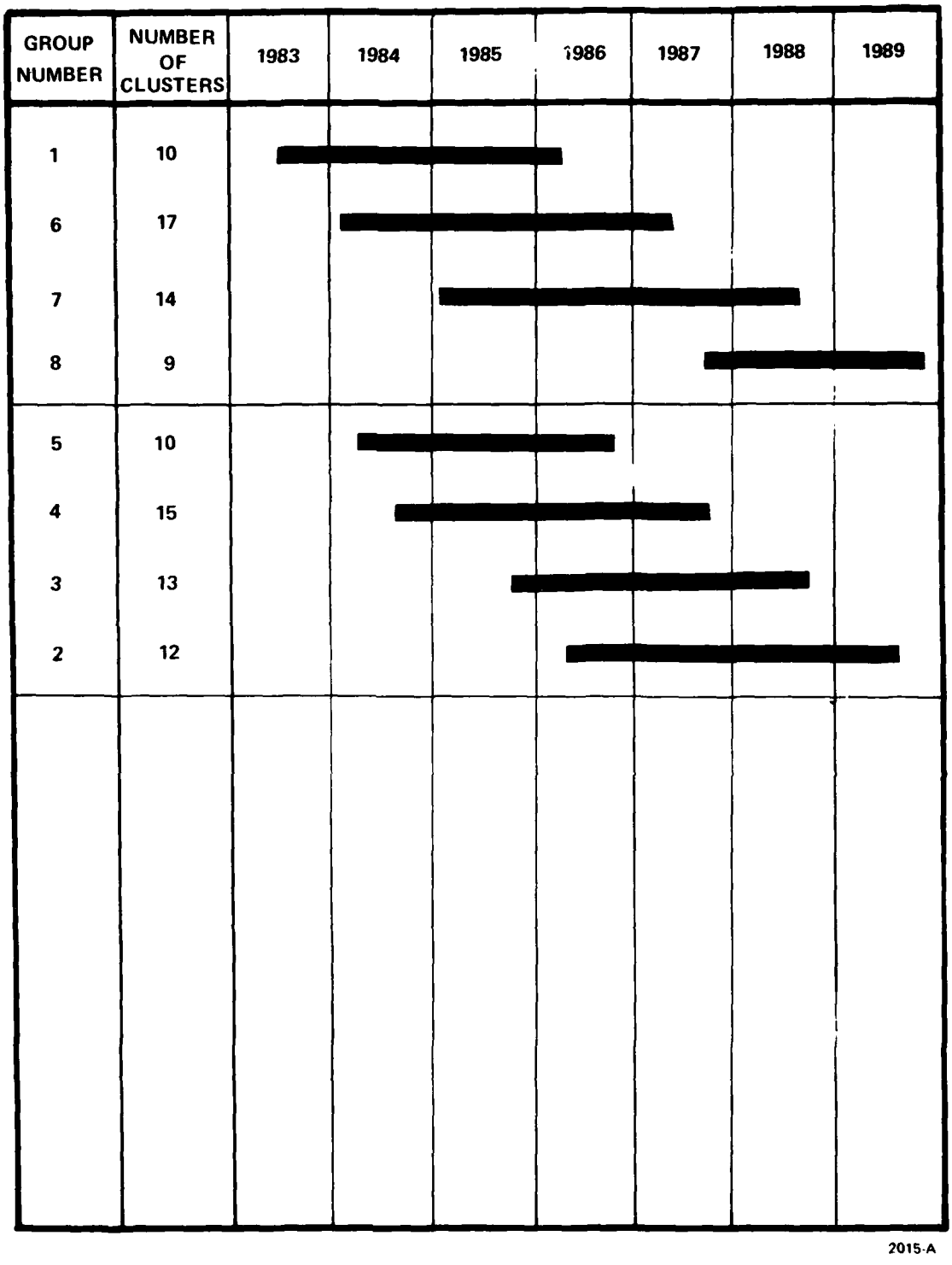


Figure 2.2-7. DDA construction schedule for portion of Alternative 8, Nevada/Utah split basing.

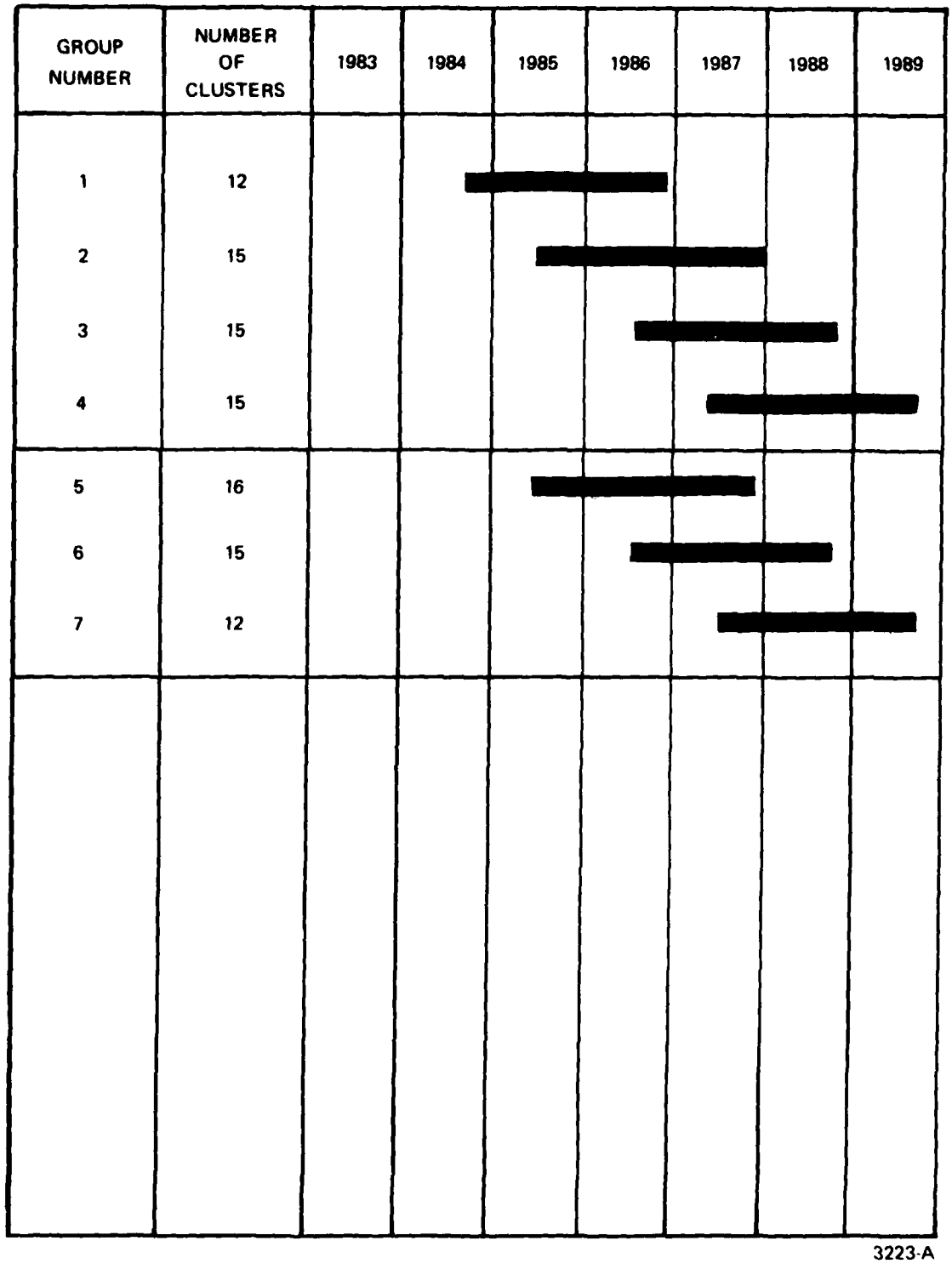


Figure 2.2-8. DDA construction schedule for portion of alternative 8, Texas/New Mexico split basing.

Table 2.2-12. Average direct personnel requirements for portion of Alternative 8, Nevada/Utah split basing.

DESCRIPTION	PERSONNEL									
	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Construction										
DDA[1]		100	1,900	6,200	6,750	6,350	4,500	1,200		
First OB Complex[2]	1,100	1,850	2,400	2,050	1,250					
Subtotal	1,100	1,950	4,300	8,250	8,000	6,350	4,500	1,200		
A & CO										
DDA[1]		50	100	1,350	2,300	1,650	900	950		
First OB Complex[2]		250	700	1,350	2,150	2,150	2,100	2,000	50	
Subtotal		300	800	2,700	4,450	3,800	3,000	2,950	50	
Operations										
First OB Complex[2]			1,250	2,450	3,700	4,950	6,250	7,400	7,400	7,400
TOTAL	1,100	2,250	6,350	13,400	16,150	15,100	13,750	11,550	7,450	7,400

2250-3

[1]DDA includes PS, ASC, DTN, CMF, RSS, and CR.

[2]First OB complex includes OB, DAA, OBTS, and airfield.

Table 2.2-13. Average direct personnel requirements for portion of Alternative 8, Texas/New Mexico split basing.

DESCRIPTION	PERSONNEL									
	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Construction										
DDA[1]			100	1,950	6,750	8,150	6,800	2,650		
Second OB complex[2]		300	1,850	2,400	2,000	1,200				
Subtotal		300	1,950	4,350	8,750	9,350	6,800	2,650		
A & CO										
DDA[1]				400	850	1,500	2,200	2 150	50	
Second OB complex[2]		250	700	1,350	2,150	2,150	2,100	2,000	50	
Subtotal		250	700	1,750	3,000	3,650	4,300	4,150	100	
Operations										
Second OB complex[2]				1,250	2,400	3,700	4,850	6,050	6,050	6,050
TOTAL		550	2,650	7,350	14,150	16,700	15,950	12,850	6,150	6,050

3565 - 3

[1]DDA includes PS, ASC, DTN, CMF, RSS, and CR.

[2]Second OB complex includes OB, DAA, and airfield.

Table 2.2-14. Total construction resources for portion of Alternative 8, Nevada/Utah split basing.

CONSTRUCTION RESOURCES	QUANTITY PER YEAR							
	1982	1983	1984	1985	1986	1987	1988	1989
Personnel[1]	1,100	1,971	4,314	8,274	7,993	6,323	4,450	1,208
Water (AF)								
Incremental	360	947	5,696	11,672	10,346	8,671	5,387	704
Cumulative	360	1,307	7,003	18,675	29,021	37,692	43,079	43,783
Disturbed Area (Acres)								
Incremental	1,670	3,339	10,513	16,687	15,528	14,057	8,934	1,399
cumulative	1,670	5,009	15,522	32,209	47,737	61,794	70,728	72,127
Materials								
Steel (Tons)								
Incremental		820	3,086	36,327	51,265	50,972	40,443	15,586
Cumulative		820	3,906	40,233	91,498	142,470	182,913	198,769
Concrete (CY*1,000)								
Incremental		140	195	410	463	374	297	116
Cumulative		140	335	745	1,208	1,582	1,879	1,995
Asphalt (TNS*1,000)								
Incremental		160	1,233	1,217	1,004	256	132	
Cumulative		160	1,393	2,610	3,614	3,870	4,002	
Aggregate (CY*1,000)								
Incremental	130	388	3,450	6,924	5,588	4,784	2,686	
Cumulative	130	518	3,968	10,892	16,480	21,264	23,950	
Prime Coat (TNS)								
Incremental		587	5,733	5,521	4,315	935	488	
Cumulative		587	6,320	11,841	16,156	17,091	17,579	
Fencing (LF*1,000)								
Incremental			37	604	831	811	643	254
Cumulative			37	641	1,472	2,283	2,926	3,180

[1]Personnel numbers are yearly averages.

0218-2

Table 2.2-15. Total construction resources for portion of Alternative 8, Texas/New Mexico split basing.

CONSTRUCTION RESOURCES	QUANTITY PER YEAR							
	1982	1983	1984	1985	1986	1987	1988	1989
Personnel[1]		300	1,933	4,326	8,711	9,294	6,811	2,658
Water (AF)								
Incremental		110	885	5,748	12,701	11,546	8,984	1,782
Cumulative		110	995	6,743	19,444	30,990	39,974	41,756
Disturbed Area (Acres)								
Incremental		570	3,607	10,913	18,157	17,993	14,625	3,402
cumulative		570	4,177	15,090	33,247	51,240	65,865	69,267
Materials								
Steel (Tons)								
Incremental			740	3,315	38,188	65,561	57,278	33,369
Cumulative			740	4,055	42,243	107,804	165,082	198,451
Concrete (CY*1,000)								
Incremental			140	197	424	568	420	245
Cumulative			140	337	761	1,329	1,749	1,994
Asphalt (TNS*1,000)								
Incremental			110	1,309	1,333	546	304	
Cumulative			110	1,419	2,752	3,298	3,602	
Aggregate (CY*1,000)								
Incremental		40	359	3,429	7,582	6,257	4,783	231
Cumulative		40	399	3,828	11,410	17,667	22,450	22,681
Prime Coat (TNS)								
Incremental			403	6,073	5,947	2,580	1,113	
Cumulative			403	6,476		15,003	16,116	
Fencing (LF*1,000)								
Incremental				38	635	1,058	911	531
Cumulative				38	673	1,731	2,642	3,173

[1] Personnel numbers are yearly averages.

3324-3

Table 2.2-16. Total OB complex construction resources for portion of Alternative 8, Nevada/ Utah split basing.

CONSTRUCTION RESOURCES	QUANTITY PER YEAR							
	1982	1983	1984	1985	1986	1987	1988	1989
Personnel[1]	1,100	1,850	2,400	2,050	1,250			
Water (AF)								
Incremental	360	590	780	680	390			
Cumulative	360	950	1,730	2,410	2,800			
Disturbed Area (Acres)								
Incremental	1,670	2,920	3,750					
cumulative	1,670	4,590	8,340					
Materials								
Steel (TNS)								
Incremental		820	1,050	880	520			
Cumulative		820	1,870	2,750	3,270			
Concrete (CY*1,000)								
Incremental		140	180	150	90			
Cumulative		140	320	470	560			
Asphalt (TNS*1,000)								
Incremental			250	210	130			
Cumulative			250	460	590			
Aggregate (CY*1,000)								
Incremental	130	200	270	230	140			
Cumulative	130	330	600	830	970			
Prime Coat (TNS)								
Incremental			2,140	1,840	1,120			
Cumulative			2,140	3,980	5,100			
Fencing (LF*1,000)								
Incremental			5	40	23			
Cumulative			5	45	68			

[1]Personnel numbers are yearly averages.

3314-2

Table 2.2-17. Total OB complex construction resources for portion of Alternative 8, Texas/New Mexico split basing.

CONSTRUCTION RESOURCES	QUANTITY PER YEAR							
	1982	1983	1984	1985	1986	1987	1988	1989
Personnel[1]		300	1,850	2,400	2,000	1,200		
Water (AF)								
Incremental		110	640	830	710	400		
Cumulative		110	750	1,580	2,290	2,690		
Disturbed Area (Acres)								
Incremental		570	3,320	4,200				
cumulative		570	3,890	8,090				
Materials								
Steel (Tons)								
Incremental			740	950	800	460		
Cumulative			740	1,690	2,490	2,950		
Concrete (CY*1,000)								
Incremental			140	180	150	90		
Cumulative			140	320	470	560		
Asphalt (TNS*1,000)								
Incremental				250	210	130		
Cumulative				250	460	590		
Aggregate (CY*1,000)								
Incremental		40	230	300	250	140		
Cumulative		40	270	570	820	960		
Prime Coat (TNS)								
Incremental				2,200	1,840	1,060		
Cumulative				2,200	4,040	5,100		
Fencing (LF*1,000)								
Incremental					40	23		
Cumulative					40	63		

[1] Personnel numbers are early averages

Table 2.2-18. Total DDA construction resources for portion of Alternative 8, Nevada/Utah split basing.

CONSTRUCTION RESOURCES	QUANTITY PER YEAR						
	1983	1984	1985	1986	1987	1988	1989
Personnel[1]	121	1,9 4	6,224	6,743	6,323	4,450	1,208
Water (AF)							
Incremental	357	4,916	10,992	9,956	8,671	5,387	704
Cumulative	357	5,273	16,265	26,222	34,893	40,280	40,984
Distributed Area (Acres)							
Incremental	419	6,763	16,687	15,528	14,057	8,934	1,399
Cumulative	419	7,182	23,869	39,397	53,454	62,388	63,787
Steel (TNS)							
Incremental		2,036	35,447	50,745	50,972	40,443	15,856
Cumulative		2,036	37,483	88,229	139,201	179,644	195,500
Concrete (CY 1,000)							
Incremental		15	260	373	374	297	116
Cumulative		15	275	648	1,022	1,319	1,435
Asphalt (TNS 1,000)							
Incremental	160	983	1,007	874	256	133	
Cumulative	160	1,143	2,150	3,024	3,280	3,413	
Aggregate (CY 1,000)							
Incremental	188	3,180	6,694	5,448	4,784	2,686	
Cumulative	188	3,368	10,062	15,510	20,293	22,900	
Prime Coat (TNS)							
Incremental	587	3,593	3,681	3,195	935	488	
Cumulative	587	4,179	7,860	11,055	11,990	12,478	
Fencing (LF 1,000)							
Incremental		32	564	807	811	643	252
Cumulative		32	596	1,403	2,214	2,857	3,110
Protective Shelters							
Incremental		24	417	597	600	476	187
Cumulative		24	441	1,038	1,638	2,113	2,300
Miles of DTN Roads							
Incremental	35	211	217	188	55	29	
Cumulative	35	246	462	650	705	734	
Miles of Cluster Roads							
Incremental		331	901	722	733	413	
Cumulative		331	1,232	1,954	2,687	3,100	

[1]Personnel numbers are yearly averages.

4003-1

Table 2.2-19. Total DDA construction resources for portion of Alternative 8, Texas/New Mexico split basing.

CONSTRUCTION RESOURCES	QUANTITY PER YEAR					
	1984	1985	1986	1987	1988	1989
Personnel [1]	83	1,926	6,711	8,094	6,811	2,658
Water (AF)						
Incremental	245	4,918	11,991	11,146	8,984	1,782
Cumulative	245	5,163	17,154	28,300	37,284	39,066
Disturbed Area (Acres)						
Incremental	287	6,713	18,157	17,993	14,625	3,402
Cumulative	287	7,000	25,157	43,150	57,775	61,177
Steel (TNS)						
Incremental		2,365	37,388	65,101	57,278	33,369
Cumulative		2,365	39,753	104,854	162,131	195,500
Concrete (CY 1000)						
Incremental		17	274	478	420	245
Cumulative		17	292	770	1,190	1,435
Asphalt (TNS 1,000)						
Incremental	110	1,059	1,123	416	304	
Cumulative	110	1,169	2,293	2,709	3,013	
Aggregate (CY 1,000)						
Incremental	129	3,129	7,332	6,117	4,783	231
Cumulative	129	3,258	10,590	16,707	21,490	21,721
Prime Coat (TNS)						
Incremental	403	3,873	4,107	1,520	1,113	
Cumulative	403	4,276	8,383	9,903	11,016	
Fencing (LF 1,000)						
Incremental		38	595	1,035	911	531
Cumulative		38	632	1,668	2,579	3,110
Protective Shelters						
Incremental		28	440	766	674	393
Cumulative		28	468	1,234	1,907	2,300
Miles of DTN Roads						
Incremental	24	228	242	89	65	
Cumulative	24	252	493	583	648	
Miles of Cluster Roads						
Incremental		308	982	920	723	38
Cumulative		308	1,291	2,210	2,933	2,971

[1]Personnel numbers are yearly averages.

400 2-1

construction of protective shelters and roads, but not temporary facilities such as aggregate pits, etc. Reinforcing steel and plate steel make up the steel quantities. The quantities shown for aggregate include only road construction. There is no one peak year for all of the construction resources for either Nevada/Utah or Texas/New Mexico.

Requirements for certain resources, such as concrete and steel, are the same for Alternative 8 (Nevada/Utah/Texas/New Mexico) and the Proposed Action (Nevada/Utah). This is because these resources as used in the construction of the protective shelters and both the deployment systems have the same total number of shelters, 4,600. Requirements for other resources, such as aggregate, vary between the two deployment systems because the total length of road systems are different.

Operations Resource Requirements (2.2.4.4)

Generally, the resource requirements for operations for Alternative 8 will be the same as for the Proposed Action. There will be some minor variations because of an additional DAA in Alternative 8 and because the total road mileage is less for Alternative 8. See Section 2.2.1.4 for a discussion of the operations resource requirements for the Proposed Action.

NO ACTION ALTERNATIVE (2.2.5)

For purposes of this discussion, the No Action Alternative is defined as no deployment decision at this time. This will result in a continuation of existing trends in the candidate siting areas with consideration given to major planned projects other than M-X. The effects of projected growth vary regionally depending upon the type of resource and the stress on the resource supply.

Not selecting a basing location for the M-X sytem at this time will result in a continuation of these trends. This assessment of the future baseline of the region without the M-X system summarizes the non-project regional impacts upon the natural and human environments.

Natural Environment (2.2.5.1)

The natural environment resource categories are groundwater, surface water, air quality, mining and geology, vegetation, wildlife, aquatic species, protected species, and wilderness and significant natural areas.

Groundwater (2.2.5.1.1)

The groundwater resource category refers to subsurface water naturally contained in the zone of saturation which usually supplies wells and springs. Focus is on the anticipated agricultural, mining, and municipal uses of groundwater in each study area.

Nevada/Utah

Water use in the Nevada/Utah study area is expected to increase in the near future. Mining activity is projected to expand, resulting in increased water use. Also population growth is expected to increase water use. In addition irrigated

agricultural land is expected to expand, although not substantially. Two power plants that would utilize groundwater are planned for the study area: the White Pine Power Project estimated to require 26,000 acre-ft of water per year and the Intermountain Power Project expected to use 40,000 acre-ft of water per year. Water use in the Nevada/Utah study area is expected to increase in different locations from the M-X water demands.

Texas/New Mexico

Overdraft of groundwater is occurring in the Texas/New Mexico study area. As groundwater levels decline and pumping costs increase, the cost of water will increase to all sectors, including the mining industry. Water requirements for the oil fields may increase as enhanced recovery techniques such as water and steam injection are used. Total water use in the study area is projected to decrease about 7 percent from 1980 to the year 2000. Efforts are underway to convert irrigated land to dry farming and to identify alternative energy sources (biomass to fuel converted engines at Clovis, for example) to ensure the viability of agriculture in the region.

Surface Water (2.2.5.1.2)

The surface water resource category refers to all waters of the surface of the study area including fresh and salt water, ice, and snow. Concern in this discussion is focused on lakes, streams, and drainage areas that serve as conveyances or reservoirs for precipitation and runoff.

Nevada/Utah

Surface sources provide a significant amount of the available water in the Nevada/Utah study area. In the past, the presence of a surface water source facilitated development in the area. Presently, nearly all surface water sources are totally allocated and substantial further development is not possible. A change in the general use or availability of surface water sources is not predicted. The Harry Allen Power Plant would use about 10,000 acre-ft of surface water per year.

Texas/New Mexico

Virtually all surface water in the region is appropriated and is being used beneficially within the terms of international treaties, interstate compacts, court decrees, and state laws. A major exception is the Ute Reservoir, which has been appropriated by the New Mexico Interstate Stream Commission but is largely unused at present.

Other major surface water resources in the project area would be available only by purchase of water rights or lease of water from existing users. Water in Lake Meredith in Moore County, Texas, must be purchased from the Canadian River Municipal Water Authority. Rights to water, in storage along or flowing in the Pecos River in New Mexico, would have to be purchased or leased from irrigation districts.

Air Quality (2.2.5.1.3)

The air quality resource category is concerned with the acceptable pollution control level subject to state and federal regulation. These controls can constrain future regional growth and industrial development. For example, a future project with sulfur dioxide or particulate emissions will be required to limit ambient air quality impacts if the project site is in an area that has attained or plans to attain National Ambient Air Quality Standards (NAAQS). In "Clean Air" areas, impacts cannot exceed legally established and available "Prevention of Significant Deterioration" (PSD) increments (allowable changes). Project development will be limited to the availability of increments.

Nevada/Utah

Proposed industrial projects that may consume available increments include the General Battery Manufacturing Plant near Nephi, Utah, and Continental Lime Plant near Fillmore, Utah, and the Precision-Built Modular Home Manufacturing Plant near Delta, Utah. Proposed energy and mining development in the study region will also be potential increment consumers. There are 21 proposed mines in the study region including a Molybdenum Mining-Processing facility near Minersville, Utah, and a Martin-Marietta Cement Plant near Delta, Utah. Proposed energy-related projects include a geothermal power plant near Milford, Utah, a SUFCO Coal Loading facility near Nephi, Utah, the Intermountain Power Project in Millard County, Utah, and the Allen-Warner Valley Energy System in Warner Valley, Utah. Nonattainment areas where emission offsets or other control strategies may be required include Steptoe Valley and Las Vegas Valley in Nevada. In nonattainment areas, a proposed project may be required to obtain emission offsets, or other control strategies may need to be developed to demonstrate a net air quality benefit.

Texas/New Mexico

All of the Texas/New Mexico study area is in attainment of NAAQS for all pollutants, with the exception of dust. Total suspended particulate nonattainment areas are in Lea and Eddy counties in southern New Mexico. Therefore, PSD increments will be the overriding constraint on future development. Predictions for industrial growth in the Texas/New Mexico study area are uncertain. Any industrial or energy development in the area would tend to reduce air quality.

Mining And Geology (2.2.5.1.4)

The mining and geology resource category pertains to the process of extracting mineral deposits or building stone from the earth. The hydrocarbon group, i.e., oil, natural gas, and coal are included in the resource category.

Nevada/Utah

Estimates indicate a 60 percent growth in the mining industry in Nevada by the year 2000; an increase of about 20 mines. Old deposits will be reopened as the value of minerals exceed economic thresholds. Controlling factors would be the accessibility of the locations, the availability of water, and the availability of skilled labor.

Texas/New Mexico

Mining is of relatively minor importance in the Texas/New Mexico study area, although major extraction of oil and gas occurs on the periphery. Some exploration for uranium is occurring in the area and interest in non-metallic resources exists, particularly gypsum. Also, a carbon dioxide gas field is being developed in New Mexico to support secondary recovery from oil fields in Texas. In proven oil fields of eastern New Mexico and the Texas Panhandle around Roswell, Clovis, Amarillo, and Dalhart there is a high potential for increased future production of hydrocarbons. Improvements in exploration techniques are leading to the discovery of new fields.

Vegetation (2.2.5.1.5)

The vegetation resource category refers to the plant life and/or the total plant cover of a given area. Vegetative cover prevents erosion, aids in percolation of water from rainfall, provides wildlife with habitat, is of value to the livestock industry, and can contribute to the aesthetic value of an area.

Nevada/Utah

A continued loss and degradation of native vegetation is anticipated. This trend is expected as a result of energy resource development, population growth, increases in recreation, and greater use of water resources. Continued overgrazing in certain locations is projected to continue, but BLM allocations of land for grazing are currently undergoing a major review designed to reduce potential overgrazing during the next decade.

Texas/New Mexico

In the Texas/New Mexico study area, no change is expected in the status of undisturbed native vegetation; which exists only as small patches scattered throughout rangeland and farmland. Small population growth estimates concentrated in the larger towns make significant loss of undisturbed native vegetation unlikely. Potential changes in land use, due to aquifer overdrafts, should not affect the native vegetation. No major projects involving extensive land use changes are planned for the region.

Wildlife (2.2.5.1.6)

The wildlife resource category refers to terrestrial vertebrates that are neither human nor domesticated, and includes mammals, birds, and fish hunted and observed by man.

Nevada/Utah

The Bureau of Land Management (BLM) protects rangelands through allotment management plans which should have beneficial effects on some wildlife species. Populations of most wildlife species are projected to remain stable, with increases in a few (e.g., pronghorn and elk) as a result of state wildlife management programs and decreases in a few (e.g., bighorn sheep). In general, major construction projects and increases in mining throughout the region will have a negative effect on the wildlife through poaching, hunting, and habitat disturbance.

Texas/New Mexico

Projected changes in wildlife are dependent upon changes in agriculture land use. Approximately 90 percent of the land is used for rangeland or agriculture, of which 25 percent is irrigated cropland and 15 to 20 percent is dryland farming. These proportions are projected to change as groundwater becomes increasingly expensive to pump causing dryland farming to increase relative to irrigated farming. No major changes in wildlife abundances or species composition are foreseeable until aquifer overdrafts cause the proportion of cropland to rangeland to shift toward the latter use.

Aquatic Species (2.2.5.1.7)

The aquatic species resources category pertains to all species that inhabit surface water for all or most of their life cycle.

Nevada/Utah

Habitat conditions in many isolated springs and streams in the study area have been degrading both recently and in the distant past. This has resulted primarily from irrigation and livestock water use. Examples include the recent extirpation of Rhynichthys osculus relicus in Snake Valley, Utah, (Crist and Holden, 1980), and the extirpation of the White River spinedace and large population reduction in the desert sucker, both from Preston Big Spring, White River Valley, Nevada (Deacon et al., 1980). Recreational activities and introduction of exotic species in addition to the above mentioned stresses have interacted to reduce the Pahranagat roundtail chub in Ash Springs outflow, Nevada, to less than 45 adults (Deacon et al., 1980). Additional future stresses from projects such as the White Pine Power Project can be expected to reduce further the viability of some additional endemic aquatic species populations.

Pressures from existing stresses of livestock and irrigation water use are expected to remain approximately constant or gradually increase over the next 20 years. Regulation of water use along with protected species surveillance and legislation should protect the existing conditions so that new extirpations or extinctions of imperilled aquatic species should occur less frequently than during the last 20-50 years. Major new projects or activities will require impact assessments which should, in most cases, favor imperilled species protection and maintenance of the status quo.

Texas/New Mexico

The increase in endemic species rarity has resulted over the past 20-50 years chiefly from exploitation of the available resources for agricultural and livestock purposes; these trends are not expected to continue. Strict legislation both by state and federal governments has recently been enacted in order to protect the remaining populations of imperilled species. Major new activities and/or projects will require impact analyses and mitigations that, in most cases, will benefit protected and recommended protected aquatic species. Conditions of existing populations, thus, are not expected to degrade significantly in the next 20 years.

Protected Species (2.2.5.1.8)

The protected species resources category is concerned with those listed and proposed threatened and endangered species under Section 7 of the Endangered Species Act of 1973 and similar state endangered species legislation.

Nevada/Utah

If management plans for population recovery succeed, most protected species are expected to increase in numbers over the next 20 years. All threatened and endangered species in the Nevada/Utah study area are so classified because they have shown recent, steep declines in abundance. Their present rarity is directly or indirectly due to human activities such as habitat destruction, illegal shooting or capture, and poisoning. The legal protection afforded these species is recent and is designed to reverse their trend toward extinction.

Texas/New Mexico

Given the lack of other major projects, the slow population growth and the minimal change in present land use patterns for the near future, it is unlikely that the status of any of the protected animal species in the Texas/New Mexico study area will decrease appreciably. Management plans for these species may even cause an improvement in status.

Wilderness and Significant Natural Areas (2.2.5.1.9)

The wilderness and significant natural areas resource category is applicable to all land meeting wilderness criteria and set aside under the Wilderness Act of 1964 and the Federal Land Policy Management Act.

Nevada/Utah

The BLM is examining its holdings in an attempt to identify areas meeting wilderness criteria. The maximum estimate of possible BLM established wilderness areas in the region, is approximately the size of Delaware. Final determinations for these lands are not scheduled for completion until 1991. In addition to the BLM lands is the proposed Great Basin National Park which could bring close to a million visitors into the region.

Texas/New Mexico

There are no plans for new state parklands in the Texas Panhandle. In New Mexico, a new state park is being developed 80 mi northwest of Clovis on the Pecos River and two are proposed: one near Hobbs, in Lea County, and one near Tucumcari. The possible inclusion of Mescalero Sands and Sabinosa designated wilderness study areas in the Wilderness system will be decided in the near future.

Human Environment (2.2.5.2)

The human environmental resource categories are employment and labor force, population, housing, public finance, community infrastructure, quality of life, transportation, energy, land ownership, land use (grazing, cropland, and recreation),

Native Americans, archaeological and historical resources, and construction resources.

Employment and Labor Force (2.2.5.2.1)

The employment resource category pertains to the total employment, unemployment, and the local labor force of the designated regions of influence.

Nevada/Utah

Major anticipated activities are primarily associated with mineral extraction and processing and/or electrical energy production. In the Nevada study area four large projects are anticipated to occur during the next decade: the White Pine Power Project, the reopening of Kennecott Copper Company's mine near Ruth, and metal processing in McGill in White Pine County and the Anaconda Nevada Molybdenum Project in Nye County. In the Utah study area six anticipated projects are expected to have direct employment effects: Alunite Mining and Processing, Roosevelt Hot Springs Geothermal Energy Exploration and Power Plant, Pine Grove Molybdenum Project, Intermountain Power Project, Martin Marietta Cement Plant, Continental Lime Cement Plant, and Precision-Built Modular Home Manufacturing.

Texas/New Mexico

Major anticipated employment activities in the study area are primarily associated with electric power generation, highway expansion, and carbon dioxide and coal slurry pipelines. The Southwestern Public Service Company is planning and building two large coal-fired electrical generating units, Tolk 1 and Tolk 2, in Lamb County, Texas. The Texas Department of Highways and Public Transportation is planning major improvements to Interstate 27 over a 115-mi stretch from Amarillo to Lubbock. The Amoco pipeline project is designed to bring carbon dioxide (CO_2) from wells in Colorado to the Texas/New Mexico area that will traverse Union, Harding, Quay, Curry, and Roosevelt counties. Shell and Mobil plan to construct a pipeline to transport CO_2 across New Mexico in a northwest-southeast direction transversing Chavez and DeBaca counties within the Texas/New Mexico region. Arco plans to build a pipeline to transport CO_2 across the region from north to south through Union, Quay, Curry, and Roosevelt counties. Finally, the San Marco Pipeline Company plans to build a 900-mile coal slurry pipeline, 80 mi of which would cross Union County in the northeastern corner of New Mexico.

Population (2.2.5.2.2)

The population resources category focuses on the estimated and projected number of inhabitants of the designated regions of influence from 1982 through 1994.

Nevada/Utah

Population is projected to increase by approximately 498,000 persons through 1994, raising the population from approximately 1.45 million persons in 1982 to 1.95 million. The 12-county Nevada/Utah region is expected to grow at a 2.5 percent compound annual rate between 1982 and 1992, with Nevada growing by 2.9 percent and Utah by 2.3 percent. This growth is the result of some expanded energy and mineral activities within the two states and the high birth rate, notably in Utah.

Texas/New Mexico

The 25-county Texas/New Mexico region is projected to grow at a 1.0 percent compound annual growth rate between 1982 and 1994, with the 17 Texas counties growing at a 1.1 percent annual rate and the eight New Mexico counties at a 0.60 percent annual rate. Population is projected to grow by 86,000 persons, from 694,000 persons in 1982 to 780,000 persons by the end of 1994.

Housing (2.2.5.2.3)

The housing resource category refers to the housing unit requirements in the designated regions of influence.

Nevada/Utah

By 1994, housing unit requirements are projected to total approximately 663,000. This will represent a 35 percent increase over the number of estimated units in 1982. Of the total in 1994, 268,000 units or 40 percent are anticipated to be required in Nevada, virtually all in Clark County, and 395,000 or 60 percent in Utah, principally in Salt Lake/Utah counties.

Texas/New Mexico

By 1994, housing unit requirements in the Texas/New Mexico region are projected to equal 276,000 units, an increase of 12 percent over the number of dwellings in 1982. Of the total required units in 1994, 52,000 or 19 percent are anticipated to be needed in New Mexico, principally in Chaves County, and 224,000 or 81 percent in Texas, with most concentration in Lubbock and Potter/Randall counties.

Public Finance (2.2.5.2.4)

The public finance resource category is concerned with the projected revenues, expenditures, and capital expenses of all local governments within the designated regions of influence.

Nevada/Utah

The region is anticipated to experience moderate to high rates of growth. Proposed energy and mineral developments anticipated in the Nevada/Utah study area will contribute to these growth rates. Local governments charged with the provision of public services to the residents within each jurisdiction do not have the wide variety of tools available to raise the necessary monies to support public service demands as they have had in the past. At present, the future of federal revenue sharing programs and other similar local government and programs are highly uncertain in light of recent efforts calling for a balanced federal budget.

Texas/New Mexico

Growth rates are projected to be relatively low and local governments will probably experience few problems providing necessary services. The Clovis Municipal School District and Dalhart Independent School District do not expect enroll

ment demands in excess of capacity under projected growth conditions through 1994. With no other major construction projects anticipated in the region local governments should enjoy relatively stable growth and not experience any adverse effects associated with rapid large-scale growth.

Community Infrastructure (2.2.5.2.5)

The community infrastructure resource category is related to physical and manpower requirements in education, health care, public safety (both law enforcement and fire protection) water supply, wastewater treatment, solid waste management and community recreation within the designated regions of influence.

Nevada/Utah

The community infrastructure of the Coyote Spring Valley, Ely, Beryl, Milford and Delta vicinities are presented collectively. Student enrollments and teacher requirements are projected to increase, on average, by about 40 percent over the period 1982-1994, with most growth concentrated in the Coyote Spring Valley vicinity. Very little growth is forecast for both Milford and Ely. Similar percentage increases are forecast for other infrastructural elements, e.g., health services and police and fire personnel, since they also are projected on the basis of population growth. Since the regional potable water system has some excess capacity, most systems can answer future demands. Most wastewater and solid waste systems are capable of absorbing future demands with limited improvements. Also, regional urban recreational facilities are sufficient to meet future use requirements.

Texas/New Mexico

The community infrastructures of the Clovis and Dalhart vicinities are presented together. Most growth in student enrollments and teacher requirements are projected for the Dalhart area, with a 20 percent increase over the 1982-1994 period. Student enrollments and teacher requirements in Clovis on the other hand, are forecast to remain almost unchanged over the same period. There are no anticipated increases in physicians from 1982 to 1994 and in Clovis, for registered nurses either. In the Dalhart area, the number of nurses is projected to increase almost 20 percent, or 9 nurses, over the 1982-1994 period. The number of police and fire personnel is projected to remain almost unchanged during the same period. Under the slight projected population increases, the remaining infrastructures: potable water systems, wastewater treatment, solid waste disposal, and community recreation, seem sufficient to absorb increased demand with limited improvements.

Quality of Life (2.2.5.2.6)

The quality of life resource category, as defined for this discussion, is the composite of social organization, community service, and economic health which alter the perceived or actual degree of merit of the human experience.

Nevada/Utah

The 12-county Nevada/Utah growth is the result of expanded energy and mineral activities within the two states and the high birth rate, notably in Utah. At specific locations the current life style of rural small community will be impacted

by large projects. Some job opportunities and per capita newcomers are expected to increase the shift from agricultural to urban.

Texas/New Mexico

At the 25-county region level changes in the quality of life can be assumed to be relatively minor. The low overall rates of growth are expected to produce little social disorganization and no taxing of community services. At the regional level, job opportunities and income improvements, while being steady, are not likely to be extraordinary, and a migration of the young to larger urban centers in search of employment diversity is expected to continue.

Transportation (2.2.5.2.7)

The transportation resource category focuses on federal and state road networks, traffic volumes, future roadway requirements and airport and railroad service.

Nevada/Utah

The highways are primarily two-lane roads with the exception of the Interstate routes on the periphery of the region. The road system is not extensive compared to most areas of the country and accessibility to many areas is poor. The region as a whole is expected to increase in population by about 35 percent over the 1982 - 1994 period. A corresponding increase in traffic should be easily accommodated by the existing road system because none of the current traffic volumes are near the existing capacities. However, traffic problems could develop at individual locations in the vicinity of major projects that may be constructed. Appropriate roadway improvements would be required to mitigate those potential traffic problems.

The region is served by two railroads which are expected to continue to provide service to the area. Major airports at Las Vegas, Salt Lake City, and Reno provide service to the region along with smaller airports at other communities. No significant change in the airline service to the region is foreseen.

Texas/New Mexico

Most of the Texas/New Mexico region road network is composed of two-lane roadways but a substantial portion is four-lane roadway. The existing system has sufficient capacity to accommodate present as well as future needs, particularly given the small expected 10 percent increase in population by 1992. A corresponding increase in traffic should, in general, pose no problem for the existing road network. However, within the region, isolated communities may develop traffic problems as a result of growth in the immediate vicinity, but appropriate road improvements should mitigate most problem areas.

The region is served by three major railroads which are expected to continue to provide service to the area. The major commercial airports in the region are Clovis and Amarillo and no significant change in service is foreseen.

Energy (2.2.5.2.8)

The energy resource category focuses on two aspects of projected energy use: 1) electric power demands and 2) petroleum products and natural gas consumption.

Nevada/Utah

The region is serviced by regions 27, 28 and 30 of the Western System Coordinating Council. Under summer conditions peak demand is projected to increase from approximately 64,000 megawatts (MW) in 1980 to 77,000 MW in 1985 and to 89,000 MW in 1989. Under winter conditions peak demand is projected to increase from approximately 65,000 MW in 1980 to 78,000 MW in 1985 and to 89,000 MW in 1989. In general, slight decreases are projected in consumption of petroleum, natural gas, fuel oil, heating oil, and gasoline for the 1980 to 1990 period. Only jet fuel is projected to be increasingly consumed in this period.

Texas/New Mexico

The region is serviced by Region 22 of the Southwest Power Pool. Under summer conditions peak demand is projected to increase from approximately 13,000 MW in 1980 to 17,000 MW in 1985 and to 21,000 MW in 1989. Under winter conditions peak demand is projected to increase from approximately 10,000 MW in 1980 to 13,000 MW in 1985 and to 16,000 MW in 1989. As with the Nevada/Utah region, slight decreases are projected in consumption of petroleum, natural gas, fuel oil, heating oil, and gasoline for the 1980 to 1990 period.

Land Ownership (2.2.5.2.9)

The land ownership resource category pertains to the current and projected patterns of tract holdings in the designated regions of influences including land held by federal, state, and local governments and private industry and individuals.

Nevada/Utah

Of the land ownership types in the region, federal land is subject to the greatest adjustments. Several proposals exist to convert public lands to private or state ownership or to change the administrative status. These include mining claims, the Desert Land Entry Program, Indian Reservation Land Expansion, Wilderness Areas withdrawals, Nevada and Utah state park proposals, and National Park Service proposals.

Texas/New Mexico

The vast majority of the land in the Texas/New Mexico region is privately owned. Some BLM-administered land is located chiefly in the eastern portions of Chaves County. Less than 6 percent of the total area is state owned and this state owned land is located entirely in New Mexico.

Land Use (2.2.5.2.10)

The land use resource category focuses on three resources: grazing, cropland, and recreation. Grazing lands are typically native, unimproved, xeric regions used

primarily for livestock and wildlife forage production. Recreational land use is limited to outdoor leisure outlets.

Nevada/Utah

Agricultural development in Nevada and Utah is primarily geared to the livestock industry representing up to 70 percent of the agricultural dollar value in Nevada. Livestock is the predominant industry in the Nevada study area and is expected to remain so. Overall, about 79 percent of Nevada and 77 percent of Utah is grazed. In Nevada future land area requirements for irrigated agriculture were assumed to remain constant through the year 2000. However, this assumption is questionable pending the final disposition of the Carey and Desert Land Entry Land Acts. In Utah by the year 2000 it is projected that cropland area will increase 3.6 percent. The dominant recreational activities in Nevada and Utah are water-related, vehicle-related and "relaxing outdoors." Dispersed recreation is probably the primary attraction in the study area and of the most consequence to environmental concerns.

Texas/New Mexico

Farming and grazing are the major land uses in the region. Agriculture and livestock industries constitute a substantial part of the economy and can be expected to continue to do so in the future. For New Mexico, the future projections identify increases in the irrigated acreages for six of the eight study area counties. In Texas, a decrease of 1.5 percent is projected by the year 2000 due to the conversion of irrigated land to dryland. In the region, projected demands for developed outdoor recreation are closely corrolated to local population growth.

Native Americans (2.2.5.2.11)

The Native American resource category pertains to the cultural resource base and traditional lifestyles of indigenous tribal inhabitants. Culturally significant resources include ancestral sites, sacred areas, native plants and animals, and free access to areas considered essential for cultural perpetuation.

Nevada/Utah

Native Americans in the region are expected to continue the gradual process of growth and economic diversification and efforts for expansion of tribal land and water resources, both of which are necessary for economic survival and future development. Stable social and cultural conditions will provide the opportunity for self-directed growth and the maintenance of Native American traditions and identity.

Texas/New Mexico

In this region, increased recreational activity will facilitate unauthorized excavation (pot hunting), vandalism, and unintentional disturbance. Projected road improvements would not significantly increase the potential for public access to culturally significant sites. No Native American socioeconomic resources have been identified within the region.

Archaeological And Historical Resources (2.2.5.2.12)

The archaeological and historical resource category pertains to sites of paleohistoric and historic events with scientific and cultural significance normally eligible for the National Register of Historic Places and protected by federal laws and regulations.

Nevada/Utah

The regional conditions of high depositional integrity and research potential are expected to persist. Some cultural resources will be impacted in facility construction areas and along transmission line corridors of the White Pine Power Project and the Intermountain Power Project, but the overall impact of this development will be limited. A minimal effect on the entire Great Basin resource base will be experienced, although general impacts due to increased population are anticipated.

Texas/New Mexico

Known potentially significant archaeological resources in the region tend to be concentrated in deeply stratified deposits in ravines and in stratified and unstratified dune areas on the Llano Estacado, along drainages and near other water sources in the Canadian and Pecos River valleys on the Panhandle High Plains. Cultural resources in these areas are generally well preserved because of remoteness and physical character of the location. However, direct impacts to archaeological resources will occur near urban centers as a result of quarrying, construction of artificial lakes, and flood control. These activities will not affect the majority of resources which are located in isolated rural areas. Some indirect impacts such as vandalism and looting to sites in or adjacent to recreation areas will also increase. In general, even with these direct and indirect impacts, the remaining cultural resource base will be preserved.

Construction Resources (2.2.5.2.13)

The construction resources category pertains to the future supply and demand of cement and steel for industrial, public works, and utility projects.

Nevada/Utah

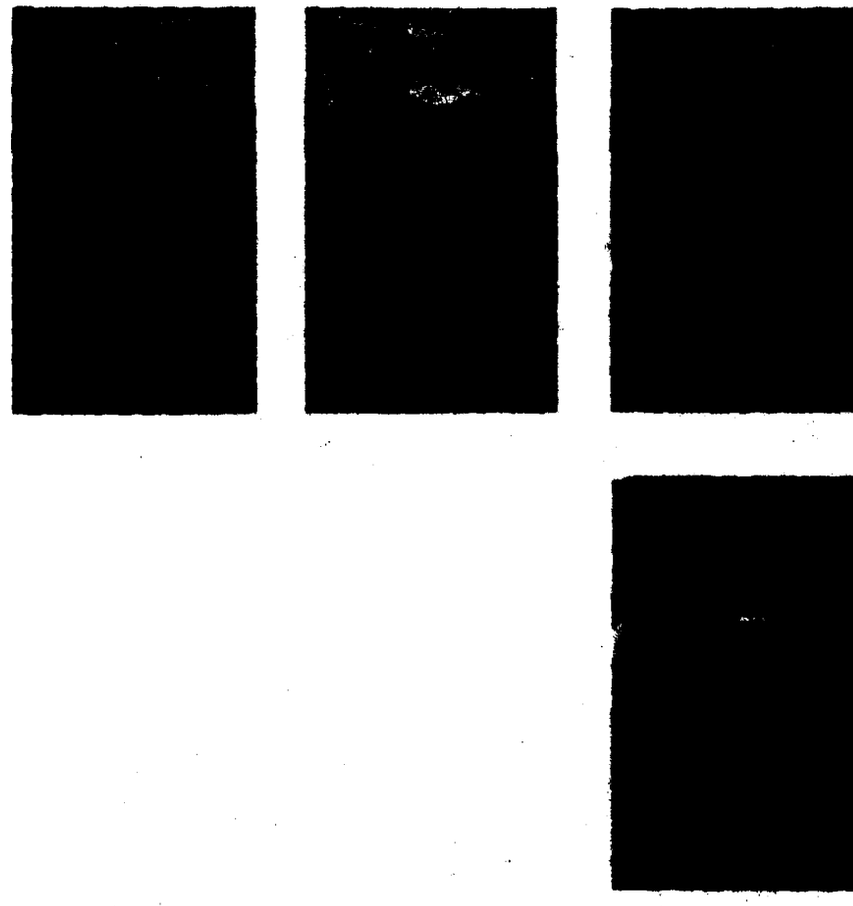
The regional market area for cement and steel includes Arizona, California, Colorado, Idaho, Montana, Oregon, Nevada, New Mexico, Utah, Washington, and Wyoming. For cement, steady increases are projected between 1980 and 1989 in the value of construction contracts (71 percent), production (30 percent), consumption (25 percent), and mill value (63 percent). In 1979 total capacity associated with a one percent increase in capacity utilization was 16,560 tons for reinforced steel production and 45,620 tons for raw steel production. Many steel plants in the market area have the production equipment in-house to increase output under normal market conditions, if demand warrants.

Texas/New Mexico

The regional market area for cement is Arizona, Arkansas, Colorado, Kansas, Louisiana, Mississippi, Missouri, Oklahoma, New Mexico, Texas, and Utah. Steady

increases are projected for cement between 1980 and 1989 in the value of construction contracts (77 percent), production (16 percent), consumption (30 percent), and mill value (62 percent). The steel market area includes Arizona, Colorado, Oklahoma, New Mexico, Texas, Utah, and the southern portions of California and Nevada. Total capacity associated with a one percent increase in capacity utilization for 1979 was 22,370 tons for reinforced steel production and 58,640 tons for raw steel production. If demand is sufficient, many steel plants in the market area have the potential to increase output under normal market conditions.

Proposed Action



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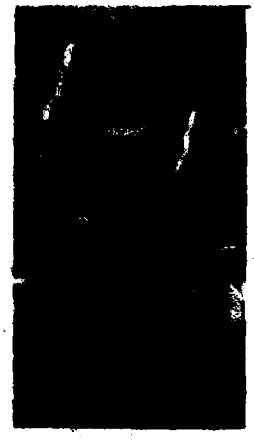
Proposed Action:

Coyote Spring Valley

Milford



IMPACTS OF THE PROPOSED ACTION

This section presents a summary of potential impacts to important resources. Conclusions are presented for the Proposed Action and each alternative. Applicable mitigation measures are integrated into the methodology and impacts sections.

The region of influence for natural or biophysical resources is the hydrologic subunit and the county unit is used as a region of influence for human or socioeconomic resources in Nevada/Utah. Further information and expanded details are provided in Chapter 4.

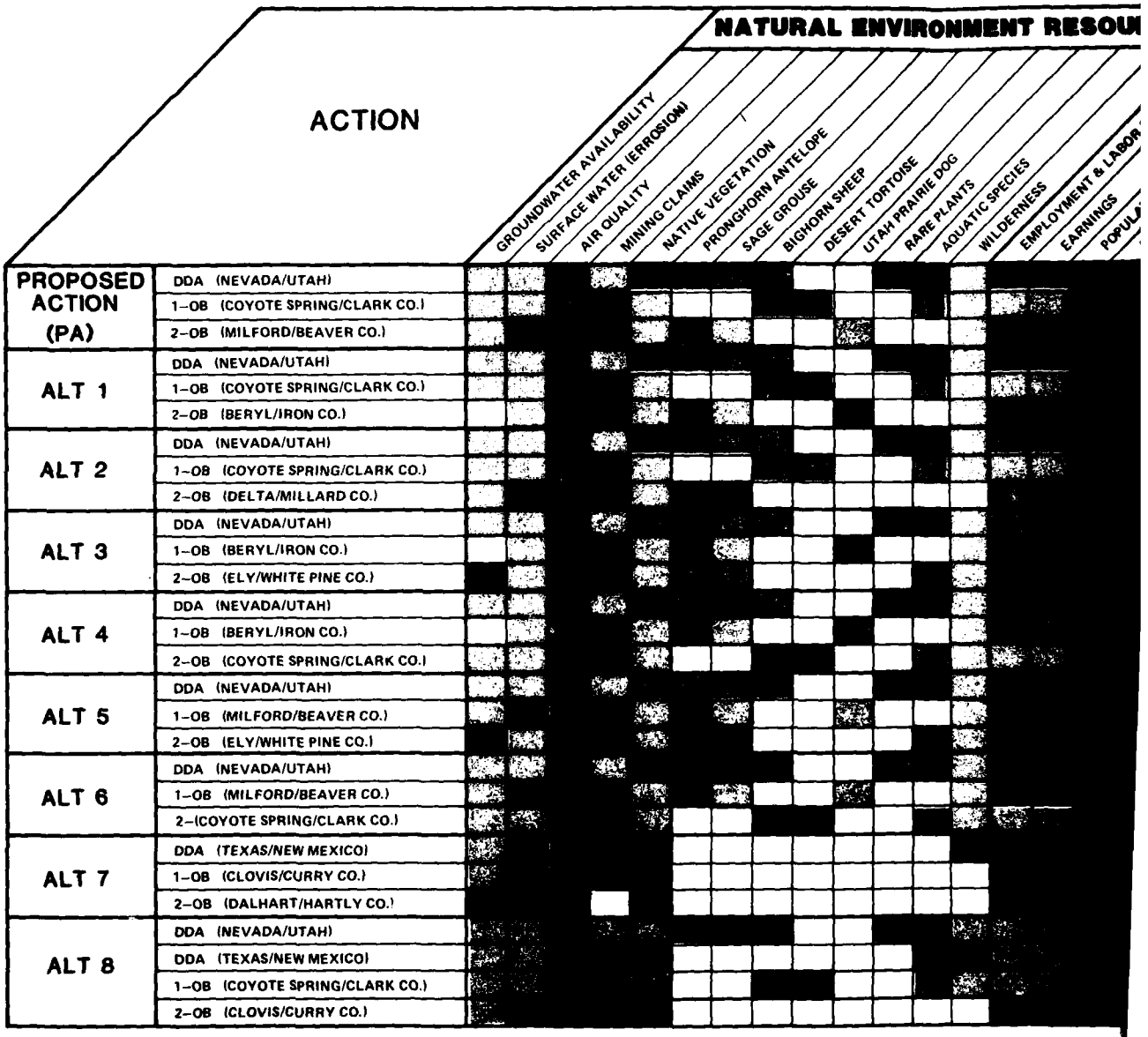
The overall discussion contained in Chapters 2 and 4 is reduced to two summary figures in this introduction. Figures 2.3-1 and 2.3-2 summarize impacts of the Proposed Action and the eight alternatives considered in Section 2.4 through 2.11 for short-term and long-term impacts, respectively. The anticipated impact levels are more fully developed in Chapter 4 where individual hydrologic subunits (Nevada/Utah) and counties (Texas/New Mexico) are evaluated. The impact levels shown in the two figures are summarized for each alternative in the resource-by-resource discussion below.

GROUNDWATER (2.3.1)

Water resources would be developed to meet short-term (2 to 5 years) M-X construction and longer-term (30 years) operation needs. The most significant M-X impacts would be lowering of groundwater levels. This could include a general lowering of the groundwater level over an entire valley or a local decline associated with a cone of depression surrounding an active well. These impacts include potential reduced spring flows, interference with present well users, reduction of regional groundwater flow, reductions in water quality, and, in extreme cases, land subsidence. Some impacts may be temporary, particularly in the DDA where water use would be short-term, and often the groundwater source could be expected to recover after M-X use ends. These impacts assume that the state engineers authorize groundwater withdrawals in the amount expected to be required. If they are not approved, water would have to be obtained by lease or purchase of water

Fig 2.3-1 **SUMMARY COMPARISON O**

BETWEEN THE PROPOSED



1. WHILE THERE MAY BE AN OVERALL ESTIMATE OF NO IMPACT OR LOW IMPACT WHEN CONSIDERING THE DDA REGION AS A WHOLE, IT MUST BE RECOGNIZED THAT DURING SHORT-TERM CONSTRUCTION ACTIVITIES, SPECIFIC AREAS OR COMMUNITIES WITHIN OR NEAR THE DDA COULD BE SIGNIFICANTLY IMPACTED. THESE LOCAL IMPACTS ARE ANALYZED ON A HYDROLOGICAL SUBUNIT OR COUNTY BASIS IN CHAPTER 4.

2. THE REDUCTION IN DDA SIZE FOR NEVADA/UTAH UNDER ALTERNATIVE 8 DOES NOT NECESSARILY CHANGE THE SIGNIFICANCE OF IMPACT ON A SPECIFIC RESOURCE. MANY IMPACTS OCCUR IN A LIMITED GEOGRAPHIC AREA WHICH IS INCLUDED IN BOTH THE FULL AND SPLIT DEPLOYMENT DDAs, OR ARE SPECIFIC TO THE OB SUITABILITY ZONE..

2-117/2-118

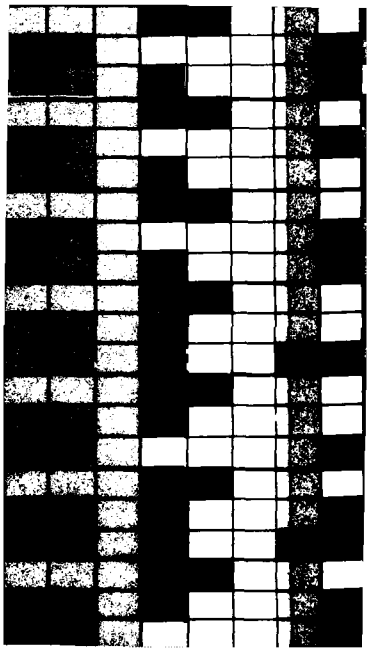
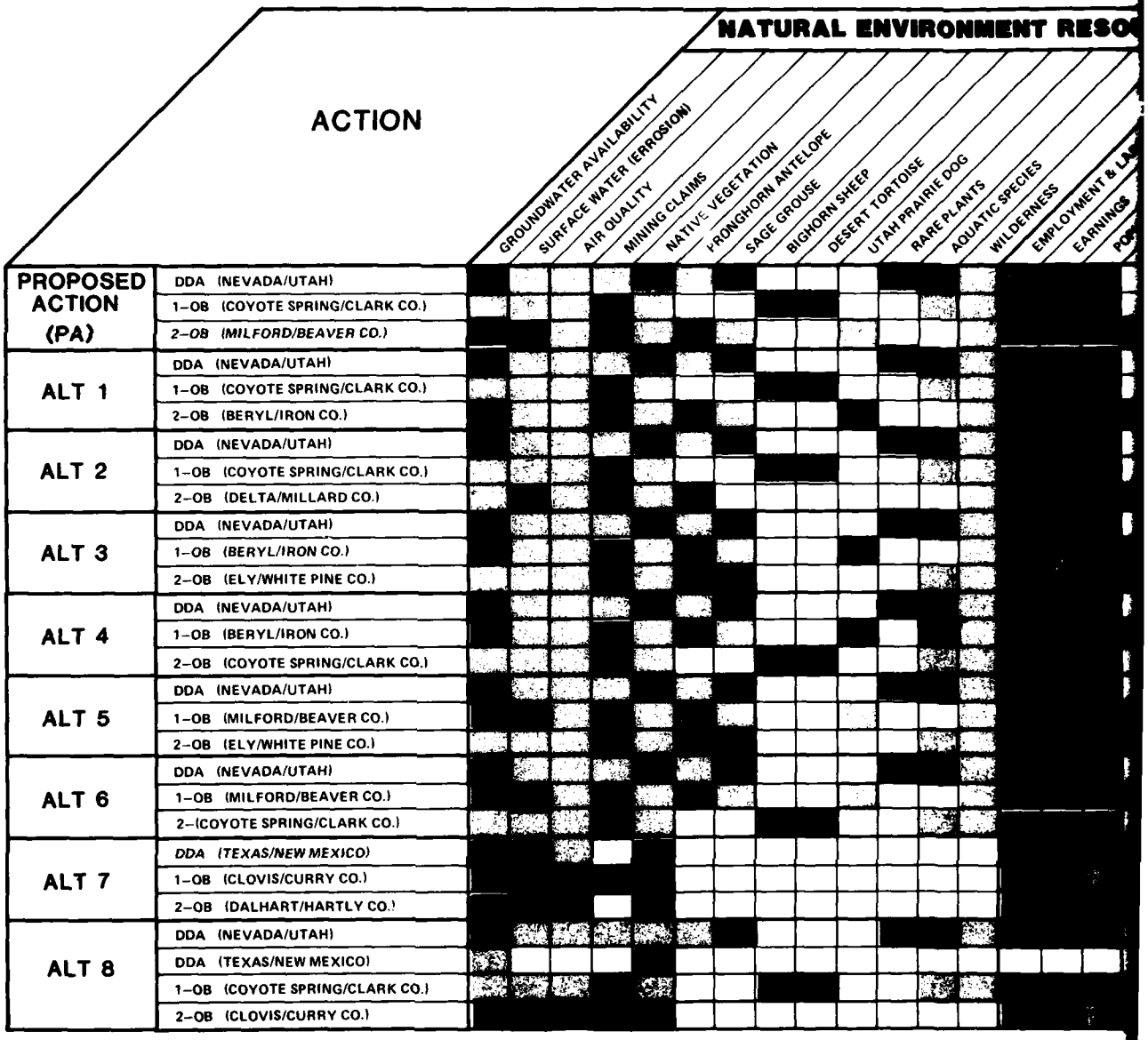


Fig 2.3-2 SUMMARY COMPARISON

BETWEEN THE PROPOSED



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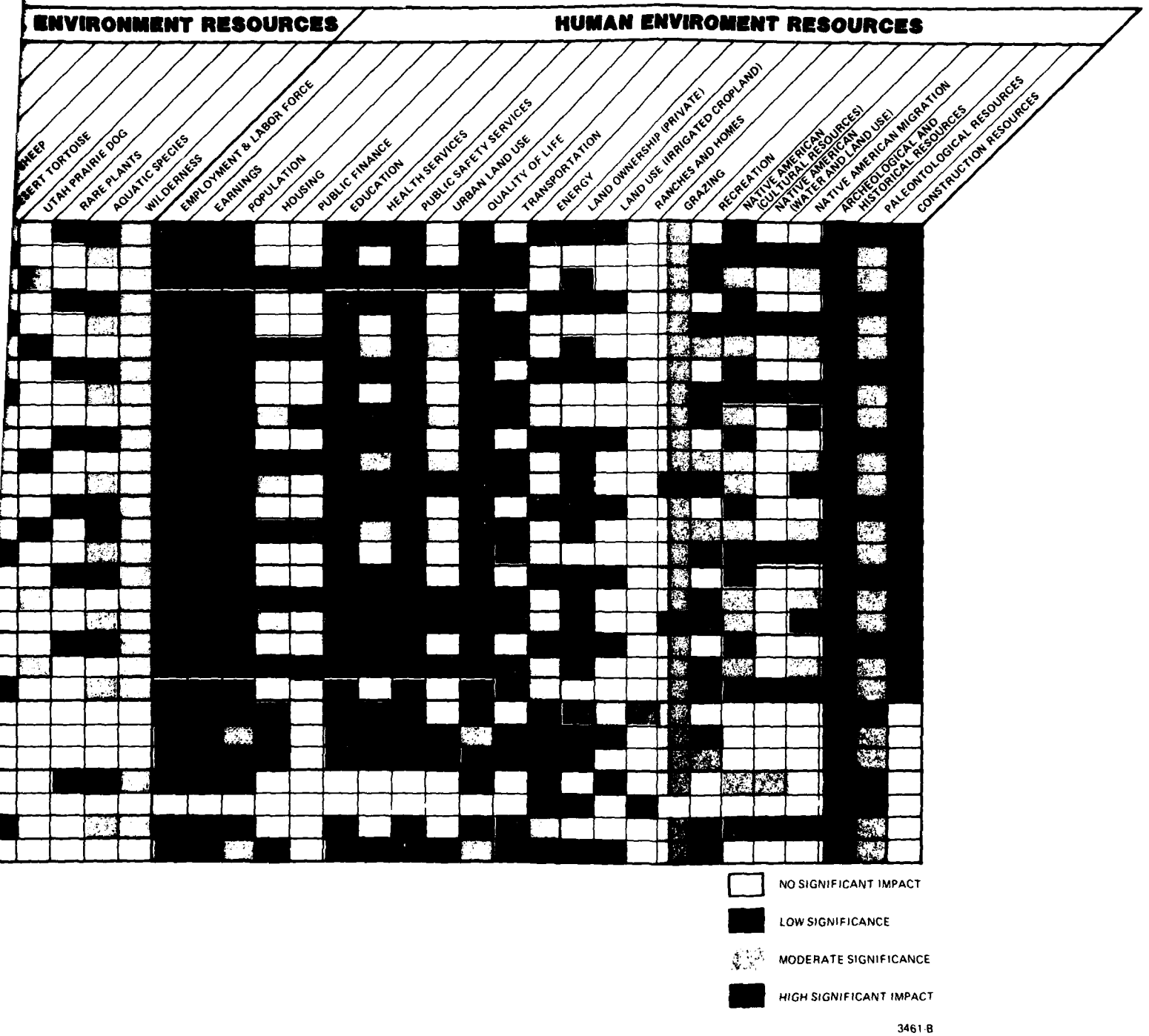
RY COMPARISON OF LONG TERM IMPACT SIGNIFICANCE
IN THE PROPOSED ACTION AND ALTERNATIVES[1,2]



2-119/2-120

rights from present users, interbasin transfer (which also requires state approval), or temporary trucking of water. Use of presently established water rights by the Air Force or damage to them would require that the owner be void just conpensation.

Factors used in the analysis were current use, M-X needs, water in storage, estimated perennial yield, and legal constraints. The analysis was performed by hydrologic subunit. In some hydrologic subunits, the estimated perennial yield is currently being exceeded by withdrawals, implying that the groundwater table is being lowered.

DDA construction would be primarily in the Great Basin drainage system with some facilities in the Colorado River Basin. DDA construction may compete with other major projects and new small users. Competing water demands were considered for identified potential new users at the alternative OB locations.

DDA hydrologic subunits expected to receive significant short-term impacts are Pine, Wah Wah, Monitor, Ralston, Stone Cabin, Penoyer, Coal, and Lake. Over the long term, no DDA subunits are expected to receive more than moderate impacts, which are not considered significant.

Coyote Spring OB is in the White River groundwater subsystem of the Colorado River drainage basin. Subsurface flow is from north to south, through the Pahranagat and Coyote Spring hydrologic subunits, to the Upper Moapa Valley where the water reaches the surface at Muddy River Springs. The water is now used for irrigation by Moapa Reservation Native Americans, and farming is their economic base. M-X water use could result in a significant adverse impact on agricultural users and aquatic species.

OB construction needs are predicted to be small and short-term. OB operations water requirements if drawn from Coyote Spring, Kane Spring, and Upper Moapa Valley hydrologic subunits would be in excess of recharge. The potential adverse significant short- and long-term impacts at the Coyote Spring OB could be mitigated by reducing water use or importing water from the Clark County Colorado River Basin allotment.

The Milford OB area has a declining water level due to overdrafting and it is unlikely that new appropriations of groundwater would be authorized. Water for OB use would probably have to be purchased from present agricultural users. This could potentially remove 2,000 acres from irrigated farm use. If existing water rights are purchased, additional impacts would be possible due to a change in the location and size of the diversion.

Based on available data, the analysis presented in Chapter 4, and scientific judgment, the preferred alternative from the perspective of groundwater availability would be Alternative 7 with deployment in Texas/New Mexico and operating bases at Clovis and Dalhart. The alternatives would be ranked as follows:

Proposed Action	Seventh
Alternative 1	Ninth
Alternative 2	Fifth
Alternative 3	Third
Alternative 4	Eighth
Alternative 5	Second
Alternative 6	Sixth
Alternative 7	First
Alternative 8	Fourth

SURFACE WATER (2.3.2)

Construction of roads across bajadas would increase water erosion and sedimentation impacts during major storms. Accelerated erosion and sedimentation impacts during the undercutting of roads would include widening and deepening of gullies, siltation of surface waters and fields, filling of highway and irrigation ditches, and the plugging of culverts. Erosion causes the more productive surface layers of soil to be removed, making revegetation more difficult. Engineering designs could reduce impacts of roads crossing natural drainages.

Subunits with high, short-term erosion impact ratings are Snake, Pine, Tule (White), Wah Wah, Kobeh, Monitor, Antelope, Garden, Jakes, and Cave. Low ratings were given Government Creek, Sevier Desert, Pahranagat, and Pahroc. The remaining subunits have a moderate, short-term potential for erosion impact.

The Coyote Spring OB in the Coyote Spring and Muddy River Spring hydrologic subunits has a moderate short-term potential erosion impact rating. The rating is due to construction activities, moderately stable undisturbed soils, and steep slopes. The long-term impacts would not be significant if mitigation is used. The Milford OB in Suzie Creek and Mary's Creek hydrologic subunits has a low potential erosion impact rating due to the generally level topography. With mitigation, there would be no long-term impacts.

Based on available data, the preceding analysis, and scientific judgment, the preferred alternative from the perspective of surface water would be Alternative 7 with deployment in Texas/New Mexico and operating bases at Clovis and Dalhart. The alternatives would be ranked as follows:

Proposed Action	Sixth
Alternative 1	Ninth
Alternative 2	Fifth
Alternative 3	Seventh
Alternative 4	Eighth
Alternative 5	Third
Alternative 6	Fourth
Alternative 7	First
Alternative 8	Second

AIR QUALITY (2.3.3)

Hydrologic subunits in which air quality would be affected by the Proposed Action were ranked according to the relative significance of impacts. Impact significance considered cumulative impacts from M-X and other projects, short- and long-term effects and potential effects on existing and proposed Class I and nonattainment areas.

Air quality impacts were assessed using air quality models that predict pollutant concentrations as a function of meteorological and emissions data that are input into the model. Point-Area-Line (PAL), IMPACT, and HIWAY models were applied. It was determined from the modeling results that certain M-X-associated activities would result in significant impacts. Some M-X air quality impacts have not been quantified given the preliminary stage of project design. These potential impacts include NO_x generators expected at construction camps and HC and NO_x sources expected in the OBs.

Significant primary short-term disturbances would be the operation of construction support facilities (NO_x, particulates), construction of clusters (particulates), and construction of the primary or secondary operating base (particulates). Primary disturbances significant for the long-term would be operation of the DDA (particulates) and operation of the OB (particulates and CO).

Existing air quality is generally excellent with the exception of the Steptoe Valley, Las Vegas Valley, and the Gabbs Valley nonattainment areas. Because of emissions from a copper smelter northeast of Ely, Steptoe Valley has been identified by the EPA as a nonattainment area for SO_2 and is being considered for redesignation to nonattainment status for TSP.

DDA construction could increase 24-hr particulate levels to as high as 160 ug/m^3 averaged over a 4-km^2 grid. Greater particulate level increases exceeding state and federal air quality standards would occur locally near construction activities. Subunits with dense construction activities were given high-impact rating during the short term. Impacts would include short-term visibility restrictions and long-range transport effects that could restrict visibility in scenic vistas of Cedar Breaks National Monument and Zion National Park, Bryce Canyon, Lake Mead National Recreation Area, Great Basin National Park, or the Lehman Caves National Monument. Subunits within 40 to 100 mi of those scenic areas are rated moderate to high impact. Dust levels would also increase temporarily at Duckwater Indian Reservation. All areas could expect increased dust from areas where vegetation would be removed for construction. Health problems may result from the inhalation of particles of zeolites, if present.

It is difficult to quantify how reduced air quality could affect future development. One method would be depletion of allowable PSD increment, but the extent of depletion is not predictable. On the other hand, PSD increments are used by stationary sources, few of which would be built for M-X. Major M-X impacts would be from disturbed land and vehicles. The TSP increment could be reduced by wind erosion of roads and other exposed surfaces, but whether the expected reductions are subject to regulations is uncertain.

The Milford OB is within 100 mi of Zion and Bryce Canyon Class I areas and the Cedar Breaks proposed Class I area. Also, the Milford airfield is within 40 mi of the Cedar Breaks area. Elevated particulate levels due to fugitive dust caused by

construction of the operating base or increased SO_x, NO_x, or oxidant levels during operation of the operating base may affect visibility at these Class I areas. Operation base community vehicular traffic would cause elevated CO concentrations to occur in the immediate vicinity of the OB and support community.

The Coyote Spring OB is within 20 mi of the existing Reid Gardner Power Plant and the proposed Harry Allen Power Plant. The Coyote Spring subunit is adjacent to Las Vegas Valley which is a nonattainment area for TSP, O_3, and CO. Population increases in the county, the result of the OB at Coyote Spring, would use a portion of allowable emission offsets (Las Vegas Valley Air Quality Implementation Plan). During the construction of the operating base, fugitive dust from construction may aggravate the particulate problem in Las Vegas Valley. The Coyote Spring watershed was rated moderate for long-term impact.

Available data visibility analysis, and scientific judgment suggest the preferred alternative from the perspective of air quality would be Alternative 7 with deployment in Texas/New Mexico and operating bases at Clovis and Dalhart. The alternatives would be ranked as follows:

Proposed Action	Fifth(tie)
Alternative 1	Fifth(tie)
Alternative 2	Fourth
Alternative 3	Second (tie)
Alternative 4	Fifth(tie)
Alternative 5	Second(tie)
Alternative 6	Fifth(tie)
Alternative 7	First
Alternative 8	Third

MINING AND GEOLOGY (2.3.4)

M-X use of land occupied by a mineral claim or claims could limit mineral development. Although siting decisions have avoided, and will continue to avoid known mining areas, it is possible that valuable ore deposits in bedrock under valleyfill could not be developed by open-pit method. Individual claims worked part-time as recreation or income supplement may also be displaced. A case-by-case review of potential conflicts will resolve these potential impacts as they are identified.

Increased values to precious metals have created a mining boom in Nevada and Utah, which makes previously uneconomic mining properties valuable. The Proposed Action would have the potential to temporarily slow the boom because mining would have to compete with M-X for labor, materials, and equipment. In the long term, the M-X system would provide an improved heavy-duty road network, which would be available for present and future mining operations. The long-term benefits of a new transportation network are estimated to outweigh the short-term competition for resources.

The Coyote Spring OB is in an area of little mining activity and few mining claims; low impacts are predicted. The Milford OB is in an area with many claims. Therefore, its location could have moderate impacts, although the economic viability of many of the claims has not been established.

Available data and analysis, and scientific judgment suggest the preferred alternative from the perspective of mining claims would be Alternative 7 with deployment in Texas/New Mexico and operating bases at Clovis and Dalhart. The relative ranking of alternatives is presented below. The difference among the Proposed Action and Alternatives 1 through 6 is minor:

Proposed Action	Eighth
Alternative 1	Seventh
Alternative 2	Sixth
Alternative 3	Third
Alternative 4	Fifth
Alternative 5	Fourth
Alternative 6	Ninth
Alternative 7	First
Alternative 8	Second

NATIVE VEGETATION (2.3.5)

The impact to native vegetation was determined by comparing deployment layouts to the known distribution of vegetation types. The potential for indirect effects to vegetation was determined using information from literature on large-scale projects.

About 160,000 acres of vegetation would be removed by the principal components of the system. Vegetation types removed would be chiefly shadscale scrub, Great Basin sagebrush, and, to a lesser extent, pinyon-juniper woodland. Other bajada and valley bottom vegetation types would also be affected, including alkali sink scrub, desert marsh and spring vegetation, riparian woodland, creosote bush scrub, and wash and arroyo vegetation.

Secondary effects to vegetation would result from accelerated wind and water erosion, sedimentation, soil compaction, deposition of excavated material, altered surface water flow patterns, groundwater drawdown, and increased fugitive dust. The most significant of these effects are likely to be localized near cleared areas. The value of non-recovered cleared and surrounding areas for livestock use, wildlife habitat, and recreational use would be significantly reduced.

Weedy species, especially alien annuals, would spread into the disturbed areas. Halogeton, a weed toxic to livestock, becomes quickly established after disturbance, but can be partially controlled by comprehensive revegetation procedures. After severe or repeated disturbance, halogeton can alter soil chemistry so that native vegetation is excluded. Site modification by halogeton may prevent native species reestablishment for over 50 years. Halogeton has reduced or eliminated grazing in certain areas of the Great Basin.

There would be no reestablishment of vegetation in areas used for roads and structures. Cleared areas which would not be used for roads or structures have the potential for being slowly revegetated. The rate of natural revegetation depends on precipitation, intensity of erosion, and the response of reestablishing species. Natural revegetation would be inhibited when the soil is compacted, covered with material unsuitable for plant growth, or when the soil is removed, exposing toxic subsoil, hard soil layers, or bedrock. Recovery times for affected vegetation types

are expected to be very long. Full recovery is not expected within the lifetime of the M-X project and is projected to require over 100 years. The rate of vegetation recovery could be greatly accelerated with the implementation of a comprehensive revegetation program, including soil reapplication, seeding and mulching, irrigating, and minimizing repeated disturbance.

At the Coyote Spring OB, over 7,500 acres of native vegetation would be removed, mainly creosote bush scrub and joshua tree woodland, with some desert marsh and spring vegetation, and wash and arroyo vegetation. Much of this removal would be permanent. Substantial vegetation recovery would not occur within the lifetime of the M-X project and complete recovery would likely take over 100 years.

Indirect impacts from recreational activities would be expected primarily in Pahranagat, Meadow Valley Wash, Las Vegas, Lower Moapa, Virgin River, Black Mountains, and California Wash hydrologic subunits. The impacts would not vary greatly if the location of the OB is shifted within the area of suitability, except that proportions of vegetation types may change. There could be a significant difference in impacts to moisture-requiring vegetation types, including marsh and spring vegetation, and wash and arroyo vegetation.

Cumulative indirect impacts to Coyote Spring and other hydrologic subunits may result from work on a portion of the Harry Allen power project in Dry Lake Valley (Garnet hydrologic subunit).

Construction of the Milford OB would result in the direct removal of about 5,500 acres of native vegetation, mainly Great Basin sagebrush, shadscale scrub, and alkali sink scrub types. Indirect recreational activities impacts would be greatest in Pine, Beaver, Sevier Desert, Parowan, and Beryl-Enterprise hydrologic subunits. Additional cumulative indirect impacts to Milford and nearby hydrologic subunits may result from construction of an alunite plant to the south.

The direct and indirect loss of native vegetation during the construction and operations phase of the project would be unavoidable. The amount permanently destroyed may be reduced and some vegetation could be reestablished as a result of mitigation, but major adverse impacts could not be avoided.

Since native vegetation is relatively uncommon in Texas/New Mexico and ubiquitous in Nevada/Utah, the preferred alternative from the perspective of native vegetation is Alternative 7, full deployment in Texas/New Mexico with operating bases in Clovis and Dalhart. The alternatives would be ranked as follows:

Proposed Action	Fourth (tie)
Alternative 1	Fourth (tie)
Alternative 2	Fourth (tie)
Alternative 3	Third (tie)
Alternative 4	Fourth (tie)
Alternative 5	Third (tie)
Alternative 6	Fourth (tie)
Alternative 7	First
Alternative 8	Second

PRONGHORN ANTELOPE (2.3.6)

Greatest impacts on the pronghorn would be from key habitat disturbance. Key habitats are areas where pronghorn are most frequently found, including important summer water sources and kidding areas. Construction has the potential to disturb key habitat in all hydrologic subunits containing project elements and pronghorn key habitat except Kobeh Valley, Cactus Flat, and Steptoe Valley. Range would be directly disturbed in all subunits except Monitor (northern), Penoyer, and Steptoe. Construction noise and visual impacts would occur over an area considerably larger than that actually disturbed. Pronghorn would avoid construction, thus reducing habitat. Population increases would increase recreational activities, including ORV use and poaching. The sum of direct and indirect impacts on this species could be significant.

Other projects, such as the molybdenum mine near Tonopah, White Pine Power Project, a molybdenum project in Pine Valley, the Allen-Warner project in Dry Lake Valley, an alunite mine in Wah Wah Valley, and the Intermountain Power Project near Delta, would need water and would cause additional land disturbances and population growth. Construction activities for most of these projects would be localized. Water use and indirect effects may result in cumulative impacts when combined with M-X.

The consequences to pronghorn would be a reduction of their numbers, which would affect hunting and nonconsumptive uses (e.g., photography and observation). Impacts are projected for 21 hydrologic subunits. Short-term habitat loss was assumed to occur 1 mi from all M-X activities. In 18 hydrologic units, the short-term loss of habitat would be 40 percent or greater. The short-term loss of range, in addition to key habitat, would exceed 50 percent in 11 hydrologic subunits; both impacts would be significant and adverse. Long-term impacts would be moderate in all hydrologic subunits where key habitat would be disturbed.

Establishment of new habitat through water development, limiting ORV use in pronghorn habitat, prohibition of high-power rifles in construction camps, timing of construction activities to avoid key habitat during critical summer months, and increased policing for poaching could reduce the long-term impacts to insignificant or even positive levels.

No impacts would be predicted as the result of the Coyote Spring OB, but the Milford OB would be within a pronghorn range. Construction would eliminate 4,200 to 4,500 acres--over half of the key habitat--and additional key habitat would be disturbed by increased human activity. These impacts would be adverse and might cause the complete removal of the species in the OB vicinity. Locating the OB in other areas within the suitability zone southeast of the Union Pacific railroad tracks and north of Lund or due west of Thermo Siding, could reduce these effects.

Other pronghorn populations in Pine, Hamblin, Wah Wah, Sevier Desert-Dry Lake, Milford, and Cedar City hydrologic subunits would have the potential of being reduced by human activity and ORV use.

Based on available data, the discussion above summarized from Chapter 4, and scientific judgment, the preferred alternative from the perspective of pronghorn antelope would be Alternative 8 with deployment in Nevada/Utah and Texas/New

Mexico and operating bases at Coyote Spring and Clovis. The alternatives would be ranked as follows:

Proposed Action	Fifth (tie)
Alternative 1	Fourth (tie)
Alternative 2	Third
Alternative 3	Sixth
Alternative 4	Fourth (tie)
Alternative 5	Seventh
Alternative 6	Fifth (tie)
Alternative 7	First
Alternative 8	Second

SAGE GROUSE (2.3.7)

M-X project elements would overlap the sage grouse range in 21 hydrologic subunits with losses of 3 percent or less. Key habitat occurs within 1 mi of system elements in 14 subunits. The Kobeh hydrologic subunit has the potential of being heavily impacted by construction, losing 13 to 29 leks (breeding grounds), 5 of 18 brood-use areas, and over 160 acres of wintering ground habitat. From these physical area reductions and high human activity, the sage grouse population could decline up to 50 percent. Because the Nevada Department of Wildlife considers any loss of key habitat a significant impact, the 14 hydrologic subunits in which potential loss would occur are rated as high impact.

The single most effective mitigation would be avoidance of key habitat. Improved policing of ORV activity and hunting could reduce population decline as well but not as much as avoiding key habitats.

No significant impacts would be expected at the Coyote Spring OB, but indirect effects could have significant impacts at the Milford OB. Indirect population impacts from the Milford OB would be expected to spill over into adjacent hydrologic subunits and could have significant impacts in Beaver, Parowan, Hamblin, and Spring subunits.

Given available information, this EIS analysis and scientific judgment, the preferred alternative from the perspective of sage grouse would be Alternative 7 with deployment in Texas/New Mexico and operating bases at Clovis and Dalhart. The alternatives would be ranked as follows:

Proposed Action	Fourth (tie)
Alternative 1	Fourth (tie)
Alternative 2	Third
Alternative 3	Fifth (tie)
Alternative 4	Fourth (tie)
Alternative 5	Fifth (tie)
Alternative 6	Fourth (tie)
Alternative 7	First
Alternative 8	Second

BIGHORN SHEEP (2.3.8)

Impacts were determined by combining information about bighorn sheep range, abundance, and habitat requirements and the project. Direct effects were assumed where construction would intersect range or migration routes and indirect effects were assumed whenever substantial population growth would occur close to habitats.

Bighorn are found in only a few mountain ranges in the potential deployment area. The only direct project effects would occur at the Coyote Spring OB. Indirect effects would be expected at Lone Mountain and in the Grant Range, Snake Range, and Delamar Mountains, as well as in the vicinity of the Coyote Spring OB. Increased human activity at bighorn summer watering sites and increased illegal hunting would be the major causes of impact. Cumulative effects of M-X and other projects are not expected to be significant.

Workers at construction camps in Ralston, Dry Lake, Snake, and Railroad valleys would be within 25 mi of bighorn sheep habitat at Lone Mountain (146 sheep), Grant Range (100 sheep), Delamar Mountains (50 sheep), and Snake Range (Rocky Mountain bighorn transplant site) and could have temporary indirect impact on bighorn. Operations activity in the same area would be low, as would indirect impacts. The level of reduction of bighorn from construction and operations in the DDA is predicted to be low, because much of the preferred habitat of bighorn sheep is inaccessible to humans or in areas with no other attractive features, such as fishable streams or camping facilities.

Mitigation measures that could be employed to reduce indirect impacts to bighorn sheep would be prohibiting high-powered rifles among construction workers and restricting recreational use of bighorn watering sites during the summer.

The Coyote Spring OB conceptual layout would not intersect bighorn range, but the road between the OB and support community would intersect the migration route between the Meadow Valley Mountains and the Arrow Canyon Range. Increased traffic on this road could increase the rate of road-kills in the area. Development of a base community in the southwestern portion of the Meadow Valley Mountains would cause a significant loss of habitat. Shifting the base location farther north or east within the suitability zone could also cause a significant loss of habitat.

Coyote Spring OB indirect effects would occur in surrounding mountain ranges. The highest number of bighorn sheep in the state is on the Sheep Range, within 10 mi of the OB, but road access is limited. Road access is fairly good for the Delamar, Meadow Valley, and Arrow Canyon mountains. Recreational activities of construction and operations personnel in these areas, particularly in summer, could reduce bighorn population levels through interactions at water sources or by illegal harvesting. The Harry Allen power plant in Dry Lake Valley (Garnet hydrologic subunit), 25 mi south of the OB, could increase impacts to bighorn sheep in the Las Vegas and Arrow Canyon ranges.

The Milford OB is not near any bighorn sheep habitat or migration routes.

The proximity of the Coyote Spring OB suitability zone to key habitat, available data, and scientific judgment, result in Alternative 7 as the preferred alternative from the perspective of bighorn sheep. The alternatives would be ranked as follows:

Proposed Action	Third (tie)
Alternative 1	Third (tie)
Alternative 2	Third (tie)
Alternative 3	Second (tie)
Alternative 4	Third (tie)
Alternative 5	Second (tie)
Alternative 6	Third (tie)
Alternative 7	First
Alternative 8	Third (tie)

RARE PLANTS (2.3.9)

The rare species considered in this study have been identified as species of concern by the U.S. Fish and Wildlife Service and the scientific community. The number of known locations of rare plants was compared with the number of locations intersected by the conceptual layout to provide an index of direct effects for each hydrologic subunit.

Construction activities would result in the removal and damage of rare plants and the destruction and alteration of rare plant habitat. The Nevada/Utah conceptual DDA layout would intersect 28 rare plant species and about 20 percent of all known rare plant locations within the project area. A substantial decrease in the total abundance of some rare species could occur. Habitat disruption from construction activities as a result of soil disturbance, erosion, sedimentation, and soil compaction could damage rare plants or inhibit future rare plant population expansion. The removal of rare plants and the degradation of rare plant habitat may occur at considerable distance from the DDA, due to off-road vehicle use and population growth-related activities such as town expansion or recreation.

Direct impacts will be reduced through avoidance of rare plant locations and habitat identified in Tier 2 site-specific studies. Indirect impacts to rare species, such as sedimentation, flooding, and dust, could be reduced by erosion control and vegetation restoration. In previous M-X southwestern construction projects, the Air Force and contractors have restricted construction to designated areas. Land managers could further restrict other ORV uses near M-X roads and facilities.

One species, the Steno sandwort (Arenaria stenomeres), is within 2 mi of the Coyote Spring OB. ORV and other recreational use could alter habitat for this species, resulting in a decrease in its abundance or distribution. Quarry sites may involve removal of habitat. No direct impacts would be expected at the Milford OB. Indirect impacts as a result of recreational activity may occur in the vicinity of OB locations and in surrounding hydrologic subunits. Population increases resulting in increased use of areas with rare plants may occur.

Based on analysis done for this report, the available data, and scientific judgment, the preferred alternative from the perspective of rare plants would be Alternative 7, full deployment in Texas/New Mexico with operating bases in Clovis and Dalhart. This is largely the result of the relative facility of such plant species in the High Plains. The alternative would be ranked as follows:

Proposed Action	Third (tie)
Alternative 1	Third (tie)
Alternative 2	Fourth (tie)
Alternative 3	Fourth (tie)
Alternative 4	Third (tie)
Alternative 5	Fourth (tie)
Alternative 6	Third (tie)
Alternative 7	First
Alternative 8	Second

UTAH PRAIRIE DOG (2.3.10)

The federally protected Utah prairie dog would not be directly affected by the Proposed Action. The only effects anticipated from construction and operation would be indirect effects from human activity in Pine Valley, the only hydrologic subunit within the deployment area supporting this species. The prairie dog towns can be reached by an existing road and populations could be reduced by shooting and ORV use. Such impacts are considered significant because the prairie dog is federally listed as endangered.

All the significant indirect impacts could be mitigated if human activity could be controlled around the construction camp. The contractor could prohibit firearms in camp and the land manager could restrict ORV use and police the restricted area as a long-term mitigation.

The limited Utah range of this species makes Alternative 7 the preferred alternative for this resource. The alternatives would be ranked as follows:

Proposed Action	Fourth
Alternative 1	Sixth
Alternative 2	Third
Alternative 3	Seventh (tie)
Alternative 4	Seventh (tie)
Alternative 5	Fifth (tie)
Alternative 6	Fifth (tie)
Alternative 7	First
Alternative 8	Second

AQUATIC SPECIES (2.3.11)

Impacts were estimated considering legal status, habitat requirements, and effects of project activities.

Federal and state-protected aquatic species could be directly impacted, largely through reduction or change of habitat through groundwater withdrawals. Indirect impacts from population increases also would be expected.

The greatest potential for impact occurs in the White River Valley system, which involves the White River, Pahranagat, Coyote Spring, Moapa, Dry Lake, Delamar, Pahroc, Coal, Garden, Long, and Jakes hydrologic subunits. Railroad, Hot Creek, Spring, Steptoe, and Snake valleys also contain habitats that could be significantly impacted. Federal and state-protected fish in Moapa and Pahranagat

valleys could be significantly affected by groundwater withdrawal, with the greatest potential in Moapa Valley. Most of these impacts would be the result of inter-hydrologic subunit flow, a factor not well researched as yet.

Only in Railroad and Snake hydrologic subunits would project structures come within 1 mi of habitats. Habitats of the Morman White River springfish, Pahranagat roundtail chub, and White River springfish occur within 5 mi of the DDA. Direct impacts to those species would not be expected to be significant. Indirect impacts could occur in several locations. Increased fishing could impact the last known habitats of a pure strain of Lahontan cutthroat trout in the Reese River headwaters, adjacent to some of the western-most construction areas (Big Smoky Valley, etc.), and the Utah cutthroat trout in the mountains bordering the Spring and Snake hydrologic subunits. Restricting access to these trout habitats could reduce impacts.

The OB at Coyote Spring would increase the potential for direct and indirect impact to protected aquatic species in the Pahranagat and Muddy Springs hydrologic subunits. Since no federal or state-protected fish occur within at least a 40-mi radius of the proposed Milford OB, no significant direct or indirect effects of construction or operation would be anticipated.

The distribution of federal and state-protected aquatic species specifies the preferred alternative from the perspective of aquatic species as Alternative 7 with deployment in Texas/New Mexico and operating bases at Clovis and Dalhart. The alternatives would be ranked as follows:

Proposed Action	Third (tie)
Alternative 1	Third (tie)
Alternative 2	Third (tie)
Alternative 3	Second (tie)
Alternative 4	Third (tie)
Alternative 5	Second (tie)
Alternative 6	Third (tie)
Alternative 7	First
Alternative 8	Third (tie)

DESERT TORTOISE (2.3.12)

Because of its relative rarity and its declining population, the desert tortoise is state-protected in Nevada. The Beaver Dam Slope population in southwestern Utah is federally listed as threatened. Any loss of desert tortoise is considered a significant impact. No desert tortoise are found in the DDA or at the Milford OB and no direct or indirect impacts would occur. The Coyote Spring OB, however, would impact over 7,500 acres of tortoise habitat and the new railroad connecting the OB to the Union Pacific line in the east would impact more. In addition, potential mitigations to traffic effects could require a new multilane highway connecting Coyote Spring with I-15. This mitigation for traffic would itself produce another impact upon a rare species. Direct impacts could result in the loss of more than 2,000 animals.

Significant indirect impacts would be expected. People-related impacts could significantly reduce the desert tortoise population in the Coyote Spring hydrologic subunit. Illegal collection would have severe effects and would be difficult to

prevent. Tortoise densities would be greatly reduced within a half mile of all roads and intensive ORV use would collapse burrows, destroy vegetation, and otherwise destroy animals and their habitats. Restriction of ORV use would be one mitigation.

The limited distribution of the desert tortoise makes Alternative 7 with deployment in Texas/New Mexico and operating bases at Clovis and Dalhart preferred for this resource. The alternatives would be ranked as follows:

Proposed Action	Fifth (tie)
Alternative 1	Fifth (tie)
Alternative 2	Fifth (tie)
Alternative 3	Third
Alternative 4	Fourth (tie)
Alternative 5	Second
Alternative 6	Fourth (tie)
Alternative 7	First
Alternative 8	Fifth (Tie)

WILDERNESS (2.3.13)

In hydrologic subunits with M-X construction, key wilderness qualities of naturalness and solitude would be compromised; scenic values would be damaged by surface scarification; and noise levels and dust would increase. M-X roads, radar towers, and other facilities would be visible from nearby wilderness areas. Increased access to wilderness would reduce and compromise the primitive/natural qualities because of increased recreational visits at projected levels nearly twice that of designated wilderness adjacent to the region which currently suffers densities considered excessive. However, the improved access from M-X roads would facilitate enjoyment of this element of our national heritage by more people.

Wilderness quality would be significantly impacted. Over 60 percent of all Wilderness Study Areas are within a mile of a project feature and nearly two-thirds are within audible range of construction. Snake, White, Hot Creek, Garden, Cave, Lake, White River, and Railroad hydrologic subunits, which have several Wilderness Study Areas, would be the most severely impacted. Lower but significant degradation also would be expected in Little Smoky, and Pahranagat hydrologic subunits. Indirect population-related effects related to construction activity are also expected to be significant.

The overall consequence of project effects would be a short-term reduction in the wilderness character of the Great Basin through noise and visual effects and long-term visual effects which would be irreversible and irretrievable.

Three elements of the Coyote Spring OB would directly impact portions of designated Wilderness Study Areas (WSAs). The airfield would use 22 mi^2 of WSA #NV-050-0201, Fish and Wildlife #1. OB housing could be located in WSA #NV-050-0156, Meadow Valley Range; and the DTN to Delamar Valley and a secondary location for OB housing could occupy 10 mi^2 of the WSA #N5-050-177, Delamar Mountains. The DTN may also impact parts of WSA #N5-050-0IR-16, and unnamed WSAs. Since designated wilderness study areas are legally excluded from encroachments, a decision would be required to select between conflicting plans of federal agencies. As a result of OB operations, WSA #NV-050-0215 and 0216 would

experience an undeterminable amount of degradation, mostly from increased noise and visual effects.

Moving facilities within the Coyote Spring OB suitable area could modify impacts to wilderness areas, but significant impacts of construction and operations would be largely unavoidable. The Coyote Spring OB would cause significant impacts to wilderness in the Pahranagat, Delamar, and Beryl-Enterprise hydrologic subunits. Lesser impacts could occur in Snake, White, Big Smoky-Tonopah Flat, Stone Cabin, Hot Creek, Penoyer, Coal, Garden, Railroad, Steptoe, Cave, Lake, Hamblin, Patterson, White River, and Pahroc and areas outside the DDA.

In the Milford OB area, significant growth impacts would be largely unavoidable, particularly in the Snake, Pine, White, Wah Wah, Cave, Lake, and Hamblin hydrologic subunits.

Based on available data, the preceding analysis and scientific judgment, the preferred alternative from the perspective of wilderness would be Alternative 7 with deployment in Texas/New Mexico and operating bases at Clovis and Dalhart. The alternatives would be ranked as follows:

Proposed Action	Fifth (tie)
Alternative 1	Fifth (tie)
Alternative 2	Fifth (tie)
Alternative 3	Third
Alternative 4	Fifth (tie)
Alternative 5	Second
Alternative 6	Fifth (tie)
Alternative 7	First
Alternative 8	Fourth

EMPLOYMENT AND LABOR FORCE (2.3.14)

An estimated 30,000 persons would be directly employed during the peak of project activity. Construction materials, goods, and services would be needed, stimulating economic activity. Direct M-X employment would start in 1982, mostly in construction trades. It would peak at about 30,000 from 1986 through 1988. The long-term level of 13,200 direct jobs would be reached in 1991. Most impacts would occur within a 12-county bi-state region in Nevada/Utah and the Las Vegas and Salt Lake City/Provo metropolitan centers. Construction camps in the DDA and at OBs would be employment centers for construction and assembly and checkout workers. A total of 18 camps with three- to four-year use would be needed between 1983 and 1990 with up to 3,000 workers per camp in a peak year.

Large numbers of indirect jobs would be created by project payroll spending and procurement from local suppliers. At the peak (1986-88), indirect regional employment would be 22,00 to 30,000. For the long term, indirect employment would be 6,000.

The cumulative direct and indirect regional employment impacts of M-X and other large projects could be as much as 77,000 jobs. Regional unemployment would decline by as much as 2 percent in peak years, and shortages of workers would become acute.

Long-run total M-X-related direct and indirect employment would be 18,000 to 19,000 beyond 1990. Other large projects could add another 10,000. Clark County, site of the Coyote Spring OB, would receive more employment impacts than any other county. A peak of 24,600 jobs is projected in 1986, 10 percent of projected county baseline employment. In the long run, M-X would generate 10,700 jobs (including military) in Clark County, 3.5 percent of baseline. Direct and some indirect jobs would be created at the OB, with other indirect jobs in Las Vegas.

Peak (1983) direct construction employment at the OB site (2,300 workers) would be 17 percent of 1978 construction employment in Clark County. This large labor demand for OB (and DDA) construction would result in temporary labor shortages, wage escalation, and large-scale worker in-migration of over 11,500 workers in 1986.

Beaver County would experience large, sustained increases in employment as a result of the Milford OB. Peak M-X employment (8,800) would be generated in Beaver County in 1989. Long-term jobs would be 5,800. Peak M-X employment would be four times the projected employment without M-X or other projects. The project would induce average employment growth of more than 30 percent annually from 1983 through 1989. In less than a decade, this rapid growth would transform the slow-growing, agriculture-dependent local economy of Beaver County into a predominantly service- and trade-oriented economy. The relative importance of agriculture would be greatly reduced.

Other projects, molybdenum mining, alunite mining and processing, and geothermal power development in Beaver County could raise cumulative employment in 1989 to 10,800 jobs above trend-growth conditions. The additional 2,000 jobs from other projects could raise cumulative employment impact to five times that of the baseline without M-X or other projects.

Economic dislocation and localized inflation of wages, expansion of services, and rapid increase in land values would accompany rapid growth and economic structure change. The existence of national chain stores in medium-sized communities throughout the DDA should keep the prices for durable and non-durable goods competitive. The extent of the economic dislocation would depend on the timeliness and implementation of planning and growth management.

In Eureka County, DDA construction would create peak employment of 3,500 in 1988, five times the baseline. Wage-price escalation and shortages of labor and material could be significant over the 1986-89 period. No long-term employment effects are anticipated.

Nye County would have similar growth, with M-X employment peaking in 1988 at 6,400 jobs.

Spillover impacts from the Coyote Spring OB could augment DDA construction effects on employment in Lincoln County. M-X employment of persons permanently or temporarily residing in Lincoln County could reach 2,600 in 1986, then decline to 200 after 1990.

The Utah counties of Iron, Millard, and, to a lesser extent, Juab would have insignificant DDA and OB long-run employment impacts. However, short-run, boom-

type employment conditions are projected for Millard and Juab counties. In Millard County, growth from the Intermountain Power Project could increase impacts. M-X would produce a peak of 3,400 jobs in 1988 in Millard County, while M-X and other projects could result in a peak of 6,000 jobs.

In 1987, the peak year, 10,700 M-X-related jobs would be created in Salt Lake and Utah counties, and long-run employment would be a few hundred. This impact is not considered significant relative to the existing employment base.

Mitigative strategies have already begun with economic development planning, and planning assistance funds. Additionally, personnel required for the area support centers (ASCs) could be based at locations other than OBs. Use of labor-saving technologies for construction and operations could decrease labor demands. Alternatively, direct incentives for construction workers to locate their families outside the DDA could minimize short-run boom growth in some counties.

Based on available data, the preceding analysis, and scientific judgment, the preferred alternative from the perspective of Employment and Labor Force would be Alternative 8 with deployment in Nevada/Utah and Texas/New Mexico and Operating Bases at Coyote Spring and Clovis. The alternatives would be ranked as follows:

Proposed Action	Second (tie)
Alternative 1	Second (tie)
Alternative 2	Second (tie)
Alternative 3	Fifth (tie)
Alternative 4	Third (tie)
Alternative 5	Fifth (tie)
Alternative 6	Third (tie)
Alternative 7	Fourth
Alternative 8	First

EARNINGS (2.3.15)

Construction and operations employment and induced secondary employment would generate large increases in income. Peak earnings in Nevada/Utah, for example, could be $1.18 billion. Even in a relatively large, well-developed regional economy, growth of this magnitude could trigger wage-price inflation. Boom growth would be likely in towns adjacent to OBs and, at least over a short time, in communities throughout the DDA. Some M-X workers would be expected to have much higher gross incomes than the area average, tending to pull up overall earning and induce cross-occupational movement. Agriculture, for example, would tend to lose employment.

Direct worker earnings are calculated from M-X labor requirements and earnings-per-worker assumptions. Indirect worker earnings are calculated by county-level, interindustry models and estimates of indirect employment.

Peak M-X-related earnings would equal $1.18 billion (fiscal year 1980 dollars) in 1986, then decline and level off to $250 million a year by 1993. Historically, both states have exhibited rapid real earnings growth, 5.3 percent per year in Nevada and 4.2 percent in Utah over 1967-1977, but gains have been concentrated in the

metropolitan areas of Las Vegas and Salt Lake City-Provo. In the balance of the Region if Influence (ROI) counties, earnings have historically grown very slowly.

Earnings growth in Clark County, one-third of all M-X earnings, would generate some wage inflation in the short run and in key occupations. Earnings in Beaver County would peak at $170 million in 1987 and stabilize at $85 million by 1992. Earnings growth would be extremely large, and significant growth problems in Beaver County would be anticipated. Significant increases in local land values, earnings, and temporary shortages of some services and skilled construction labor would occur. Salt Lake and Utah counties earnings would peak at $125 million, they are the only areas which could accommodate the projected M-X growth without significant impact.

Other counties with earnings growth from DDA construction would have short-run impacts. Effects would be large in Nye and White Pine counties, 165-200 percent over present real earnings. Earnings in Eureka County would reach $111 million in 1988, 10 times 1978 real earnings. Earnings of this magnitude could not be accommodated without wage inflation. Effects in other counties would be similar, but of lower magnitude. The proximity of Salt Lake City and Las Vegas and an extensive interstate highway system would minimize the shortage and price inflation for material goods that were associated with the Alaska Pipeline experience. The existing transportation network would substantially reduce the magnitude of wage inflation, but the change to impacted communities would nevertheless be significant.

The preferred alternative from the perspective of earnings would be Alternative 8, split basing, that draws from two labor pools in Nevada/Utah and Texas/New Mexico and has Operating Bases at Coyote Spring and Clovis. The alternatives would be ranked as follows:

Proposed Action	Second (tie)
Alternative 1	Second (tie)
Alternative 2	Second (tie)
Alternative 3	Fifth (tie)
Alternative 4	Third (tie)
Alternative 5	Fifth (tie)
Alternative 6	Third (tie)
Alternative 7	Fourth
Alternative 8	First

POPULATION (2.3.16)

Rapid, large-scale population growth generated by construction would be followed by an abrupt population loss after construction. Fluctuations in population can have significant impacts on communities. Population changes are basic in determination of impacts on housing, water, public and private services, traffic volumes, and local government revenues and expenditures. Growth also has secondary effects: increased traffic produces atmospheric pollutants, and more outdoor recreation affects wildlife and vegetation. More economic and cultural opportunities are another result of growth.

Local governments in the regions have no growth management policies specifying acceptable or desirable growth rates. No state or national standards

exist. The severity of the consequences of population changes that would be induced by M-X and other projects is measured in terms of departure from historical annual growth rates and deviation from projected growth without M-X. This procedure measures the extent of population growth effects but not necessarily the acceptability or desirability of the increases.

The extent and distribution of population change are determined by place and time of construction work, modeled predictions of indirect employment, how and where workers will be housed, and decisions and actions about growth by individuals, businesses, and all levels of government. For the purpose of this analysis, 80 percent of military personnel are projected to be housed on OBs. This percentage is consistent with other ICBM deployments in the United States. The remaining 20 percent of military personnel, all civilian base personnel and all indirect employees and their dependents are projected to live offbase. The offbase percentage of housing could be larger or smaller depending upon the response by private industry to local housing needs. About two-thirds of all peak year in-migrants would reside in communities, with the remainder in OBs and in temporary construction camps. Construction workers will be housed in construction camps.

The Proposed Action would generate population changes as a result of procurement expenditures and direct employment. At a 12-county bistate level, population growth would not be significant because it would be tempered by other growth. M-X growth during construction from 1983 to 1987 would increase the region's annual compound growth to 4.2 percent from the projected no-M-X rate of 3.2 percent. With other projects, the region's annual growth rate would be increased to 4.5 percent.

Long-term population effects would be substantially lower. Population losses after M-X construction would reduce the annual growth rate (1988-1991) to 1.3 percent from the expected no-M-X rate of 2.1 percent. Population losses after construction of other projects would further reduce the growth rate to 1.1 percent. In each case, regional growth would not stop but the rate of growth would slow for a few years, probably returning to baseline projection by 1991-92. In summary, M-X combined with other projects would increase the region's growth rate to 4.5 percent annually from 1983 through 1987 during the construction period, while growth during the phase down period from 1988 through 1991 would be reduced to an annual rate of 1.1 percent. Baseline levels would then be realized again. At the regional scale these fluctuations in growth would not be significant.

Impacts in some counties, especially rural counties, however, would be large and significant. Growth in urban counties would be small while the population of several rural counties would more than double. Clark and Beaver counties, the location of the Coyote Spring and Milford OBs, and Iron and Washington counties would have direct population increases. Additional spillovers would occur in Lincoln and Millard counties, although the major share of their effects would be DDA construction. Clark County's peak population growth would increase the annual rate to 4.9 percent from the no-M-X rate of 3.6 percent. Growth is likely to be easily absorbed in Clark County. The county's growth rate would be lowered to 2.1 percent annually from 1987 through 1990 as a result of out-migration after construction. Baseline growth rates would then be reestablished.

Beaver County's population would grow at an annual rate of 29.9 percent during the 6-year construction period from 1984 through 1989, then decline 10.3

percent per year for the next two years. This would cause significant impacts because it would be difficult for the county to accommodate such population increases and decreases. Permanent population growth in Lincoln, Iron, Millard, and Washington counties is not predicted to be significant.

Annual compound growth rates in other counties during construction would be: Eureka, 63 percent; Lincoln, 19 percent; Nye, 17 percent; White Pine, 23 percent; Juab, 25 percent; and Millard, 12 percent. These rates would be followed by abrupt annual population losses: Eureka, -60 percent; Lincoln, -11 percent; Nye, -19 percent; White Pine, -12 percent; Juab, -16 percent; and Millard, -12 percent. Temporary construction camp facilities could reduce the degree of localized absolute impact, but the relative impact will still be significant.

The "boom-bust" cycle would be accentuated in several counties by the cumulative effects of other concurrent projects. M-X-related growth and growth associated with these projects would increase the growth rate in White Pine County to 36 percent and in Millard to 14 percent. Other projects would lower annual growth rates in Juab and Beaver counties since declines after construction of those projects would coincide with growth induced by M-X. The rapid, large-scale growth in these sparsely populated rural counties, followed by rapid population losses, would be likely to have significant impacts. These consequences are likely to be less than numbers suggest, however, since many in-migrants would be without families and accommodated in temporary construction camps rather than in communities.

Construction schedule changes, system design alternatives and temporary facilities could mitigate some adverse growth and decline problems, but the primary means of mitigation will continue to be prior planning and timely allocations of private and public resources to secure infrastructure and service personnel.

The proximity to a large urban area recommends the low relative change in population associated with the Coyote Spring OB. The preferred alternative from the perspective of population would be Alternative 1 with deployment in Nevada/Utah and Operating Bases at Coyote Spring and Beryl. The alternatives would be ranked as follows:

Proposed Action	Fourth (tie)
Alternative 1	First
Alternative 2	Fourth (tie)
Alternative 3	Fifth (tie)
Alternative 4	Second
Alternative 5	Sixth
Alternative 6	Fourth (tie)
Alternative 7	Fifth (tie)
Alternative 8	Third

HOUSING (2.3.17)

Housing shortage would be a major problem in growth communities. Local capital sources will usually be inadequate. Severe housing shortages and rapid price inflation would follow failure to meet new demands and contribute to high worker turnover rates, problems recruiting professionals, and inadequate public services.

Housing requirements for the Proposed Action include the needs of direct and indirect workers and are based on population growth figures assuming a 5 percent vacancy rate and forecast worker preference for single, multiple, or mobile units. Total M-X requirements would be 20,000 units in 1987, representing a 3.5 percent increase over normal growth. With other projects, 30,300 units, 5.3 percent above normal growth, would be needed. After 1987, housing requirements would drop, leaving a surplus of 16,700 units by 1992. Most of these would be mobile homes that could be relocated. Many of the mobile homes would be owned by construciton workers who would relocate the units to their next job site. With other projects the surplus would be slightly smaller.

Under the Proposed Action, Clark and Beaver counties would need most of the housing. Clark would need 6,860 units, a 3.3 percent increase over the normal growth baseline. About one-third of all new housing units would be a result of M-X. Beaver would be more severely impacted, requiring 3,630 units, 200 percent over baseline or almost 27 times the 135 additional units needed for normal growth. Beaver County's building industry and financial institutions would be hard pressed to meet housing needs without considerable outside assistance.

Long-term needs would be 1,000 units in Clark and 1,500 units in Beaver County, increases over normal growth of 0.4 percent and 76.4 percent, respectively. Without other projects, the cumulative impact would be the same for Clark, but would increase to 167 percent for Beaver County. Other counties could also expect increases. Lincoln County would have a peak year need for 1,000 units, a 67.8 percent increase over baseline; a significant impact. Iron and Millard counties would have small permanent impacts due to spillover from Milford. Washington County would get some spillover from Clark. Millard would be additionally impacted by other projects; M-X alone would require 1,290 units, 33 percent above baseline, but with other projects 89 percent over baseline.

All other counties in the deployment region are projected to experience short-lived impacts because of construction of the Proposed Action. Although short-lived, the impacts could be significant. Eureka, Nye, and White Pine counties would require 1,470, 2,150, and 1,500 housing units, all mobile homes, in peak years, increases over baseline of 290, 49, and 48 percent, respectively. In Utah, short-term needs, all mobile homes, would be in Juab, Salt Lake, and Utah counties. Juab M-X requirements would be 43 percent greater than the baseline and with other projects, 74 percent. Salt Lake and Utah counties' requirements, while large, 3,500 units, would be relatively minor, representing only a 1 percent increase over the baseline in the peak year.

The most effective mitigation of housing impacts would result from federal, state, county, and local coordinated planning, and timely private and public action. Housing construction, because it would directly compete with M-X OB housing and other construction needs, may be expensive due to inflated labor and construction materials' costs. Mobile homes could meet most temporary demands of communities, provided there is adequate zoning, land, and utilities. After the construction peak, the first and recreation (second) residence mobile home market in most of the west would be saturated by surplus M-X units, although some of the effect could be offset by growing local housing needs.

The prefered alternative from the perspective of Housing would be basically the same as for population. The alternatives would be ranked as follows:

Proposed Action	Fourth (tie)
Alternative 1	First
Alternative 2	Fourth (tie)
Alternative 3	Fifth (tie)
Alternative 4	Second
Alternative 5	Sixth
Alternative 6	Fourth (tie)
Alternative 7	Fifth (tie)
Alternative 8	Third

PUBLIC FINANCE (2.3.18)

This section discusses aggregate net fiscal effects on all local government units (county, city, school district, special district). Totals are derived in a model that uses population change by county. The existing local tax rate and structure and state and federal assistance are assumed to remain constant. (In fact, these intergovernment transfer payments would be increased.) Per pupil state and federal assistance to local school districts was also held constant although total would increase. Debt service for infrastructure developments has not been included since this would be detailed as part of the mitigation strategies to be developed by local, state, and federal agencies.

Deficits of approximately $73.9 million for the deployment area as a whole are anticipated in the peak year, 1986. Though this effect is significant with respect to regional expenditures, local effects are more serious. Significant degradation of service levels would occur without outside financial aid. For example, White Pine, Nye, and Juab counties would have no long-term growth, but would have peak year deficits of between $800,000 and $1.6 million.

County areas proposed for operating bases would experience similar effects. The Coyote Spring OB would result in peak-year deficits in Clark County (1985) of $3.8 million, 0.6 percent of total expenditures projected for this year. The Milford OB would result in Beaver County peak deficits of $1.9 million in 1986. Clark and Beaver counties would have annual long-term capital expenditure requirements in the range of $25 to $30 million with peak requirements of $40 to $50 million.

The potential for service level degradation in these areas is very high without outside aid, timely comprehensive planning, on-time construction of infrastructure, and ability to attract workers. No local jurisdiction would be able to cope with M-X growth without substantial outside assistance.

The distribution of public finance impacts among the four states makes the prefered alternative for this resource, Alternative 8 with deployment in Nevada/ Utah and Texas/New Mexico and Operating Bases at Coyote Spring and Clovis. The alternatives would be ranked as follows:

Proposed Action	Third
Alternative 1	Second
Alternative 2	Fourth
Alternative 3	Eighth
Alternative 4	Sixth
Alternative 5	Ninth
Alternative 6	Seventh
Alternative 7	Fifth
Alternative 8	First

EDUCATIONAL SERVICES (2.3.19)

The impact on educational services in each area would be determined by the capacity of existing schools and the number of school age children moving to the area. Overcrowded classrooms and the demand for additional teaching staff would be significant at least in the short term. Transient new students, problems of short-term integration into the communities, and overall disruption of community infrastructure may adversely impact the learning process for all students. On the positive side, in-migrants bring the community a broader base of culture and experience, the possibility of improved standards, and potential for increased diversity in educational programs.

Demands on the school districts in affected counties would occur rapidly, and advance planning will be necessary to mitigate peak-year and long-term impacts. Enrollment demands will require funds for facilities and teachers. The major planning problem is how to provide temporary services during peak construction years without incurring debts that cannot be met by the decreased operations population. Temporary or mobile classrooms might be used.

Number of teachers is the variable chosen to determine comparative significance on primary and secondary education. This variable reflects the need for schoolrooms and financial support. Estimated M-X induced peak-year and long-term teacher requirements would be significant. Due to the short-term nature of many teaching positions, it may be difficult to attract a sufficient number of teachers to the region. At the regional level, M-X induced enrollments, which would peak in 1987, generate a need for 826 additional teachers, 4.1 percent over normal growth requirements. The cumulative impact in the region due to M-X and other projects would be 1,183 additional teachers, 5.9 percent over normal. Regionally, 386 teachers would be required over the long-term due to M-X and 681 with M-X and other projects.

Requirements for educational services occur primarily within the jurisdiction of the Clark County and Beaver County school districts where the OBs would be located. Other school districts would also receive project-related demands on schools. Peak M-X induced teacher needs in Beaver and Clark school districts would be 248 and 200, respectively. In Beaver County this would be an increase of 322 percent over baseline. When other projects are included, the requirement would be 252 teachers (406 percent over the baseline). In the long-term, 158 teachers would be needed (242 percent over baseline projections) due to M-X induced enrollments, and, with other projects, 217 (334 percent over baseline). The relative impact on Clark County, however, will be less, between 3 and 4 percent. The analysis assumes that most M-X induced temporary growth will be close to Las Vegas where the

education system is more able to accommodate a large and rapid increase. Permanent growth is assumed to be divided between the immediate Las Vegas area and the Coyote Spring OB. Schools on the OB would be run by the county for the children of military personnel. These assumptions explain why relatively little impact is predicted on the quality of public school education in Clark County.

For the other counties, although enrollment increases and teacher requirements in most cases would be significant, they would be temporary, with few long-term needs. Iron and Salt Lake counties would require 22 and 79 additional teachers, respectively. Assuming enrollment demands from other projects in addition to those generated by M-X activity, White Pine, Millard, and Juab counties, already severely impacted, would experience greated demands.

Based on available education services, existing data, the analysis in Chapter 4, and scientific judgment, the preferred alternative from the perspective of Education would be Alternative 8 with deployment split in Nevada/Utah and Texas/New Mexico and Operating Bases at Coyote Spring and Clovis. The alternatives would be ranked as follows:

Proposed Action	Second (tie)
Alternative 1	Second (tie)
Alternative 2	Second (tie)
Alternative 3	Fifth
Alternative 4	Third (tie)
Alternative 5	Sixth
ALternative 6	Third (tie)
Alternative 7	Fourth
Alternative 8	First

HEALTH SERVICES PE ℜSONNEL (2.3.20)

The level of health care delivery services tends to be substandard in rural towns, and with sudden and large M-X growth, problems could become critical. The analysis shows what requirements may be, but not how local health services can attract and retain the personnel needed to deal with growth.

The measures of impact assume that doctors, dentists, and nurses needed temporarily in the boom years would not go to the area. Only health services personnel needed over the long run would be obtained. The difference is a shortfall. The significance of impacts is expressed as a percentage over the projected peak year requirements plus baseline needs. A percent greater than 15 is assumed to be a significant adverse impact.

In the region as a whole, M-X-related health services requirements would peak in 1987 at 270 personnel and with other projects, 475. Shortfalls are not significant at the regional level. Clark County's peak requirements would be 114 personnel, and other projects would bring the total to 122 personnel, a 3.2 percent increase over baseline. No additional health services personnal would be needed for the long-term. The shortfall is not significant in Clark County. In Beaver County, peak requirements would be 55, 167 percent over baseline, and with other projects, 89 personnel. Permanent long-term need would be 13 for MX alone or 47 with other projects. A significant 48 percent shortfall can be expected. Lincoln and Iron

counties have long-term effects from OBs in Coyote Spring and Milford, but only Lincoln will have a significant shortfall, 22 percent.

As with most human environment resources, health services impacts are projected to be lowered by distributing the project among the four states with Operating Bases at Coyote Spring and Clovis. The alternatives would be ranked as follows:

Proposed Action	Second (tie)
Alternative 1	Second (tie)
Alternative 2	Second (tie)
Alternative 3	Fifth
Alternative 4	Third (tie)
Alternative 5	Sixth
ALternative 6	Third (tie)
Alternative 7	Fourth
Alternative 8	First

PUBLIC SAFETY (2.3.21)

The analysis assumes that law enforcement personnel requirements would be generated by the total population, including military personnel resident on OBs. It does not consider that the Air Force would have a security force numbering 2,300 in the DDA and at the OBs. The requirement was assumed to be two police officers per thousand population.

For fire personnel, the assumptions made are that service is needed only within local communities. The Air Force and construction contractors would be responsible for adequate fire protection services at the OBs and at construction camps. The analysis does not consider that construction camp fire services and OB fire departments could supplement local fire companies and thus mitigate potential impacts. The requirement was assumed to be 1.65 fire personnel per thousand people.

Regional requirements will peak in 1987 with a need for 259 additional public safety personnel, a 4.2 percent increase over baseline. With other projects 369 would be needed. Long-term requirements are 73 for M-X and 144 with other projects. Since shortfalls will not exceed 6 percent, regional impacts are not significant.

Clark County similarly will have a low shortfall. It needs 85 to 90 personnel for the construction period and 36 to 39 for operations. Beaver County, however, has peak needs of 50 to 67 and permenent needs of 33 to 51, the range depends on whether M-X needs alone or M-X with other projects were considered. Significant impacts on public safety are expected as the result of a shortage of needed employees, and will be most severe in the short run, when public safety services are most needed.

While it may be possible to secure funding from federal, state, or other sources, it may be difficult to fill relatively low paying and temporary public safety jobs in competition with higher paying construction and services sector labor needs.

Based on available data, current analysis, and scientific judgment, the preferred alternative from the perspective of public safety services would be Alternative 8, split basing, with deployment in Nevada/Utah and Texas/New Mexico and Operating Bases at Coyote Spring and Clovis. The alternatives would be ranked as follows:

Proposed Action	Second (tie)
Alternative 1	Second (tie)
Alternative 2	Second (tie)
Alternative 3	Fifth
Alternative 4	Third (tie)
Alternative 5	Sixth
ALternative 6	Third (tie)
Alternative 7	Fourth
Alternative 8	First

URBAN LAND (2.3.22)

Urban land use requirements were determined by considering population growth requirements for housing, streets, schools, parks, and other land uses. Amounts of vacant developable land in communities that might grow as a result of locations of OBs were determined and the population distribution model applied to them. This process showed shortages and surpluses.

When urban land is insufficient for M-X-induced needs, more could be acquired by communities. If land were available, this could be done by annexation and rezoning. In Nevada/Utah, however, many communities are "land-locked" (surrounded by public land). This land could, however, be made available for community expansion through BLM administrative processes. Conversion of present public land to private use could be a conflict with agency plans depending on specific parcels of land.

It is assumed that most Coyote Spring OB workers will reside in Las Vegas and Moapa Valley areas of Clark County (90 percent) and the Alamo community in Lincoln County. Since Clark County has 96,000 vacant acres available for development, and M-X peak growth needs 2,800 acres, no significant impact is predicted.

Although spillover of Milford OB-related population would generate some land demand in Iron, Washington, and Millard counties, Beaver County would be the primary residential area. Beaver County towns of Milford, Beaver, and Minersville have 700 vacant acres of developable land and would need 1,500 temporarily, half of that for permanent expansion. Some of the need could be met by using some presently developed land for M-X-induced purposes, but additional land would have to be secured for expansion of towns or creation of new ones.

Urban land use impacts are primarily conflicts over use, development policies, zoning, and factors other than simple availability. It is assumed, therefore, that the physical availability of land will not cause significant impacts under any of the alternatives. Land-use conflicts can be mitigated somewhat by:

- Setting up advisory groups with local, regional, state, federal, and private representatives to advise governments.

- o Seeking planning fund asssitance beyond that already provided by the Air Force to Nevada/Utah state and local governments.

- o Adopting or updating zoning ordinances, regulations, and comprehensive plans.

The preferred alternative from the perspective of urban land use would be Alternative 8 with the impacts distributed among the four states and Operating Bases at Coyote Spring and Clovis. The alternatives would be ranked as follows:

Proposed Action	Fourth
Alternative 1	Second (tie)
Alternative 2	Second (tie)
Alternative 3	Fifth (tie)
Alternative 4	Third
Alternative 5	Sixth
Alternative 6	Fifth (tie)
Alternative 7	Second (tie)
Alternative 8	First

QUALITY OF LIFE (2.3.23)

Perceptions of quality of life are individual and changeable and, therefore, difficult to illustrate. The amount and quantity of change, in particular, population growth, can be used to indicate how much livingstyles might change in rural and urban areas and how people in those areas will be impacted. Change can be seen as good or bad depending on intangible measures, but rapid change is disruptive, particularly when public services cannot keep pace, when inflation becomes high, and when goods and entertainment facilities fall short of demands.

This EIS identifies regions and individual counties where requirements of M-X-related growth can be met only with difficulty and outside aid. Some of these are housing, health services, education, public safety, and community infrastructure. All are a function of population growth. The analysis establishes two levels of population growth impact, acceptable and significantly disruptive to the quality of life. Degradation of quality of life is assumed to occur whenever county population growth rates exceed 15 percent in one year or when employment growth rates equal 8 percent or more for three consecutive years.

In Clark, Iron, Salt Lake, Utah, and Washington counties, growth rates would not produce a significant impact on quality of life. White Pine and Millard would have significant one-year peak growths of more than 15 percent. Eureka, Lincoln, Nye, Beaver, and Juab counties would experience larger impacts because the one-year and over 3-year measures of growth would be exceeded. Additionally, a comparable decline of population would occur in all counties except Clark and Beaver, sites of OBs. Clark's generally low impact is because the population, mostly in Las Vegas, is large and the growth rate already high. M-X-induced growth would not significantly change the county's quality of life indices. Because the analysis is based solely on county impacts, it does not show where in the county significant impacts will be felt and how they vary. It cannot be assumed that county impacts will be the same in every community in the county's borders, particularly in the

large Nevada jurisdiction. Impacts may not touch communities remote from construction camps, and those which are impacted may not necessarily be permanently and radically changed.

Based on available data, the growth rate analysis, and scientific judgment, the preferred alternative from the perspective of quality of life would be Alternative 1. The split basing alternative (8) would be preferred except for the requirement that residential dwellings be not permitted within the shelter safety zone. This requirement to relocate families (141 for Alternative 8 and 1,400 for Alternative 7) and the inclusion of relocation in the quality of life resource makes Nevada/Utah basing preferred over Texas/New Mexico basing. The alternatives would be ranked as follows:

Proposed Action	Third (tie)
Alternative 1	First
Alternative 2	Third (tie)
Alternative 3	Fourth (tie)
Alternative 4	Second
Alternative 5	Fourth (tie)
Alternative 6	Third (tie)
Alternative 7	Sixth
Alternative 8	Fifth

TRANSPORTATION (2.3.24)

The transportation system within the project area would be significantly affected by construction of 7,200 to 7,700 mi of new roads, increasing accessibility to the region, and by traffic increases around project facilities. In the DDA, M-X roads will increase access to places that now are relatively remote. In these and other places the potential of damage to wildlife and other natural resources may increase while heavy duty haul roads would be available to the mining industry. Temporary effects, considered significant, are localized construction congestion on M-X and existing roads. Some of this might be reduced by worker car pools and other control methods. Air traffic would not be affected beyond normal airfield related controls that would be applied to OBs.

Near the OB at Coyote Spring, U.S. 93 would have to be widened to four lanes between the operating base and I-15. This mitigation to reduce traffic impacts would further impact the protected desert tortoise. Improvements to roads connecting the Milford OB to Milford, Minersville, and Cedar City (possibly through Lune) could distribute the population impacts and reduce them to potentially acceptable levels. Other minor improvements to the road systems near the two sites may be needed to accommodate localized traffic increases, especially within Milford. Use of buses and carpools and staggered work hours could reduce the level of traffic and obviate the need for major roadway improvements. In general, long-term OB-related impacts upon ground and air traffic are not expected to be significant.

Based on the analysis in this report, available data, and scientific judgment, the preferred alternative from the perspective of transportation would be Alternative 8, split deployment with operating bases in Coyote Spring Valley and Clovis. The alternatives would be ranked as follows:

Proposed Action	Third (tie)
Alternative 1	Third (tie)
Alternative 2	Third (tie)
Alternative 3	Fifth (tie)
Alternative 4	Fourth (tie)
Alternative 5	Fifth (tie)
Alternative 6	Fourth (tie)
Alternative 7	Second
Alternative 8	First

ENERGY (2.3.25)

The electric power requirement for M-X deployment and support is small compared to the available projected excess power in the electric power region. Therefore, no new generating facilities would be required other than those currently proposed. However, transmission and distribution facilities would have to be upgraded and built in a timely manner. Upgrading of existing lines would have a minimal impact. New facilities create aesthetic and right-of-way impacts, especially in pristine areas. Alternative energy systems such as solar may produce a positive impact by reducing the electric load of the M-X system and the need for transmission lines. Additionally, co-generation of electricity at the OB heating plant is being investigated.

Energy conservation measures will be specified in the master plans being developed for OB locations. The OB suitability zone and conceptual master plan incorporated in this analysis makes maximum use of south-facing slopes to incorporate passive solar and terrain-caused wind connections and conserve energy consumption. However, the potential for sensitive archaeological areas is greater on such slopes than in valley bottoms.

The fuel requirements for the M-X system and support communities would require changes in allocations with the greatest increase occurring during the construction phase. However, as a result of developing alternative energy systems and using passive solar design and energy conservation techniques for new buildings during the operations phase, the impact on the national energy demand may be minimal. The long-term impact on the national and regional energy supply because of alternative energy technological developments may be positive.

Energy requirements would be approximately equal for any alternative, but the distribution system is more developed in Texas/New Mexico. Thus, the preferred alternative from the perspective of energy would be Alternative 7, full deployment in Texas/New Mexico with operating bases in Clovis and Dalhart. The alternatives would be ranked as follows:

Proposed Action	Third (tie)
Alternative 1	Third (tie)
Alternative 2	Third (tie)
Alternative 3	Third (tie)
Alternative 4	Third (tie)
Alternative 5	Third (tie)
Alternative 6	Third (tie)
Alternative 7	First
Alternative 8	Second

LAND OWNERSHIP (2.3.26)

The significance of potential impacts on private land was based on the amount and percentage of private land disturbed for M-X by hydrologic subunit in Nevada/Utah. No consideration was given to value of land, present use, or other factors.

About 1,400 acres of private land would be disturbed by construction and 900 acres would be in permanent use for operations. As a whole, this amount is not significant, although it could be significant for individual owners. There has been an effort to avoid private land to the maximum degree possible, and this will be expanded during Tier 2 analyses and decisionmaking.

There is no private land within the proposed Coyote Spring OB, so no impacts are predicted. At the Milford OB, about 360 acres of private land could be used but this is not considered a significant amount.

The preferred alternatives from the perspective of Land Ownership would be Alternative 2 with deployment in Nevada/Utah and OBs at Coyote Spring Valley and Delta. The alternatives would be ranked as follows:

Proposed Action	First (tie)
Alternative 1	First (tie)
Alternative 2	First (tie)
Alternative 3	First (tie)
Alternative 4	First (tie)
Alternative 5	First (tie)
Alternative 6	First (tie)
Alternative 7	Third
Alternative 8	Second

IRRIGATED FARMLAND (2.3.27)

For a worst-case analysis, all irrigated cropland is assumed to be prime farmland. Significance of impact is based solely on the amount of irrigated farmland used for M-X. Use of less than 1 percent of irrigated farmland in a hydrologic subunit or county is of low potential impact, 1 to 3 percent moderate, and over 3 percent, high.

The principal interactions of M-X facilities and cropland would be Snake, Lake, and Monitor hydrologic subunits. Irrigated land temporarily used during construction could be returned to farm use and significant impacts would be reduced during operations. The total irrigated farmland used under the worst case would be 180 acres. After construction, about 77 acres could be returned to agriculture, with 113 acres out of irrigated agriculture for at least the life of the project. The most serious impact would be Government Creek hydrographic subunit.

One mitigation is avoidance of irrigated farmland and another would be the conversion of presently non-irrigated land to irrigated use. Although impacts of the

conceptual system would generally be low, it is anticipated that they would be further reduced during Tier 2 decisions.

Future non-M-X projects are not expected to directly impact large areas of irrigated cropland, although population growth may result in urban development on croplands.

OBs would not directly affect irrigated cropland. In the vicinity of both OBs, irrigated cropland could be converted to urban uses. The significance of this indirect impact cannot be predicted. Purchase of water rights may result in 2,000 acres of irrigated acreage being converted to other uses near the Milford OB.

Irrigated farm lands are relatively rare and can probably be largely avoided in Nevada/Utah but are very common and unavoidable in Texas/New Mexico. The Nevada/Utah alternatives are all preferable to Texas/New Mexico alternatives from the perspective of irrigated croplands. The alternatives would be ranked as follows:

Proposed Action	First (tie)
Alternative 1	First (tie)
Alternative 2	First (tie)
Alternative 3	First (tie)
Alternative 4	First (tie)
Alternative 5	First (tie)
Alternative 6	First (tie)
Alternative 7	Third
Alternative 8	Second

GRAZING (2.3.28)

Impacts on grazing would be the result of impacts on vegetation (Section 2.3.5), primarily sagebrush and shadscale. Assuming that the project will impact vegetation types in the hydrographic subunits, in proportion to their occurrence, the loss of animal unit months (AUMs) in the DDA will be about 7,200 AUMs or 0.72 percent of the total in all affected hydrologic subunits. Indirect losses are also possible. Over the entire project area, non-M-X projects contribute little to changes in AUM levels. Impacts may be significant for many operators utilizing public lands. They have such a narrow profit margin that their ranching could become uneconomic with even a minor AUM loss. These effects and their locations have not been determined.

Loss of water locations could also reduce AUMs. Some types of sheep operations could cease in some valleys where M-X activity is high.

Possible mitigations are avoidance of highly productive areas, monetary compensation, and range improvements such as conversion of project water developments to stock use. Specific mitigative methods will be determined by land managers as Tier 2 M-X planning proceeds.

The Coyote Spring OB could displace 153 AUMs. This will be a permanent loss affecting approximately 2.5 percent of all AUMs in the Delamar and Arrow Canyon BLM allotments, the highest percentage of any OB location.

The Milford OB could displace 248 AUMs or 0.5 percent of the Cook and Antelope Peak allotments. Some private land would also be affected. These losses will be permanent. The significance of these losses to local operators will be determined during Tier 2 studies.

Based on the analysis performed for this report, available data, and scientific judgment, the preferred alternatives from the perspective of grazing would be either Alternative 1 or Alternative 2 with full deployment in Nevada/Utah and operating bases at Coyote Spring Valley and either Beryl or Delta. The alternatives would be ranked as follows:

Proposed Action	Second (tie)
Alternative 1	First (tie)
Alternative 2	First (tie)
Alternative 3	Third (tie)
Alternative 4	Second (tie)
Alternative 5	Fourth
Alternative 6	Third (tie)
Alternative 7	Sixth
Alternative 8	Fifth

RECREATION (2.3.29)

The level of impact on recreation resources would be significant if the M-X increase in demand is greater than the supply can accommodate or significantly adds to a projected facility deficiency. The impact on the DDA would not be significant because recreation demand will be less than regional facility capacities.

A 50-mi radius was used to determine the area of influence around the major urban center expecting the greatest population in-migration associated with an OB. An OB at Coyote Spring would result in a 5 percent population increase in Clark County in the peak year and a 2.5 percent increase by 1990 over baseline projections. An equivalent increase in recreational demand would be expected in those recreational sites around the base. This increase is not expected to add significantly to projected shortages of campsite facilities or water-based recreation facilities in Clark County (Nevada SCORP, 1977).

An OB at Milford would result in a 336 percent population increase in the peak year (1989) and a 244 percent increase in 1991 over baseline projections. An approximately equivalent increase in recreational demand is expected in those recreational sites around the base. Although the Utah SCORP (1978 Draft) projects a shortage of campsites in this region of Utah by 1990 the demand attributable to M-X is not expected to produce a shortage of campsites in the vicinity of Milford. Projected demands upon water-based recreational facilities would be met by the existing supply of lakes within 50 mi of Milford. Thus, although M-X would create a large population increase over baseline projections, the existing recreational facilities in the immediate vicinity are expected to be adequate to meet the projected increase in demand associated with M-X in-migration.

Based on the analysis performed for this report, available data, and scientific judgment, the preferred alternatives from the perspective of recreation would be the Proposed Action, Alternative 2 or Alternative 6. The alternatives would be ranked as follows:

Proposed Action	First (tie)
Alternative 1	Second
Alternative 2	First (tie)
Alternative 3	Sixth
Alternative 4	Third
Alternative 5	Fourth (tie)
Alternative 6	First (tie)
Alternative 7	Fifth
Alternative 8	Fourth (tie)

NATIVE AMERICAN CULTURAL RESOURCES (2.3.30)

The relative significance of Native American cultural resources was assessed on the basis of information received from Native Americans, estimates of the cultural value of historic sites, density of resources or sites, present use of sites, and scientific value.

Site densities were predicted on the basis of historical and ethnographic accounts. These estimates are applied to all areas to determine the significance of adverse impacts expected from construction and operation. The intensity of impact was determined by analysis of the amount of ground disturbed and the proximity of resources to construction activities and construction camp locations. To weigh the general conclusions reached, the seriousness of impacts was determined by the closeness of the known or expected site to M-X facilities or its susceptibility to abuse, damage, or destruction. In Nevada/Utah, some Native Americans were contacted and some site-specific field work has been done. These studies have not yet been incorporated into this analysis.

The DDA contains 313 known Native American ancestral/sacred sites, 39 of which are within one mile of construction activity. Most long-term and indirect impacts are expected during operations. M-X roads are expected to improve area access, which will increase vandalism to rock art, ancestral habitation sites, ceremonial sites or structures, and battlefields. Mitigation-by-avoidance, the preferred mitigaiton, would be implemented under terms of the Programmatic Memorandum of Agreement which is disucssed under archaeological and historical resources.

An impact that cannot be quantified is the symbolic and spiritual effect on Native American religious and cultural life; any development irreversibly alters the holy lands of Shoshone and Southern Paiute peoples, and the M-X system represents large-scale development. Since ancestral/sacred sites and features are nonrenewable, the destruction or defacement of these resources will be an irre ·ievable loss.

Coyote Spring OB is in a major ancestral Southern Paiute seasonal migration route and is associated with temporary and permanent habitation sites, burials, and a wide variety of other sacred features. Impacts to these areas would probably be significant. Site densities are expected to be high throughout the OB area. During construction, significant impacts to ancestral settlements and associated burials would probable occur in foothills, washes and streams, and particularly along the Muddy River.

Pilfering and vandalism of anc· tral/sacred sites and features would result from population in-migration. Arrow Canyon and other significant Southern Paiute

cultural resource sites, such as burial sites, surface settlements, and storage caves, would probably receive indirect impacts from OB development. Depletion of the water table during construction or operations may reduce flow to springs and marshes in which Southern Paiutes gather plants used in rituals. The magnitude of these impacts would probably be significant.

No data on Native American ancestral/sacred sites are available for the Milford OB. The northern Escalante Desert was ancestral territory of Southern Paiutes. Some resources may occur along Beaver River, but much of this area is already disturbed by farming. Impacts to campsites would be likely along ephemeral streams from the Wah Wah Range and southern tip of the San Francisco Mountains.

Based on available data, current analysis, and scientific judgment, the preferred alternative from the perspective of Native American cultural resources would be Alternative 7 with deployment in Texas/New Mexico and Operating Bases at Clovis and Dalhart. The alternatives would be ranked as follows:

Proposed Action	Sixth
Alternative 1	Seventh
Alternative 2	Fifth
Alternative 3	Third (tie)
Alternative 4	Fourth (tie)
Alternative 5	Third (tie)
Alternative 6	Fourth (tie)
Alternative 7	First
Alternative 8	Second

NATIVE AMERICAN WATER ACCESSIBILITY AND AGRICULTURAL LAND USE (2.3.31)

Impacts to Native American water accessibility and land use in the DDA could occur in the Railroad and Little Smoky hydrologic subunits surrounding the Duckwater Reservation and the grazing lands it uses and proposes to withdraw for Reservation expansion. Impacts could also be felt at the Moapa Reservation, which is dependent on water from Muddy River Springs and the White River drainage system. These impacts would occur only if the State Engineer approved groundwater withdrawals for M-X that exceeded recharge capacity. Damage to or loss of water rights would have to be paid for by the Air Force.

In hydrologic subunits surrounding the Duckwater Reservation, 12,600 acre-ft of construction water would be required. Short-term localized effects on Duckwater Reservation springs and wells could occur. If the construction period occurs in dry years, this impact could be significant. After pumping ceased, recovery of the water table would follow in a few weeks or months. Longer-term impacts would occur if the underlying structure of springs and shallow wells were disrupted. Mitigations would require M-X groundwater pumping sufficiently distant from Duckwater resources to avoid even temporary localized impacts.

Construction in the White River drainage would have little impact at Muddy River Springs, unless it coincided with a dry period. If reductions occur at Muddy River Springs it could reduce agricultural uses at the Moapa Reservation (which currently uses 24 percent of the springs discharge) and potentially restrict

agricultural development in a proposed 70,000 acre expansion. Construction pumping could be monitored and modified to mitigate the potential reduction of the flow of the Muddy River Springs, if necessary.

The Coyote Spring OB groundwater use would directly and seriously affect the water flow of the Muddy River and indirectly impact Moapa Reservation agricultural resources. Because of this potential impact, preliminary plans are being developed to use Colorado River water from Las Vegas. This could produce an increased flow to the Moapa Reservation.

There are no identified Native American lands or water resources in the Milford OB area.

The lack of Native American water and land use in the Texas/New Mexico deployment area make the preferred alternative from the perspective of Native American Water and Land Use Alternative 7 with deployment in Texas/New Mexico and Operating Bases at Clovis and Dalhart. The alternatives would be ranked as follows:

Proposed Action	Fifth (tie)
Alternative 1	Sixth (tie)
Alternative 2	Fourth
Alternative 3	Third
Alternative 4	Sixth (tie)
Alternative 5	Second
Alternative 6	Fifth (tie)
Alternative 7	First
Alternative 8	Fifth (tie)

NATIVE AMERICAN MIGRATION PATTERNS (2.3.32)

Significant changes in migration rates and patterns impacting Native American resources and lifeways would result from a change in economic conditions. In-migration in search of employment could overwhelm the economic and socio-cultural resources of some reservations and colonies and cause economic, social, and cultural decline at others.

Native American migration in response to economic opportunities cannot be predicted. Reservations that could grow are the Duckwater (present population, 124), the Moapa (189), the Ely Colony (187), the Goshute (602), the Cedar City Colony (177), and the Kanosh (73). Given the small populations, a small number of in-migrants and their families could double or triple reservation and colony size. Housing, water, schools, and social services, already taxed or inadequate, would be significantly impacted. Federal funding based on membership would not help reservations with large numbers of nonmember residents. Crowding would stress social and cultural relations. Indians outside reservations would face similar situations. Later postconstruction conditions could contribute further problems to Indian life. Out-migration from distant reservations and later postconstruction return could stress economic, cultural, and social life.

It cannot be said whether M-X will help or hinder Indians generally. While adverse impacts can be expected, they may be offset by improved economic

conditions or by federal, state, or other assistance programs. Mitigations could be accomplished through development aid to keep peripheral reservations economically attractive during and after construction and to maintain economic vitality at central reservations after construction.

Based on available data, the analysis in this report and scientific judgment, the preferred alternative from the perspective of Native American migrations would be Alternative 7 with full basing in Texas/New Mexico and operating bases in Clovis and Dalhart. The alternative would be ranked as follows:

Proposed Action	Fourth (tie)
Alternative 1	Fourth (tie)
Alternative 2	Third
Alternative 3	Fourth (tie)
Alternative 4	Fourth (tie)
Alternative 5	Fourth (tie)
Alternative 6	Fourth (tie)
Alternative 7	First
Alternative 8	Second

ARCHAEOLOGICAL AND HISTORICAL RESOURCES (2.3.33)

Significant direct and indirect effects are expected to occur to all categories of site types: "multiple activity" (habitation sites); "special purpose" (rock art, cemeteries, shrines, battlegrounds); "limited activity" (small lithic scatters, refuse dumps, corrals, trails, short-term camps); and "isolated finds," which are isolated artifacts of human manufacture or use.

To determine the severity of impacts, certain geographic features or locations have been projected to have a high, moderate, or low possibility of sites of multiple activity, special purpose, limited activity or isolated finds. These ratings were established on the basis of the density in similar locations and importance of known finds in the deployment regions. High probability was assigned to land within one mile of present and extinct water sources; moderate probability, to unwatered foothills and land between one and two miles from springs, and low probability was assumed for steep, unwatered mountains, playas, and unwatered mid-to lower bajadas. For known cultural resources, zones of probable impact were also established, the largest surrounding archaeological and historical properties on or eligible for the National Register. High, moderate, and low probability of impact zones was plotted on maps showing M-X-disturbed areas and determinations made of the number of square miles of direct impacts. From these totals the significance of impacts by hydrologic subunit was estimated.

A Programmatic Memorandum of Agreement has been prepared by the Advisory Council for Historical Preservation and signed by the Air Force and BLM. State historical preservation officers in Nevada, Utah, Texas, and New Mexico have been asked to sign it also. The PMOA establishes a system for planning the protection or recovery of archaeological and historical resources. The PMOA also applies to many resources or particular concern to Native Americans. Plans will be published and public comment invited.

Nearly 400 mi^2 of resources would be within one mile of DDA construction. More than a third of this area contains properties of high value, many expected to be eligible for the National Register.

Hydrologic subunits in which the highest direct potential impacts could occur are Little Smoky, Railroad, and Snake with over 5 mi^2 of areas of moderate to high sensitivity within 1 mile of potential construction. Hot Creek, Wah Wah, Hamblin, Kobeh, Monitor, and Dry Lake each have over 4 mi^2 of moderate to high sensitivity area within one mile of construction. Other hydrologic subunits would have less than 3 mi^2 to a fraction of a mile.

National Register property boundaries have been avoided in the DDA layout, but indirect impacts may occur where construction is adjacent to the property. Two National Register properties, one in the Sevier Desert hydrologic subunit, a Paleo-Indian archaeological site, and in Nevada, the Sunshine locality archaeological district are adjacent to construction.

Construction also has the potential to produce high significant indirect impacts to National Register and eligible properties. Most would be caused by construction worker recreation use, vandalism, or unintentional damage. Hydrologic subunits with construction camps have the potential for the severest impacts. Other projects, such as IPP and WPPP would increase both direct and indirect impacts.

Other National Register properties potentially indirectly and significantly impacted by DDA construction and potentially impacted because of increased access and more area population during operations are: the Fish Springs Cave archaeological site, Fort Deseret, Gunnison Massacre site, Tybo charcoal ovens; Bristol Wells historic mining town, Delamar mining town, White River Narrows Archaeological District, Black Canyon Petroglyphs, and Sheep Mountain Range District. Some of these, particularly those with buildings, have already been impacted by recreation and could be further impacted by increased recreation activity.

The Coyote Spring QB has 9 mi^2 of high and moderately sensitive area near the Muddy River and 3 mi^2 of low sensitivity area within one mile of construction. The potential for indirect impacts would be very high in nearby Dry Lake, Delamar, Pahroc, and Pahranagat hydrologic subunits and in the Coyote Spring subunit. These impacts would be in addition to DDA construction impacts. National Register properties subject to indirect impacts include the Sheep Mountain Range, Black Canyon petroglyphs, and the White River Narrows district. Other highly vulnerable areas include the Muddy River drainage, Arrow Canyon in the Moapa vicinity, the Meadow Valley drainage, and the Pahranagat and White River drainages.

Indirect growth-related impacts would also be expected in nearby communities where expansion could change the present architectural character and where new construction might cause destruction of significant historical structures. Potential impacts would occur in Caliente, Panaca, Alamo, Hiko, and Pioche.

The Milford OB siting area is predicted to have moderate impacts. Two square miles of potential high sensitivity area would be within one mile of construction. An additional six square miles of moderate sensitivity area is within one mile of construction.

High indirect impacts are expected within a 50-mi radius of the Milford OB in Hamblin, Snake, Pine, White, Sevier Desert, Sevier Lake, Milford, and Wah Wah hydrologic subunits. National Register sites subject to potentially significant indirect impacts are the Wildhorse Canyon obsidian quarry and Parowan Gap petroglyphs. Other areas where significant impacts could occur are in the Beaver River drainage, Fremont sites in the Parowan Valley and farther east, and in national forests. Architectural impacts could occur in Milford, Minersville, Beaver, and adjacent small communities.

The density of archaeological resumes in Nevada/Utah, make the split basing (Alternative 8) with distributed population pressures and the Texas/New Mexico full basing (Alternative 7) ranked a close first and second, and the full basing Nevada/Utah proposed action and alternatives distant "thirds." The alternatives would be ranked as follows:

Proposed Action	Third (tie)
Alternative 1	Third (tie)
Alternative 2	Third (tie)
Alternative 3	Third (tie)
Alternative 4	Third (tie)
Alternative 5	Third (tie)
Alternative 6	Third (tie)
Alternative 7	Second
Alternative 8	First

PALEONTOLOGICAL RESOURCES (2.3.34)

Paleontologic resources are protected by law in Utah and are afforded some protection by the National Antiquities Act in the rest of the area. Some paleontological resources will likely be encountered at construction sites and possibly at building material points and in quarries. Illegal fossil collection may occur. DDA impacts can be prevented from becoming significant by incorporating a system for preservation of fossils found during construction activities.

The Coyote Spring OB is near the channel of the ancestral White River, where fossils are not known but may exist. The Muddy Creek formation near Moapa contains vertebrate fauna; paleozoic rocks containing fossils outcrop in the mountains to the east and west. Direct impacts are not predicted to be significant at the OB, but indirect impacts, primarily illegal collection, may be significant.

Important vertebrate fossils have been found in the vicinity of the Milford OB. Excavations at the OB could destroy fossils. Unless OB layouts avoid fossil-bearing areas, significant direct impacts could occur. More site-specific studies may be necessary during Tier 2 analyses.

Based on the analysis performed for this report, available data, and scientific judgment, the preferred alternative from the perspective or paleontological resources would be Alternative 8, split deployment with operating bases in Coyote Spring Valley and Clovis. The alternatives would be ranked as follows:

Proposed Action	Eighth
Alternative 1	Seventh
Alternative 2	Ninth
Alternative 3	Fourth
Alternative 4	Fifth
Alternative 5	Third
Alternative 6	Sixth
Alternative 7	Second
Alternative 8	First

CONSTRUCTION RESOURCES (2.3.35)

Cement demand is analyzed because of questions raised about its availability. (Other construction resources are discussed in Chapter 4.) Cement industry impacts have been estimated in an 11-state M-X cement supply region for each deployment region. Supply area states for the Nevada/Utah region are Arizona, California, Colorado, Idaho, Montana, Oregon, Nevada, New Mexico, Utah, Washington, and Wyoming. Direct project requirements can be estimated and scheduled with a reasonable degree of confidence. Indirect requirements cannot. To estimate indirect requirements, the project requirement for living and work areas of the operating bases was doubled. Indirect requirements are assumed to occur in the same year as direct requirements. In fact, there would be a lag of one to three years that would reduce impacts.

The peak requirement is 435,000 tons of cement in 1986. Requirements decline thereafter, ending in 1989. No long-term impacts are predicted, and short-term impacts on supply will not be significant but may have moderate significance in terms of cement price increases or their contribution to overall inflation.

While M-X cement demand is only 2 percent of area current or projected capacity, it will have an impact on regional prices, peaking at an additional $2.26 per ton or 2.6 percent of the anticipated price without M-X. Total cement use, including M-X, will increase, but non-M-X cement use will decline slightly due to higher prices. Use of a larger cement supply area and possible stockpiling to level off peak needs could further reduce supply impacts and could redistribute or reduce price increases differently.

Based on analysis performed for this report, available data, and scientific judgment, the preferred alternative from the perspective of construction resources would be Alternative 8, split deployment with operating bases in Coyote Spring Valley and Clovis. The alternatives would be ranked as follows:

Proposed Action	Third (tie)
Alternative 1	Third (tie)
Alternative 2	Third (tie)
Alternative 3	Third (tie)
Alternative 4	Third (tie)
Alternative 5	Third (tie)
Alternative 6	Third (tie)
Alternative 7	Second
Alternative 8	First

Alternative 1:
Coyote Spring Valley
Beryl

[redacted]

[redacted]

[redacted]

[redacted]

IMPACTS OF ALTERNATIVE 1

For Alternative 1, the DDA configuration is the same as that for the Proposed Action. The first OB would be at Coyote Spring, as for the Proposed Action; the second OB would be at Beryl. For all resources, except those described in this section, impacts for Alternative 1 would be the same as those for the Proposed Action.

GROUNDWATER (2.4.1)

The Beryl OB would be in an area where perennial yield is greatly exceeded by present uses. Overdraft is greater than at other Nevada/Utah OB sites. General discussion and impact rating for the Beryl OB are the same as for the Milford OB in the Proposed Action.

SURFACE WATER (2.4.2)

At the Beryl OB in Mary's Creek and Pine hydrologic subunits, short-term erosion impacts would be moderate due to the high number of channel crossings and the moderate erosion hazard of the soils. With mitigation, long-term impacts would be reduced to low.

AIR QUALITY (2.4.3)

Impacts would be the same in the DDA and at the Coyote Spring OB as for the Proposed Action. Impacts at the Beryl OB would be low. The OB is within 100 mi of the Cedar Breaks National Monument and Zion National Park. It is not near any areas designated nonattainment for pollutants.

MINING AND GEOLOGY (2.4.4)

Impacts in the DDA and at the Coyote Spring OB would be the same as for the Proposed Action. The Beryl OB is expected to have no direct impact on local mining.

NATIVE VEGETATION (2.4.5)

Impacts in the DDA and at the Coyote Spring OB would be the same as for the Proposed Action. Impacts at the Beryl OB are similar to those for Milford under the Proposed Action except that the proportion of native vegetation types lost would differ and some pinyon-juniper woodland would be destroyed.

PRONGHORN ANTELOPE (2.4.6)

Impacts in the DDA and at the Coyote Spring OB would be the same as for the Proposed Action. Impacts in the vicinity of the Beryl OB would be similar to those at the Milford OB but no key habitat would be lost. Pine, Milford, Cedar City, Wah Wah, Lake, Hamblin, and Patterson hydrologic subunits would be highly impacted as well.

SAGE GROUSE (2.4.7)

Impacts in the DDA and at the Coyote Spring OB would be the same as for the Proposed Action. The Beryl OB would cause significant impacts in five adjacent hydrologic subunits. In Pine and Hamblin, impacts could be particularly severe due to ORV use and, to a lesser extent, hunting.

BIGHORN SHEEP (2.4.8)

Impacts in the DDA and at the Coyote Spring OB would be the same as for the Proposed Action. No impacts to bighorn are predicted at the Beryl OB.

RARE PLANTS (2.4.9)

Impacts in the DDA and Coyote Spring OB would be the same as for the Proposed Action. No direct impacts to rare plants are anticipated at the Beryl OB. Previously undetected populations may be located later if this location is selected and site-specific studies are performed. Indirect effects as a result of recreational activity may occur.

AQUATIC SPECIES (2.4.11)

Impacts in the DDA and at the Coyote Spring OB would be the same as for the Proposed Action. No impacts are expected at the Beryl OB.

WILDERNESS (2.4.13)

Impacts in the DDA and at the Coyote Spring OB would be the same as for the Proposed Action. Significant impacts for the Beryl OB would be expected in the Snake, Cave, Lake, Hamblin, and Patterson hydrologic subunits.

EMPLOYMENT AND LABOR FORCE (2.4.14)

Impacts would be the same as for the Proposed Action, except in Iron, Beaver, and Washington counties. Total employment in Iron County would peak at 8,800 in 1989, 100 percent above the baseline. Only 1,300 jobs would be in the county under the Proposed Action. Long-run employment would equal 5,700, or 5,000 above long-

run employment under the Proposed Action. Cedar City would likely get much of the local growth and experience significant economic growth. Beaver County long-run employment growth is projected at 500 jobs, 5,000 less than under the Proposed Action.

Spillover effects of the Beryl OB in Washington County would produce the other important difference between this and the Proposed Action. At most, the increase in employment due to M-X would be 900 jobs under Alternative 1, and long-run employment would increase by 600 jobs.

EARNINGS (2.4.15)

Impacts would be similar to those for the Proposed Action. Significant differences would be less growth in Beaver County and more in Iron County. In Beaver County, earnings would peak at $69 million in 1986, $100 million less than the Proposed Action, but still over 300 percent of 1978 earnings. Over the long run, earnings would be $3 million. Inflationary pressures are still likely.

In Iron County, peak earnings of $158 million would be expected in 1987, 200 percent of 1978 earnings. Earnings would stabilize at $87 million, more than 100 percent over 1978 levels. Much of this growth would occur in Cedar City, though Beryl will expand sharply creating significant change in the size and structure of the county's economy.

POPULATION (2.4.16)

At the regional and state levels, population effects would be virtually identical with those projected for the Proposed Action. At the county level, population effects shift primarily to Iron County, the location of the Beryl OB, with some spillovers to Washington and Beaver counties. M-X growth in Beaver would be 3,900 in 1986 with a compound annual growth rate of 24 percent sustained over the three years from 1984 through 1986. In the long term, the permanent population increase is projected to be about 900 in the county. Growth in Iron County, on the other hand, will be at an annual rate of 13 percent over the six year construction period from 1984 through 1989. Losses are 4.7 percent annually for two years after construction. The county's permanent population increase would be about 12,800 by 1991.

HOUSING (2.4.17)

There are no significant differences between the Proposed Action and Alternative 1 at the regional and state levels. Differences would occur in Beaver, Iron, and Washington counties. Beaver's need peak at 820 units or 46 percent above normal growth, compared to nearly 200 percent for the Proposed Action. Long-term impacts would be 320 units, a 16 percent increase over baseline.

Because the OB would be at Beryl, Iron County's peak requirements are five times larger at 3,560 units, representing a 53 percent increase over baseline, and long-term effects are three times larger than for the Proposed Action. The only other county affected differently from the Proposed Action is Washington, where peak year requirements would be about twice as large.

PUBLIC FINANCE (2.4.18)

Regional and Clark County impacts are essentially the same as for the Proposed Action. In Iron County, deficits of $1.7 million are anticipated in the peak year (1986). Long-term capital expenditures in Iron County would be $24.2 million and peak year requirements, $38.6 million. Although temporary facilities could reduce peak year costs, Iron County will need outside assistance.

EDUCATIONAL SERVICES (2.4.19)

Regional impacts would be the same as for the Proposed Action. In Beaver County, 40 additional teachers would be required in peak year 1986, a 66.2 percent increase above normal growth baseline. Long-term requirements would be 11 additional teachers. Although the peak-year cumulative impacts of M-X and other projects in Beaver County would be less under Alternative 1 than the Proposed Action, 120 teachers would be required, a 200 percent increase. Long-term cumulative impacts require an estimated 69 teachers (106.1 percent above baseline).

Teacher requirements would be eight times greater in Iron County than for the Proposed Action. One hundred ninety-six additional teachers would be required to meet peak-year enrollment demands (74.1 percent over baseline), and 156 teachers would be needed over the long term (53.8 percent over baseline).

HEALTH SERVICES PERSONNEL (2.4.20)

Impacts at the regional level would be the same as for the Proposed Action. Beaver County's peak requirements fall to 11 percent of those needed under the Proposed Action; 6 personnel would be required. Long-term needs would be similarly reduced, producing a moderately significant 13 percent shortfall. Iron County would require 56 personnel, 39 percent above baseline requirements, and would have long-term needs of 13. Shortfall would be a significant 23 percent.

PUBLIC SAFETY (2.4.21)

Impacts would be generally the same as for the Proposed Action except in Beaver and Iron counties. Beaver's peak shortfall remains significant at 31 percent, but this represents only 9 people, the difference between the temporary need for 11 and the permanent need for two. In Iron County, requirements increase six times, creating a construction peak-year shortfall of 15 percent, which is of sufficient size to create public safety personnel problems.

URBAN LAND (2.4.22)

Impacts would be basically the same in the DDA and in Clark County as for the Proposed Action. Iron County (Beryl OB) would have most urban land area requirements for Minersville and Milford in Beaver County; Enterprise in Washington County and Pioche-Panaca in Lincoln County would also be affected. Within Iron County, Cedar City, Newcastle, and the rural area near the OB would experience the greatest portion of the OB-related urban land development. Since Iron County communities alone have 5,000 acres of developable vacant urban land, M-X requirements can be met, but it is not known whether the land is located where the needs would occur. The rate at which land conversion would occur either from

vacant to developed or from rural to urban could significantly impact Iron County. Under this alteration, there would be a need for an enforceable Iron County General Plan and zoning map.

TRANSPORTATION (2.4.24)

Impacts in the DDA and at the Coyote Spring OB would be the same as for the Proposed Action. The road between the Beryl OB and Beryl Junction would have to be widened to four lanes. Other minor improvements may be required, but the road system would accommodate anticipated traffic without congestion.

ENERGY (2.4.25)

Impacts would be the same as those under the Proposed Action.

LAND OWNERSHIP (2.4.26)

Impacts in the DDA and at the Coyote Spring OB would be the same as for the Proposed Action. At the Beryl OB some private land is within the suitability zone and could be used for OB construction.

IRRIGATED FARMLAND (2.4.27)

Impacts would be the same as for the Proposed Action. No irrigated cropland would be disturbed by construction at the Beryl OB.

GRAZING (2.4.28)

Impacts in the DDA and at Coyote Spring OB would be the same as for the Proposed Action. The Beryl OB occupies parts of four allotments (Tilly Creek, Bennion Spring, Del Vecchio, and Mule Spring). Losses from direct vegetation disturbance in the four allotments would be about 212 AUMs. These losses could significantly impact operators of these allotments.

RECREATION (2.4.29)

Impacts in the DDA and at Coyote Spring OB would be the same as for the Proposed Action. The placement of an OB site at Beryl would result in an increase in demand for use of outdoor recreational facilities in the vicinity. The demand for campsites projected by M-X in-migration is not expected to exceed the present supply to this region. The supply of lakes in this region is short of the projected need with M-X.

NATIVE AMERICAN CULTURAL RESOURCES (2.4.30)

Impacts in the DDA and at the Coyote Spring OB would be the same as for the Proposed Action. Near Beryl OB little is known about Native American cultural resources. Campsites, if present, are likely to be along ephemeral streams. Increased recreational use of mountain areas adjacent to the OB during construction and operations would seriously impact resources in canyon and mountain areas within 50 to 100 mi of the OB. Dense site concentrations are expected in the southern Nordic and Wah Wah ranges, the former homeland of the Indian Peaks band.

Documented sites associated with Southern Paiutes are known for the Dixie National Forest and areas between Modena and Hamblin Valley.

NATIVE AMERICAN WATER ACCESSIBILITY AND AGRICULTURAL LAND USE (2.4.31)

Impacts would be the same in the DDA and at the Coyote Spring OB as for the Proposed Action. The Beryl OB would not impact any identified Native American land or water resources.

NATIVE AMERICAN MIGRATION PATTERNS (2.4.32)

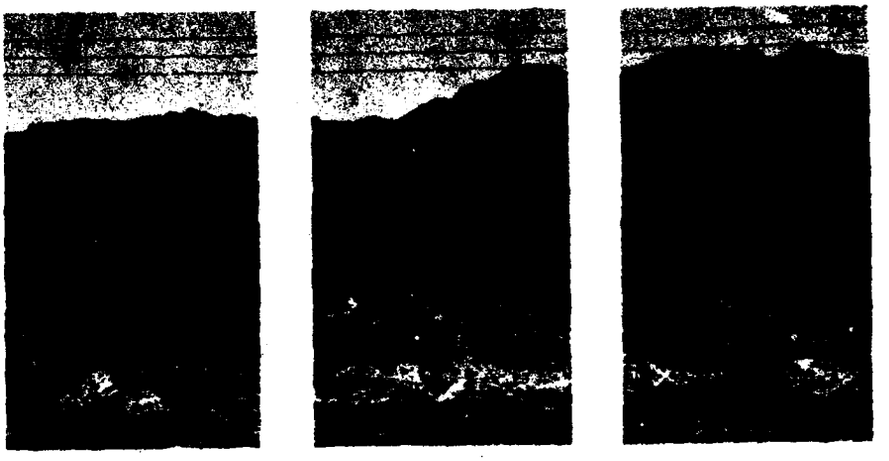
Impacts would be the same for the Proposed Action except that the Shivwits Reservation in Utah (population 65) is expected to grow and the Kanosh Reservation would be less impacted.

ARCHAEOLOGICAL AND HISTORICAL RESOURCES (2.4.33)

Impacts for Alternative 1 are comparable to those of the Proposed Action.

PALEONTOLOGICAL RESOURCES (2.4.34)

Impacts in the DDA and at the Coyote Spring OB are the same as for the Proposed Action. The Beryl OB is in a geologically similar area to the Milford OB, and the impacts would be the same.



Alternative 2: Coyote Spring Valley

Delta

IMPACTS OF ALTERNATIVE 2

For Alternative 2, the DDA configuration is the same as that for the Proposed Action. The first OB would be at Coyote Spring, as for the Proposed Action, the second OB would be at Delta. For all resources except those described in this section, impacts for Alternative 2 would be the same as those for the Proposed Action.

GROUNDWATER (2.5.1)

The Delta OB site is in an area closed to further water development because of overdraft. M-X water needs would have to be purchased, probably from farmers, with consequences to agriculture. The impacts of the diversion of water from agricultural use would be increased because of the nearby Intermountain Power Project (IPP) which would be constructed at the same time as the OB. IPP has purchased irrigation water, but the impacts it may have on farming are not predicted. Impacts at the Delta OB are predicted to be low in the short range and high in the long term.

SURFACE WATER (2.5.2)

At the Delta OB, short-term erosion impacts would be low due to limited runoff, low construction density, the level topography, and stable soils. With mitigation, no long-term impacts should occur.

AIR QUALITY (2.5.3)

The Delta OB is ranked high for short-term impacts and moderate for long-term impacts.

MINING AND GEOLOGY (2.5.4)

No impact is expected at the Delta OB.

NATIVE VEGETATION (2.5.5)

Construction of the Delta OB would require the removal of about 5,500 acres of vegetation, mostly shadscale and alkali sink scrub types. Impacts are not significantly different from those expected at the Milford OB described in the Proposed Action. The loss of shadscale scrub may be greater at Delta than at Milford.

Indirect recreational impacts would be greatest in Beaver, Fish Springs, Government Creek, Rush, and Sevier Desert hydrological subunits. Additional impacts to the native vegetation nearby may result from the construction of the Intermountain Power Project.

PRONGHORN ANTELOPE (2.5.6)

The Delta OB would be on the edge of a pronghorn range, but construction would have no significant effect on pronghorn populations. Indirect impacts, primarily from ORV use and illegal hunting, could be significant in the immediate vicinity of the OB and in Snake, Pine, White, Fish Springs, Dugway, Government Creek, and Wah Wah hydrologic subunits.

SAGE GROUSE (2.5.7)

The Delta OB itself would have no significant impact on sage grouse, but OB personnel could severely impact habitat in the Snake hydrologic subunit, largely through ORV use.

BIGHORN SHEEP (2.5.8)

No impacts to bighorn are predicted at the Delta OB.

RARE PLANTS (2.5.9)

At the Delta OB location, terrace buckwheat (Eriogonum natum) occurs in the suitability zone. OB construction and operation may alter the habitat and decrease abundance of this species. The plant is a recommended threatened species.

AQUATIC SPECIES (2.5.11)

The nearest protected aquatic biological resource is the occurrence of the state protected least chub in Coyote and Tule Spring, located about 35 mi to the west of the proposed Delta OB. No direct effects of water withdrawal from construction of this OB are expected on these least chub habitats since they occur one valley distant and perpendicular to the direction of groundwater flow. Indirect impacts could occur as a result of recreation, but would not be significant.

WILDERNESS (2.5.13)

Significant wilderness impacts are expected in the Snake, White, Fish Springs, Sevier Desert, and Sevier Desert/Dry Lake hydrologic subunits.

EMPLOYMENT AND LABOR FORCE (2.5.14)

Impacts would be basically the same as for the Proposed Action except that Iron, Beaver, and Washington counties would have smaller impacts and Millard

County more. M-X employment in Millard County would peak at 12,400 in 1988, 9,000 jobs more than under the Proposed Action. In the long run, employment would be 6,600 or 6,400 above the Proposed Action.

Including IPP and other projects, employment in 1988 would be 15,100 jobs, 2,700 more jobs than with M-X alone. Over the long run, these other projects add about 1,100. Rapid build up of employment in Millard County would create significant economic dislocation. Construction scheduling and coordination among projects could create a longer but less dramatic peak with construction employees moving from IPP to M-X. Since Delta is currently organizing for growth associated with IPP, the long-term increased growth combined with M-X economic diversity may be better handled here than at any other single location other than Coyote Springs. The Delta community could become the dominant city in the region.

Beaver County would have less growth than with the Proposed Action. However, peak employment would be about 2,300 jobs, and long-run growth, 350. Long-term employment would be 5,400 less than with the Proposed Action.

EARNINGS (2.5.15)

Impacts are similar to those for the Proposed Action except that Beaver County impacts are similar to those for Alternative 1. Also, earnings would rise sharply in Millard County as compared to the Proposed Action.

Millard County earnings of $274 million are expected in 1988, 700 percent of 1978 earnings. The net increase would be 240 percent of the earnings forecast for the Proposed Action. Earnings would decline to $94 million in 1991, more than twice 1978 baseline. Earnings growth will create significant growth impacts.

POPULATION (2.5.16)

At the regional and state levels, population effects would be virtually identical to those for the Proposed Action. In Millard County, the site of the Delta OB peak population growth would equal 24,000 for 1988, and annual growth would be 19 percent over the preceding five years. The effects of other projects increase this to 27 percent. Annual losses would be 10 to 20 percent after construction for two or three years, leaving a permanent increase of 13,700 persons in Millard County.

HOUSING (2.5.17)

There would be no significant differences between Alternative 2 and Proposed Action housing impacts at the region or state level. Beaver County's requirements drop to 20 percent of those under the Proposed Action, but they would still be 40 percent over normal growth. A greater difference is long-term; Beaver County's permanent requirements would be only 12 percent of those for the Proposed Action. Iron County's housing requirements would be lower by 76 percent and would have no permanent long-term requirements. Juab County's peak year requirements would be larger and require 210 permanent units. In Millard, because of the Delta OB, housing requirements would peak at 4,800 units, 122 percent over baseline and four times greater than under the Proposed Action; long-term requirements are similarly raised. The cumulative impacts of M-X and other projects would be 180 percent greater than baseline in Millard County.

PUBLIC FINANCE (2.5.18)

Regional and Clark County impacts would be substantially the same as for the Proposed Action. Millard County, site of the Delta OB, would have peak deficits of $2.2 million (1987), 8.8 percent of total expenditures in this year. Long-term capital expenditure requirements would be $25.9 million, and peak requirements, $51.1 million. Fiscal effects on Beaver County would be much less than for the Proposed Action.

EDUCATIONAL SERVICES (2.5.19)

Beaver County would need fewer teachers; 36 teachers in the peak year (59.6 percent above baseline) and one teacher in the long term.

Millard County's peak year requirements would be 254 teachers, four times greater than the Proposed Action, and 184 percent above baseline. Long-term requirements would be 166 teachers, 112.1 percent over baseline.

HEALTH SERVICES PERSONNEL (2.5.20)

Beaver County's M-X-related peak requirements would be six individuals, 18 percent less than for the Proposed Action. With no long-term needs, the shortfall would be a significant 15 percent. Other projects would increase the shortfall to 21 percent. Millard County's peak needs would be 65 personnel, 13 for the long term. Shortfall would be 37 percent, which would increase to 42 percent with other projects. These impacts would be significant.

PUBLIC SAFETY (2.5.21)

Impacts are generally the same as for the Proposed Action except in Millard County. There the shortfall would be 37 compared to 19 for the Proposed Action. The impacts would be significant.

URBAN LAND (2.5.22)

The requirements for additional land devoted to urban uses in Millard County would increase significantly. In 1979, Millard County had 3,415 acres of developed urban land and 2,327 acres of vacant urban land. Although some requirements for additional urban land are likely in adjacent Juab and Beaver counties, the largest demand, more than 85 percent, would be in Millard County. The Delta-Hinckley area would receive the greatest increase in demand for urban land, while lesser effects could be felt in the communities of Fillmore and Holden.

In the peak year about 2,027 acres of urban land would be required while the long-term demand is considerably lower at 727 acres. Millard alone has 3,415 acres of developable vacant, urban land, enough for M-X needs, but it is not known whether the land is located where the needs would occur.

QUALITY OF LIFE (2.5.23)

Impacts would be the same as for the Proposed Action except in Millard County, where impacts would be significant for the short- and long-run due to the Delta OB and in Beaver County where short-run impacts are projected.

TRANSPORTATION (2.5.24)

U.S. 50 between the Delta OB and the town of Delta would have to be widened to four lanes, but other roads in the vicinity should accommodate increases. Spot capacity improvements and improved traffic control may be required at some Delta area locations.

LAND OWNERSHIP (2.5.25)

The Delta OB would require no private land.

IRRIGATED FARMLAND (2.5.26)

No irrigated cropland would be disturbed by the Delta OB, although purchase of water rights could impact about 2,000 irrigated acres.

GRAZING (2.5.27)

The Delta OB would be in the Desert allotment. Grazing losses would be 208 AUMs. Regionally this loss is not significant but it may be to individual grazing permitees.

RECREATION (2.5.28)

No significant impacts would be expected from the Delta OB while other impacts would be comparable to those with the Proposal Action.

NATIVE AMERICAN CULTURAL RESOURCES (2.5.29)

The Delta OB would be in a densely settled aboriginal area. Known sites are limited to several lithic scatters and campsites near the OB. Direct construction impacts cannot be predicted because of limited data. Within a two-mile radius of the Sevier and Beaver rivers, site concentrations and significant impacts are expected to be greatest.

The larger northern Sevier Desert area contains a wide variety of significant Native American cultural resources which could be indirect impacted. Simultaneous development of the Intermountain Power Project area at nearby Lynndyl may lead to even greater demands for increased recreational development of areas in which sensitive Native American resources are concentrated.

NATIVE AMERICAN WATER ACCESSIBILITY AND AGRICULTURAL LAND USE (2.5.30)

The Delta OB would not impact any identified Native American land or water resources.

NATIVE AMERICAN MIGRATION PATTERNS (2.5.31)

The Kanosh Reservation is closer to the Delta OB site than to the Milford OB site in the Proposed Action and has a major potential of receiving Native American in-migrants and their corresponding impacts.

ARCHAEOLOGICAL AND HISTORICAL RESOURCES (2.5.32)

At the Delta OB, 10 mi^2 of predicted moderate to low sensitivity area would be impacted. High impacts would occur on the National Register Paleo-Indian site if this area were cut by the OB railroad. This would have to be addressed specifically during Tier 2 studies and decisionmaking. Indirect impacts would be high in Snake, Pine, White, Fish Springs, Dugway, Government Creek, Sevier Desert, Sevier Lake, and Wah Wah hydrologic subunits and in the towns of Delta, Hinckley, Deseret, Oak City, and Lynndyl.

PALEONTOLOGICAL RESOURCES (2.5.33)

The Delta OB area is geologically similar to the Milford OB, and the impacts would be the same.

[redacted]

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Alternative 3:

Beryl

Ely

[redacted]

IMPACTS OF ALTERNATIVE 3

For Alternative 3, the DDA configuration is the same as that for the Proposed Action. The first OB would be at Beryl, Utah, and the second OB would be at Ely, Nevada. For all resources except those described in this section, impacts in the DDA would be the same as those for the Proposed Action, and those for the Beryl OB the same as those for Alternative 1.

GROUNDWATER (2.6.1)

The Ely OB site is in the Steptoe hydrologic subunit which has been designated as a critical groundwater basin because allocated water rights exceed perennial yield. Use, however, is much lower than perennial yield, and OB water use can probably be assured by purchase of presently allocated resources. Impacts at the Ely OB would be lower in the short term than at any other Nevada/Utah OB. They could increase to a moderate level on completion of the White Pine Power Project, whose large allocation is the reason for the critical basin designation.

SURFACE WATER (2.6.2)

At the Ely OB in the Steptoe hydrologic subunit, short-term erosion impacts would be moderate due to the moderately stable soils, slopes of 3 to 5 percent, and high runoff from the mountains. Erosion impacts could be mitigated through revegetation of the disturbed soils and engineering design. Long-term impacts would be low after mitigation.

AIR QUALITY (2.6.3)

Impacts would be substantially the same as for the Proposed Action. The Ely OB in the Steptoe hydrologic subunit is assigned a high-impact rating in the short term and a moderate-impact rating in the long term.

MINING AND GEOLOGY (2.6.4)

The Ely OB may conflict with expansion of the Ward Mining District and possible mining in the Egan Range Mountains and valleyfill. Impacts at the Ely OB are rated moderate.

NATIVE VEGETATION (2.6.5)

Construction of the Ely OB would result in the direct removal of about 5,500 acres of native vegetation, mainly Great Basin sagebrush and pinyon-juniper woodland types. This impact is not significantly different from that expected at the Milford OB, the Proposed Action. Indirect recreational impacts will be greatest in Spring, White River, Ruby, Jakes, and Snake hydrologic subunits.

Additional impacts to the native vegetation of the Ely area and the other nearby hydrologic subunits are expected from the planned reopening of the Kennecott copper mine, north of Ely and the construction and operation of the White Pine County power plant.

PRONGHORN ANTELOPE (2.6.6)

No direct impacts to pronghorn are expected in the vicinity of the Ely OB. Indirect impacts, however, could occur in Steptoe, Snake, Pine, Spring, and Tippet hydrologic subunits.

SAGE GROUSE (2.6.7)

Significant impacts would occur, mostly within a radius of 30 mi from the Ely OB. Direct impacts would be permanent while indirect impacts would be long term. Sage grouse populations in the vicinity of the OB could be reduced by a large percentage. The White Pine Power Project would add to impacts. Impacts of the Ely OB on sage grouse would be the most severe of any alternative.

BIGHORN SHEEP (2.6.8)

No impacts are expected at the Ely OB.

RARE PLANTS (2.6.9)

At the Ely OB, no direct impacts to known rare plant locations are expected for the proposed base location. Three rare plant species occur within the suitability zone and may be directly or indirectly impacted if the OB is relocated within the suitability zone. These species have been recommended for federal listing. Population growth related effects and recreation related effects may occur in the Steptoe and surrounding hydrologic subunits.

UTAH PRAIRIE DOG (2.6.10)

No impact is predicted at the Ely OB.

AQUATIC SPECIES (2.6.11)

Groundwater withdrawal is expected to have only localized and minimal effects on the relict dace. However, if the M-X OB were at Ely and the proposed White Pine Power Project were constructed in Steptoe or White River valleys, there could be potential for cumulative effects of groundwater withdrawal on at least the southern portions of the Steptoe hydrologic subunit relict dace populations at Grass Spring, Steptoe Ranch Spring, and Steptoe Creek.

The single population of pure strain Utah cutthroat trout in Goshute Creek, 60 mi north of the OB could be significantly impacted by fishing. The most effective mitigation measures that could be instituted would be setting aside Goshute Creek as a preserve for the Utah cutthroat trout and not allowing fishing. Potential recreational effects on other hydrologic subunits could be significant. The main mitigation is preservation of habitats through fencing or policing, which will be the responsibility of the habitat manager.

DESERT TORTOISE (2.6.12)

There would be no impact in the Ely OB vicinity.

WILDERNESS (2.6.13)

Significant impacts would be in the Snake, White, Hot Creek, Railroad northern, Steptoe, Cave, Lake, Hamblin, and White River hydrologic subunits.

EMPLOYMENT AND LABOR FORCE (2.6.14)

Impacts in the region and in Eureka, Lincoln, Nye, and Juab counties would be the same as for the Proposed Action; M-X employment would be less in Clark and Beaver counties and greater in Iron and White Pine counties. There would be slight spillover effects from the OB in Beaver and Washington counties.

Iron County peak employment of 12,200 is forecast in 1986, almost 11,000 jobs above the Proposed Action. Over the long run, M-X-induced change in employment would be 17,600 or 6,700 jobs above employment under the Proposed Action. Effects would be significant. Compared to the Proposed Action, White Pine County M-X employment would peak in 1987 at 11,200 jobs, 6,900 above peak employment under the Proposed Action. Over the long run, 7,100 jobs would be created. Peak employment in Clark County is 8,600 jobs in 1986, a reduction of 16,000 jobs compared to peak employment with the Proposed Action. Over the long run, only 650 M-X jobs are forecast, a decline of 10,000 from levels in Clark County under Proposed Action.

EARNINGS (2.6.15)

Impacts would be similar to those for the Proposed Action except that earnings would be much less in Clark and Beaver counties and much higher in Iron and White Pine. Little impact on Clark County's economy is likely. Effects on Beaver County are similar to those for Alternative 1.

Iron County peak growth of $230 million would be 25 times the Proposed Action growth in earnings. Significant change in the size and structure of the local economy would be likely. In White Pine County peak earnings would rise by approximately $220 million, while long-term annual earnings would increase about $100 million. Given the current lack of economic diversity, a significant adjustment period would result. An OB and WPPP would add diversity to the economy and likely result in more economic stability in the future.

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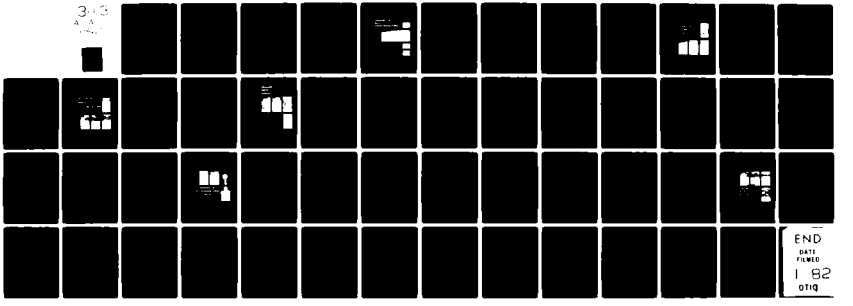

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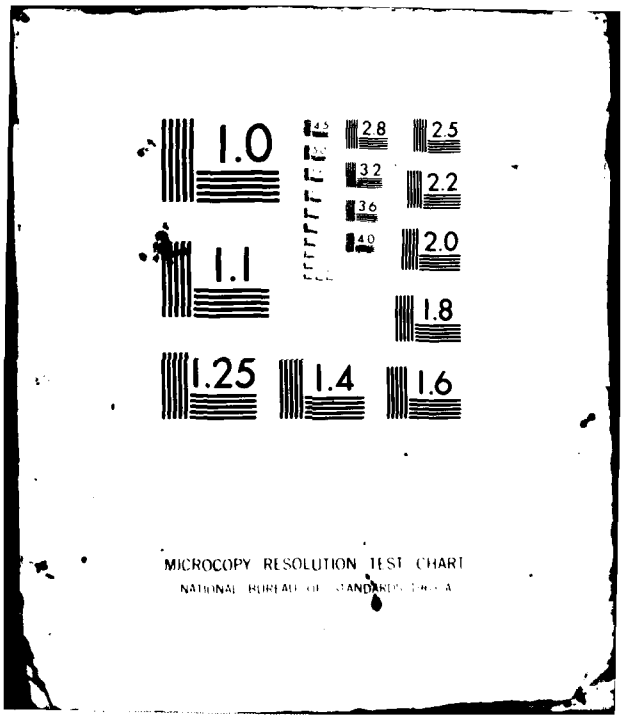
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POPULATION (2.6.16)

Population effects at the regional level would be substantially the same as for the Proposed Action. In Iron County, the annual growth rate would be 19 percent over five years. Losses after construction would result in a decline of -1.6 percent annually from 1987 through 1990. Long-term population increase would equal 17,000 by 1990.

White Pine County would grow at 29 percent annually over the five-year construction period beginning in 1984. Declines would be -7.5 percent annually for the next three years, resulting in a long-term increase of 14,300 persons. Other projects increase the change to 35 percent annually, while the declines would be increased to -8.5 percent annually.

HOUSING (2.6.17)

There would be no significant differences from the Proposed Action at regional and small impact differences at the state level. White Pine would require 1,600 housing units, an increase of 43 percent. White Pine's M-X-related housing requirements are 25 times normal growth but with other projects would be 140 percent above baseline.

Iron County needs would peak at 4,500 units, a 71 percent increase over baseline and six times more than for the Proposed Action. The long-term needs would be 24 percent over baseline. Washington County's peak year requirements would be 300 percent larger than under the Proposed Action.

PUBLIC FINANCE (2.6.18)

Regional impacts would be similar to those under the Proposed Action. Peak year (1985) deficits of $2.0 million are anticipated in Iron County, 6.1 percent of total expenditures in that year. White Pine County, site of the Ely OB, would have peak deficits of $3.8 million (1986), or 16 percent of expenditures.

EDUCATIONAL SERVICES (2.6.19)

Regional impacts would be the some as for the Proposed Action. Iron, Washington, and White Pine counties would require 9, 4, and 3 times more teachers, respectively, in the peak year than with the Proposed Action. Clark and Beaver counties, on the other hand, would have lower requirements. Iron and Washington counties require approximately 206 (78 percent above baseline) and 19 (5.3 percent above baseline) additional teachers, respectively. Long-term requirements are similar to peak in both counties.

Beaver County would require 45 additional teachers in peak year 1986 (74.4 percent over baseline) and 14 additional teachers in the long term (21.5 percent over baseline). When other projects are considered, cumulative peak-year requirements would be 125 additional teachers, a 208.3 percent increase over baseline, and long-term needs would be 72 additional teachers (110.8 percent over baseline).

HEALTH SERVICES PERSONNEL (2.6.20)

At the regional level, impacts would be the same as for the Proposed Action. White Pine County's peak requirements would be 78 personnel. Long-term needs

would be 13, producing a significant 47 percent shortfall. Beaver County would require 16 percent as many health personnel as under the Proposed Action, the impact of which would not be significant.

Iron County peak needs would be 74 and long-term 15, producing a 28 percent shortfall. Washington County would not be significantly impacted.

PUBLIC SAFETY (2.6.21)

Impacts would be similar to those under the Proposed Action except that Clark County's impacts, low under the Proposed Action, would almost disappear. Impacts in Iron County would be similar to Alternative 1. The White Pine would have a deficit of 42 percent, 41 jobs. Impacts on public safety in that county would be substantial and significant. Beaver County's impacts would be slightly less and Washington's slightly higher than for the Proposed Action.

URBAN LAND (2.6.22)

Impacts in the DDA would be the same as for the Proposed Action, and, at the Beryl OB, slightly larger than for Alternative 1. White Pine County would have to meet the Ely OB urban land requirements. The Ely community would have the greatest share of the project-induced demand for land development, with lesser effects in Ruth and McGill. White Pine, with about 900 acres of vacant urban land, could not meet M-X demands from available land. Conversion of present public land to urban use or increased density with a change in residential life style would be required.

QUALITY OF LIFE (2.6.23)

White Pine, with only a single year of excessive growth under the Proposed Action, would have a sustained excessive growth rate because of the Ely OB. Iron County impacts would be the same as for Alternative 1. The Ely OB would create a much larger, more stable economy in White Pine County which has historically experienced periods of rapid growth and decline due to an economy based on little economic diversity.

TRANSPORTATION (2.6.24)

Near the Beryl OB, traffic impacts would be similar to those for Alternative 1, but traffic volumes would be about 20 percent higher. Near the Ely OB, traffic increases along U.S. 6-50-93 between the OB site and Ely may require widening to four lanes. Within Ely, road improvements may be necessary to avoid congestion. A WPPP west of Ely combined with M-X traffic could require improved U.S. 6 or U.S. 50 west of Ely.

LAND OWNERSHIP (2.6.26)

The Ely OB suitability zone contains private land and about 1,300 acres would be required by the conceptual OB analyzed. However, within the suitability zone, the OB could be located on public land. Exact siting would be determined during more detailed Tier 2 studies and decisionmaking.

GRAZING (2.6.28)

Impacts at the Beryl OB would be essentially the same as for Alternative 1 except that the possible AUM loss increases to 370. At the Ely OB (Steptoe), losses would be a total of 176 AUMs in the Tamberlain, Little White Rock, and West Schell Bench allotments. Regionally, these impacts are not significant but they may be to individual permitees.

RECREATION (2.6.29)

The potential impacts associated with the OB site at Beryl are discussed under Alternative 1. The Ely OB would, with other projects, cause shortages of water-based recreation and tent/trailer and vehicle camping facilities. Most significant impacts would be at three lakes-Comins, Bassett, and Cave Creek.

Most impacts to campsites would be in the Humboldt National Forest. Water-based recreation would be significantly impacted over the long term. Campground development may be required to keep up with projected demands.

NATIVE AMERICAN CULTURAL RESOURCES (2.6.30)

From the Beryl OB, the DTN to Pine Valley could run through a major mountain pass known to have untouched aboriginal settlements. The DTN also could pass the Needle Range in Pine Valley, which includes the former population center of the Indian Peaks band of Southern Paiutes. This area has significant secular and sacred resources still in use and disturbance of it would be a significant impact.

The portion of the suitability zone north of Ely is associated with dense concentrations of Shoshone ancestral sites and are expected to be very sensitive to local Native Americans. Site data for the suitability zone south of Ely are less complete. The lower and upper bajadas of the Egan Range contain springs and traditional foods; recreational use of this area will be significant. Lowlands are expected to be less sensitive, comparatively. The Willow Creek Drainage could have Shoshone campsites. Due to the dense Shoshone settlement of Steptoe Valley and adjacent Spring Valley in prehistoric and historic times, indirect impacts to ancestral/sacred sites could be extensive.

NATIVE AMERICAN WATER ACCESSIBILITY AND AGRICULTURAL LAND USE (2.6.31)

The Ely OB would not impact any identified Native American land or water resources.

NATIVE AMERICAN MIGRATION PATTERNS (2.6.32)

The Ely Colony would be more attractive to economic migrants than under the Proposed Action. Utah Southern Paiute reservations and colonies would become net suppliers of migrants to other locations.

ARCHAEOLOGICAL AND HISTORICAL RESOURCES (2.6.33)

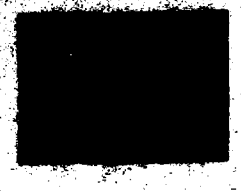
The Ely OB vicinity includes many water sources and therefore substantial direct impacts would be expected. The National Register Ward Charcoal Ovens site

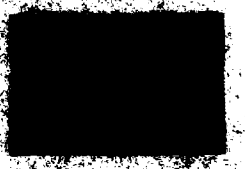
is expected to be significantly impacted. High indirect impacts would be expected in Newark, Railroad, Jakes, Long, Steptoe, Cave, Dry Lake, Lake, and Spring hydrologic subunits and high impacts in Little Smoky, Butte, Hamblin, White River, and Snake. Towns significantly impacted would be Ely, McGill, and Ruth.

PALEONTOLOGICAL RESOURCES (2.6.34)

Impacts in the DDA and at the Beryl OB would be the same as for the Proposed Action. Along the edge of Steptoe Valley between Ely and the OB are *Sheep Pass Formation* outcrops containing fossils. Paleozoic rocks outcropping in the mountain ranges east and west of the OB also contain fossils. All could be significantly impacted by illegal collecting.

Alternative 4:
Beryl
Coyote Spring Valley





IMPACTS OF ALTERNATIVE 4

For all resources, except those listed in this section, impacts in the DDA and at the Coyote Spring OB would be the same as those for the Proposed Action. Impacts at the Beryl OB would the the same for Alternative 3.

AIR QUALITY (2.7.3)

Coyote Spring and Beryl OBs are rated high impact for short-term impacts and moderate for long term. The major short-term impact would be fugitive dust during construction; the long-term impacts would be higher CO emissions from OB and induced traffic.

AQUATIC SPECIES (2.7.11)

At the Coyote Spring OB, elimination of DTN and OBTS construction would reduce impacts in Pahranagat Valley compared to those for the OB under the Proposed Action. Impacts of groundwater withdrawal on the downslope Moapa Fish Sanctuary would slightly decrease, but they are still expected to be significant and possibly irretrievable.

WILDERNESS (2.7.13)

The DDA and associated impacts would be the same as for the Proposed Action. Impacts for the first OB at Beryl are the same as those for Alternative 3. Although the siting of Coyote Spring as a secondary base would reduce the influx of permanent residents by about 24 percent, no substantial changes in indirect population-related effects are anticipated.

EMPLOYMENT AND LABOR FORCE (2.7.14)

Regional impacts would be the same as for the Proposed Action; county impacts would be less in Clark and Beaver counties, and substantially greater in Iron County. In Iron and Beaver counties, impacts would be the same as for Alternative 3. Peak employment in Clark County would be 18,800 jobs in 1986, a reduction of about 6,000 jobs from the Proposed Action. Over the long run, 8,300 M-X jobs are forecast for the county, a decline of about 2,300 from the Proposed Action.

EARNINGS (2.7.15)

Impacts would be similar to those for the Proposed Action except that earnings in Clark and Beaver counties would be reduced and those in Iron greatly increased. Earnings in Beaver County would be similar to those under Alternative 1. Clark peak-year earnings of $273 million are $86 million less than under the Proposed Action and they stabilize in 1992 at $113 million, $32 million less than for the Proposed Action. Even this very large and well developed economy would have rapid earnings growth and wage and price inflation. Growth in earnings in Iron County would be significant, particularly during construction. Impacts are similar to those described under Alternative 3.

HOUSING (2.7.17)

Impacts in the DDA are substantially the same as for the Proposed Action. Clark County with its smaller OB, would need only 70 percent of the housing required for the Proposed Action. The long-term and cumulative impacts would be reduced similarly. The impacts in Beaver County would be be considerably less than under the Proposed Action. Even so, impacts would be significant, with the peak-year's housing requirements 57 percent and long-term 22 percent over normal growth.

Iron County with the Beryl OB would need six times more housing than under the Proposed Action--a requirement of 4,540 units, 71 percent above baseline. Long-term requirements would be 1,880 units, 24 percent above baseline. Washington County peak requirements would be 680 units, 7 percent more than baseline, an increase of 185 percent over Proposed Action requirements.

PUBLIC FINANCE (2.7.18)

Regional impacts would be substantially the same as for the Proposed Action. Iron County impacts would be similar to the impacts for Alternative 3. Clark County peak year (1986) deficits would be $3.7 million, slightly less than under the Proposed Action, and no significant adverse long-term effects are anticipated. Capital expenditures in Clark County would be slightly lower than for the Proposed Action.

EDUCATIONAL SERVICES (2.7.19)

Regional impacts would be the same as for the Proposed Action. Iron and Washington counties would experience greater impacts than with the Proposed Action and Clark and Beaver would experience less. Iron and Washington counties would require 206 (78 percent above baseline) and 20 (5.6 percent above baseline) additional teachers in the peak year. Long-term requirements are similar to peak in both counties.

Clark County would need 197 additional teachers in the peak year, 2.8 percent over baseline. Beaver County would need an additional 45 teachers in the peak year (75 percent over baseline) and 14 additional in the long term (21.5 percent over baseline). When other projects are considered, the Beaver County peak-year requirements would be 125 additional teachers and long-term requirements would be 72 additional teachers.

HEALTH SERVICES PERSONNEL (2.7.20)

At the regional level, impacts would be the same as for the Proposed Action. Clark County's requirements would be 69 percent of those under the Proposed Action, 79 personnel. Even with no long-term needs, significant impacts are not anticipated. Beaver County will also have fewer needs than under the Proposed Action, but the shortfall would be a significant 21 percent. Iron County's peak need would be 74 and long-term need 15. A significant shortfall of 28 percent, compared to 3 percent under the Proposed Action would be expected. Washington County would not be significantly affected.

PUBLIC SAFETY (2.7.21)

Impacts would be generally the same as for the Proposed Action. Beaver and Washington county impacts would be the same as for Alternative 3.

URBAN LAND (2.7.22)

Impacts in the DDA and at the Coyote Spring OB would be essentially the same as for the Proposed Action and at the Beryl OB, the same as for Alternative 3.

QUALITY OF LIFE (2.7.23)

Impacts would be the same as for the Proposed Action, except in Iron County where they would be the same as for Alternatives 1 and 3.

TRANSPORTATION (2.7.24)

Impacts in the DDA would be the same as for the Proposed Action. However, in the vicinity of the Beryl OB, traffic levels would be 20 percent higher (as in Alternative 3) and at the Coyote Spring OB, traffic would be 20 percent less.

IRRIGATED FARMLAND (2.7.27)

Impacts would be the same as for the Proposed Action.

GRAZING (2.7.28)

Impacts in the DDA would be the same as for the Proposed Action. Impacts at the Coyote Spring OB would be the same except the AUM loss would be about 106 AUMs. The impacts at the Beryl OB would be the same as for Alternative 3.

RECREATION (2.7.29)

There are no significant impacts expected in the Coyote Spring vicinity. Potential impacts associated with the OB site at Beryl are discussed under Alternative 1.

NATIVE AMERICAN CULTURAL RESOURCES (2.7.30)

Impacts in the DDA and at the Coyote Spring OB would be substantially the same as for the Proposed Action and the impacts at the Beryl OB the same as in Alternative 3.

The Coyote Spring OB has the greatest impact potential to known Native American cultural resources. Elimination of the DDA and OBTS will substantially reduce direct impacts to ancestral/sacred sites, particularly in the areas of Pahranagat Wash, Kane Springs Wash, and the Lower Pahranagat Valley. No significant change is predicted in the level of indirect impacts.

NATIVE AMERICAN WATER ACCESSIBILITY AND AGRICULTURAL LAND USE (2.7.31)

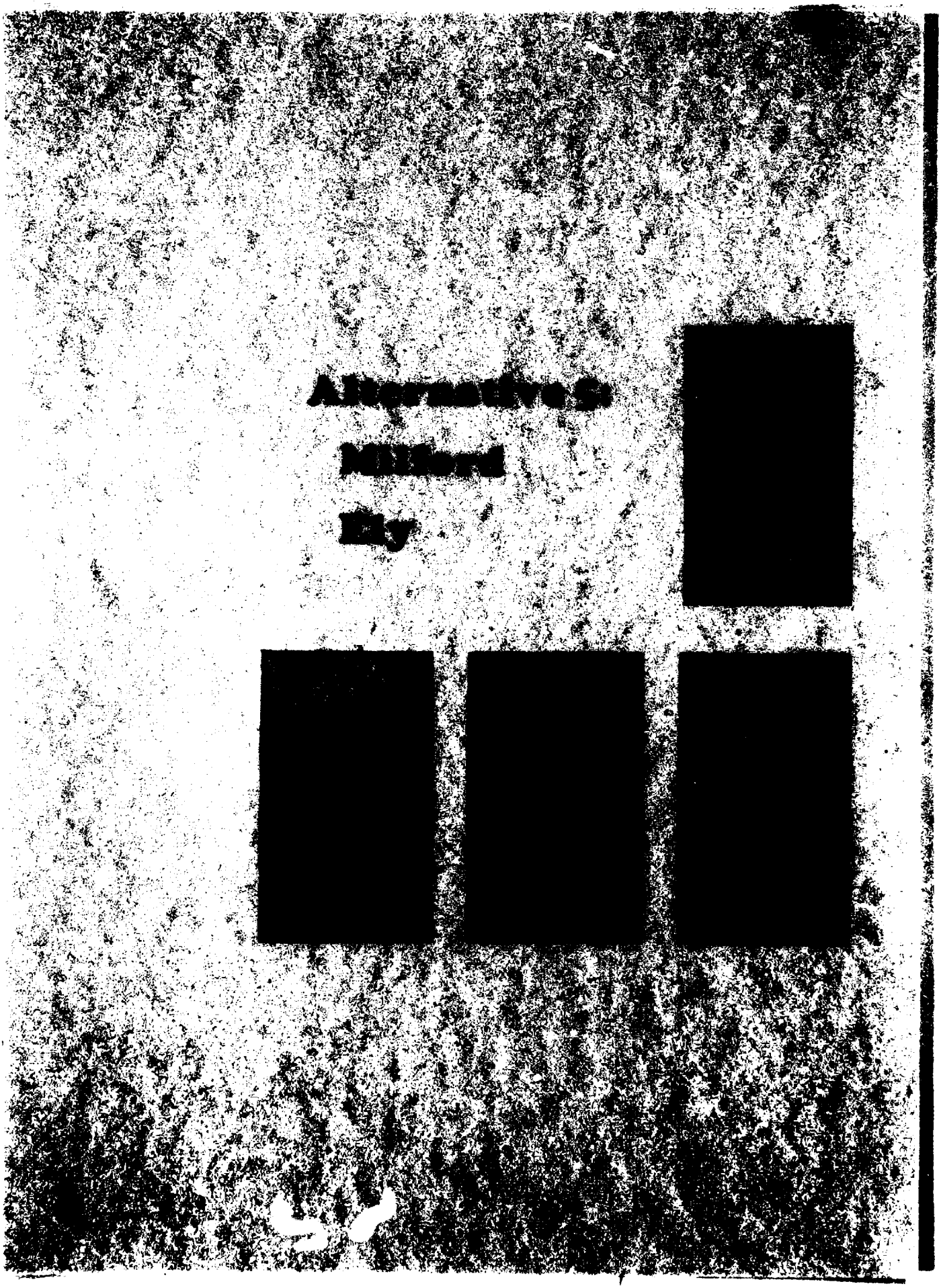
Impacts and suggested mitigations are would be same as for Alternative 1 and the Proposed Action.

NATIVE AMERICAN MIGRATION PATTERNS (2.7.32)

Impacts and suggested mitigations would be the same as for Alternative 1 and the Proposed Action.

ARCHAEOLOGICAL AND HISTORICAL RESOURCES (2.7.33)

Impacts in the DDA and at the Coyote Spring OB would be the same as for the Proposed Action and at the Beryl OB substantially the same as for Alternative 1. At Beryl, however, the OBTS and the DTN to Pine Valley are located in areas of predicted high sensitivity and are likely to cause significant impacts to important cultural resources.



IMPACTS OF ALTERNATIVE 5

For all resources except those described in this section, impacts in the DDA and at the Milford OB would be the same as for the Proposed Action. Impacts at the Ely OB would be the same as those for Alternative 3.

WILDERNESS (2.8.13)

At the Milford OB, Snake, Pine, White, Wah Wah, Cave, Lake, and Hamblin hydrologic subunits would have potential for significant impacts. Otherwise, Milford OB impacts are the same as those of the Proposed Action. Impacts for the Ely OB are the same as for Alternative 3.

EMPLOYMENT AND LABOR FORCE (2.8.14)

In Beaver County, peak employment would be 13,600 in 1986, about 4,800 more jobs than in the Proposed Action. Over the long run, M-X change in employment would be 7,600 or 1,800 jobs more than for the Proposed Action. Employment growth in White Pine County would be comparable to Beaver County, but totals would be slightly less.

EARNINGS (2.8.15)

Beaver County earnings would peak at $291 million in 1986, an increase of $122 million over the Proposed Action. Long-run growth would be $28 million more than under the Proposed Action. Impacts on White Pine County would be similar, and larger than for the Proposed Action.

POPULATION (2.8.16)

With the Milford OB, Beaver County's population growth rate would reach 45 percent annually over five-year construction from 1982 through 1986, with declines of about -6 percent annually over the next four years. Permanent population in-migration would equal 17,200 by 1990. The effects of other concurrent projects would accentuate impacts.

HOUSING (2.8.17)

In Clark County, housing requirements would be only 3 percent of those under the Proposed Action with no permanent effects. White Pine County's (Ely OB) requirements would be comparable to those under Alternative 3.

The Milford OB would result in Beaver County's requirements 34 percent above those under the Proposed Action. Iron County would experience spillover effects from Beaver County with somewhat higher requirements than the Proposed Action. Washington County's peak-year requirements would be 48 percent higher than under the Proposed Action.

PUBLIC FINANCE (2.8.18)

Beaver County's peak (1985) deficits would be $2.3 million, 11.7 percent of total expenditures in that year. Long-term capital expenditures in Beaver County would be $32.9 million or about $8 million above requirements under the Proposed Action.

EDUCATIONAL SERVICES (2.8.19)

Clark County additional teacher requirements would not be significant. White Pine County impacts would be comparable to Alternative 3.

The peak-year and long-term requirements would be somewhat higher in Beaver County than with the Proposed Action with 222 (367 percent over baseline) and 208 (319 percent) additional teachers required. Iron and Washington counties' requirements would also be somewhat higher than under the Proposed Action.

HEALTH SERVICES PERSONNEL (2.8.20)

Clark County requirements would be only 2 percent of those under the Proposed Action. White Pine County's peak requirements would be comparable to Alternative 3. Beaver County is projected to have a shortfall since its peak requirements of 75 personnel exceed its long-term need of 17. In both counties, other projects could reduce these shortfalls. Iron County would experience almost double the peak-year needs as under the Proposed Action, but a shortfall of only 7 percent is anticipated.

PUBLIC SAFETY (2.8.21)

Impacts in the DDA and in Beaver County would be essentially the same as for the Proposed Action, although more land would be needed at Milford. Impacts in White Pine County would be the same as for Alternative 3.

QUALITY OF LIFE (2.8.23)

Impacts would be the same as for the Proposed Action except in White Pine County where they would be the same as for Alternative 3.

TRANSPORTATION (2.8.24)

Impacts within the DDA are the same as for the Proposed Action. At the Milford OB, traffic levels would be about 20 percent higher than for the Proposed Action. At the Ely OB, impacts would be the same as for Alternative 3.

GRAZING (2.8.28)

Impacts from the DDA would be the same as for the Proposed Action, and at the Ely OB, the same as for Alternative 3. At the Milford OB, AUM loss will be about 359 AUMs.

NATIVE AMERICAN CULTURAL RESOURCES (2.8.30)

At the Milford OB, more ground would be disturbed and consequently more resources may be significantly impacted than for the Proposed Action.

NATIVE AMERICAN MIGRATION PATTERNS (2.8.32)

Impacts are the same as for the Proposed Action except the Moapa Reservation would supply migrants rather than receive them; Ely Colony would receive significant in-migration.

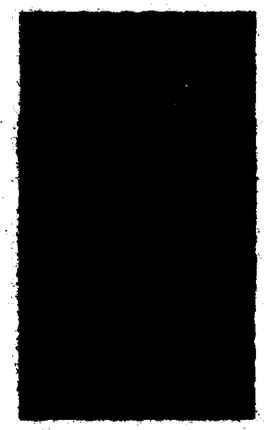
ARCHAEOLOGICAL AND HISTORICAL RESOURCES (2.8.33)

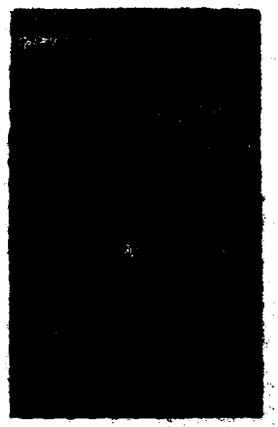
Impacts in the DDA and at Milford OB would be substantially the same as for the Proposed Action except three additional square mies of moderate to high sensitivity area would be affected. Impacts at the Ely OB would be the same as for Alternative 3.

Alternative 6:

Milford

Coyote Spring Valley





IMPACTS OF ALTERNATIVE 6

All resource impacts except those described in this section are substantially the same as those for the Proposed Action. Alternative 6 would be comparable to the Proposed Action except Milford would be the first OB and Coyote Spring would be the second OB.

WILDERNESS (2.9.13)

The DDA and associated impacts would be the same as for the Proposed Action. Impacts for a first OB at Milford and a second OB at Coyote Spring would be the same as those for alternatives 5 and 4, respectively.

EMPLOYMENT AND LABOR FORCE (2.9.14)

No significant differences are projected at the regional level. In Beaver County, the impacts would be the same as those for Alternative 5, and for Clark, impacts would be similar to those forecast under Alternative 4.

EARNINGS (2.9.15)

No significant differences are projected at the regional level. In Beaver County, the impacts would be the same as those for Alternative 5, and for Clark, impacts would be similar to those projected under Alternative 4.

POPULATION (2.9.16)

No significant differences from the Proposed Action are projected at the regional level, although a greater share of the population growth would occur in Utah. At the county level, population effects are projected to be slightly higher in Beaver and lower in Clark compared to the Proposed Action. Beaver County's annual growth rate would be slightly higher than those of the Proposed Action. Permanent population growth would reach 17,200 persons by 1992. The corresponding reduction in Clark County growth is not significant.

HOUSING (2.9.17)

Impacts at the regional level would be essentially the same as under the Proposed Action. The smaller Coyote Spring OB causes Clark County's peak year housing requirements to drop to 70 percent of the Proposed Action with a similar drop in the long term. Beaver County's peak year requirements would be 34 percent higher, as would its long-term needs because of the larger Milford OB. Washington County's spillover requirements would also be larger.

PUBLIC FINANCE (2.9.18)

Regional impacts are substantially the same as for the Proposed Action, the same in Clark County as for Alternative 4, and the same in Beaver County as for Alternative 5.

EDUCATIONAL SERVICES (2.9.19)

Impacts would be substantially the same as for the Proposed Action, with much larger impacts in Beaver, and slightly larger effects in Iron and Washington counties and slightly smaller ones in Clark.

TRANSPORTATION (2.9.24)

Impacts in the DDA would be the same as for the Proposed Action and at the OBs, traffic levels will be about 20 percent higher near Milford (as in Alternative 5) and about 20 percent lower near Coyote Spring (as in Alternative 4).

GRAZING (2.9.28)

Impacts from the DDA would be the same as for the Proposed Action, the same at the Milford OB as for Alternative 5 and at the Coyote Spring OB as for Alternative 4.

NATIVE AMERICAN CULTURAL RESOURCES (2.9.30)

Impacts relevant to the Milford OB would be the same as the Proposed Action and Alternative 5. Potential impacts relevant to Coyote Spring would be the same as for the Proposed Action and Alternative 4.

ARCHAEOLOGICAL AND HISTORICAL RESOURCES (2.9.33)

Impacts in the DDA and at the Coyote Spring OB would be the same as for the Proposed Action and at the Milford OB the same as for Alternative 5.

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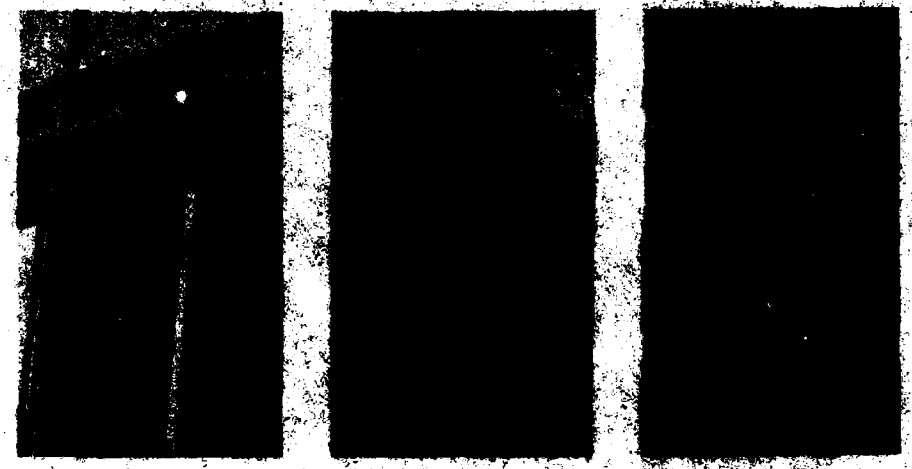


IMPACTS OF ALTERNATIVE 7

Alternative 7 would involve DDA areas in northwestern Texas and eastern New Mexico. The first OB would be located near Clovis, New Mexico and share at least some facilities with Cannon AFB. The second OB would be located near Dalhart, Texas.

GROUNDWATER (2.10.1)

Impacts of DDA construction water use would be similar to those for the Proposed Action except that few springs exist to be affected in Texas/New Mexico. Most regions and subregions are in overdraft, but DDA needs can be met by purchase. Declining watertables and increasing pumping costs are making water use for irrigation uneconomical. DDA water needs would be only a fraction of present uses and should, therefore, have little impact on the watertable level and on the agricultural economy. Some short-term DDA requirements, however, might increase local aquifer depletion rates up to 5 percent in all regions except IX (see Chapter 4).

High short-term impacts are predicted in region VIII, moderate short-term impacts are predicted in regions VII, V, and VI and low in I, III, and IX. DDA long-term ratings are uniformly low for all regions.

The Clovis OB would be located in an area of irrigated farmland. Increased energy costs are being met by development of local biomass resources and engine conversions to power center pivot irrigation systems. Construction impacts would be the same as those for operations. OB operations are expected to lead to moderate to high significant long-term impacts because of aquifer depletion. In the long term, the expanded community of Clovis, the OB, and agriculture will compete for available water. Short-term impacts, however, will be moderate to low. Long and short-term water impacts at the Dalhart OB are rated low.

SURFACE WATER (2.10.2)

Water erosion impacts would be low in all counties and at the OBs because of level topography and stable soil types. Where local areas of rolling topography do

exist, disturbed soils could be revegetated. No long-term impacts would occur with mitigation.

AIR QUALITY (2.10.3)

Fugitive dust emission impacts would be of primary concern both during the short and long term. Fugitive dust emissions from construction activity and the stationary sources that process construction materials at the construction camp will cause excessive localized particulate concentrations. Preliminary evidence indicates that elevated NO_x would result from levels from construction camp generators however, precise quantification is not possible at this time. These sources would be examined in more detail during Tier 2 studies. Counties with construction camps are rated moderate high impact in the short term.

The Texas/New Meixco area has the highest percentage of dust observations in the U.S. Due to the nearly level topography, high wind velocities, and the loose consistency and dryness of many of the soils in the Texas/New Mexico study region, soil erosion by wind (soil blowing) has historically caused problems for farmers in the area by removing productive soils. Wind-blown fugitive dust also reduces visibility and increases particulate concentrations. Wind erosion is especially severe on the fine sandy loam, loamy fine sand and sandy soils.

During construction, soil blowing could be a significant impact in the Texas/ New Mexico area. Several measures would be taken to help control wind erosion during road construction. These include watering and use of surface binding agents on heavily traveled road sections. Limiting vehicle speeds and controlling vehicle numbers are also viable methods of dust control. Off-road travel should be restricted to reduce the disturbance of soil surface and damage to natural vegetation. Potential fugitive dust source other than roads should also be covered by surface film binding agents or natural aggregates. The surface roughness of disturbed areas could be maximized with graded ridges to reduce surface wind velocity. At the end of the construction period, the disturbed areas should be revegetated.

For the long-term, impacts in the OB counties of Curry and Hartley are rated moderate because of increased CO concentrations from vehicles and space heating-cooling emissions. M-X system impacts on existing and proposed Class I areas of White Mountain, Pecos, Wheeler Peak, and Capulin Mountain were reflected in higher ratings assigned to counties within 100 mi of the Class I areas.

MINING AND GEOLOGY (2.10.4)

There is little mining activity in the area, and no significant impacts would be expected. There may be some minor location conflicts with a CO_2 gas field in Union and Harding counties. These would be investigated in more detail during Tier 2 studies. No impacts are expected at the Clovis OB or at the Dalhart OB. The latter is close to Hugoton gas fields but no impacts, except perhaps competition for labor, are expected.

NATIVE VEGETATION (2.10.5)

Full deployment in Texas and New Mexico would primarily affect cropland and intensively grazed rangeland, but very little undisturbed native vegetation. Grama,

bluestem, and mesquite grasslands would be the most extensively impacted vegetation types. Indirect effects to native vegetation would be smaller than for the Proposed Action.

Although impacts to native vegetation would be serious and perhaps permanent, this alternative would affect less variety and extent of native vegetation than the Proposed Action. Native vegetation, 25 mi north of the Clovis OB, could be indirectly impacted by recreational use of the area. Potential direct impact on native vegetation could occur at the Dalhart OB in the riparian vegetation at the southwest corner of the suitability zone.

PRONGHORN ANTELOPE (2.10.6)

Direct project effects would be limited to areas of overlap in rangeland in four counties in Texas and seven counties in New Mexico. Key habitat data were not available. The operating base at Clovis is not in pronghorn range, and no other large-scale projects are expected to contribute impacts.

Due to the higher level of human disturbance already present in Texas and New Mexico, pronghorn tolerance to human activity is greater than in Nevada/Utah, reducing impacts. Although direct and indirect impacts to pronghorn could be similar to those caused by the Proposed Action, no significant impacts are predicted.

SAGE GROUSE (2.10.7)

No sage grouse are in the areas. The lesser prairie chicken is a comparable species found in five counties. Short-term impacts are expected from poaching and ORVs. The prairie chicken will likely reoccupy habitat once construction ends and lands are revegetated. Complete recovery may not be possible and populations may be reduced.

BIGHORN SHEEP (2.10.8)

No bighorn sheep are in the area so no impacts would occur.

RARE PLANTS (2.10.9)

No rare plant species are known in the area so no impacts would be expected.

AQUATIC SPECIES (2.10.11)

No significant impacts are expected.

DESERT TORTOISE (2.10.12)

The desert tortoise does not occur in the area.

WILDERNESS (2.10.13)

Due to the low physical relief of the proposed siting area, visual impacts for construction activities would be minimal. Construction noise impacts would be

significant as in the Proposed Action but would occur at fewer WSAs. Radar towers would moderately reduce the aesthetic value of the Mescalero Sands designated WSA.

The first OB site at Clovis is over 200 mi by road from Mescalero Sands, and no significant direct or indirect effects are expected. The second OB is located near Dalhart. No impacts to wilderness are expected at the Clovis or Dalhart OBs.

EMPLOYMENT AND LABOR FORCE (2.10.14)

At the peak of project activity during 1986-88, impacts in counties are expected to be small relative to baseline. Bailey, Deaf Smith, Parmer, Chaves, Harding, and Quay counties would have significant short-term employment impacts but no long-run growth.

Peak employment would be 53,000 in 1988, 17 percent of projected baseline. Unemployment rates would decline, and some labor skills will be in short supply. Long-run impacts would stabilize after 1990 at 18,000, roughly 5 percent of the region's baseline, and about the same as for the Proposed Action. No other projects are considered large enough to significantly alter the impacts.

Growth would be concentrated in Curry County because of the Clovis OB. M-X employment would peak at 14,900 in 1988, double the county's baseline. Employment would decline and stabilize at 8,900 jobs after 1990. This long-run level is 60 percent of long-run forecast baseline. The City of Clovis would be the focus of much of the growth.

Dallam and Hartley counties would share in the economic expansion that would result from the Dalhart OB. Peak employment in Dallam County would be 6,600 in 1988, an increase of 300 percent of baseline. In Hartley County, peak employment in 1988 would be 7,300, five times baseline. Long-run impacts would be smaller, 850 jobs in Dallam County, and 4,800 in Hartley.

Five remaining counties--Lubbock, Moore, Potter, Randall and Roosevelt--are forecast to receive large M-X employment growth. Lubbock County would likely be able to assimilate a peak of 3,400. Peak employment of 9,100 jobs in Amarillo in 1987, would be 10 percent of baseline.

Peak M-X impacts of 3,500 jobs in Roosevelt County in 1988 would be 50 percent of baseline. An additional 1,900 M-X jobs in Moore County would be 27 percent of baseline. Neither county could accommodate such rapid, large-scale growth without stress. Long-run impacts would be much smaller, but would induce change.

EARNINGS (2.10.15)

Earnings would increase $1.1 billion (fiscal year 1980 dollars) in 1987, and decline and stabilize at $246 million by 1993. At the peak, M-X-related earnings would equal 26 percent of the region's 1978 total earnings. The long run would be 6 percent of 1978 levels. Metropolitan areas such as Amarillo, Clovis, and Portales would experience both short and long-run growth. Roosevelt County would likely be most heavily impacted because of its small economic base. DDA construction

impacts would be heavy in Bailey, Deaf Smith, Parmer, Chaves, Harding, and Quay counties; price inflation and construction and goods shortages would occur.

Curry County earnings would peak at $255.3 million in 1986, slightly more than 1978 total county earnings of $254.8 million, decline and stabilize at $121.7 million by 1992. Growth would significantly alter the size and nature of the county's economy, bringing wage and price inflation, changing the occupational mix, and creating local shortages.

Earnings would peak at $182.3 million in Hartley in 1987 and at $223.4 million in Dallam County in 1988. Growth would be significantly above 1978 county total earnings. Dallam earnings would decline to $4.0 million in 1993; Hartley County, to $83.9 million. Long-run, project-related employment in Hartley County would induce significant economic stress.

POPULATION (2.10.16)

Total population would grow almost 10,000 higher than in Nevada/Utah, but it would not be significant at the regional level. The construction growth period from 1983 through 1987 would increase the annual growth rate to 3.4 percent, compared to one percent without the project. Population losses after construction would bring declines of 0.9 percent annually for four years. Thereafter, the one percent annual growth rate would be expected to recur.

In contrast to the region, county effects during the construction growth would likely be large and significant. Annual rates of population change in this period are: Bailey, 8.2; Dallam, 23.6; Deaf Smith, 6.9; Hartley, 37.7; Moore, 6.9; Parmer, 11.2; Potter/Randall, 3.3; Chaves, 6.5; Curry, 10.3; Harding, 87.5; Quay, 14.4; and Roosevelt, 5.5. With the exception of Curry, Dallam, Hartley, and Potter/Randall counties, population impact would be short-lived. High rates of growth in these counties would be followed by out-migration after construction. Sizeable permanent population growth would occur in Curry, Dallam, and Hartley counties, with lesser permanent effects in Lubbock, Moore, Potter/Randall, and Roosevelt counties as a result of OBs.

High rates of growth contrast to populations which have grown very slowly. Projected population increases would constitute fundamental change. Adverse consequences are likely to be fewer, however, than might be suggested by aggregate population changes since large shares of the construction population would be without families and accommodated in camps. About 60 percent of all new, permanent population would be housed on the OBs.

HOUSING (2.10.17)

The peak-year housing requirements would be 23,240 units, an increase of 9 percent over the normal growth. This contrasts with a peak requirement of 20,000 units for the Proposed Action. The long-term impacts of M-X would be somewhat greater in Texas/New Mexico than under the Proposed Action.

Among the counties affected, long-term would be Curry, Hartley, Dallam Potter/Randall, and Roosevelt. Hartley County, for example, would have peak requirements of 2,518 units, a 171 percent increase, and long-term requirements of

972, which exceeds normal baseline by 58 percent. Dallam County would also experience large peak-year and long-term housing needs. Lubbock and Moore counties would also have large absolute numbers of peak M-X housing requirements due to procurement expenditures and indirect workers, but their housing markets are relatively large and thus in a better position to absorb M-X requirements. These two counties, as well as Parmer, Bailey, Sherman, Deaf Smith, Quay, Harding, and Chaves are projected to experience only short-lived impacts due to short-term construction activity.

Curry County, with the Clovis OB, would be the most impacted. Peak requirements would be 6,130 units, 40 percent over baseline. Requirements would be 34 times as great as those needed for normal growth. Curry's long-term housing needs due to M-X would be 2,130, a 14 percent increase. Roosevelt County, adjacent to Curry County, would also experience significant peak-year impacts.

PUBLIC FINANCE (2.10.18)

In the region as a whole, peak year (1986) deficits would equal $7.6 million, 1.2 percent of expenditures in this year. Capital outlays to support long-term demand for public buildings, schools, streets, and water and wastewater facilities, would equal $76.9 million.

In Curry County, peak year deficits would equal $1.9 million, 4.4 percent of total public expenditures in this year. In the long-run, $1.4 million excess revenues are projected; they could be used to lower tax rates or expand service. Hartley County peak-year deficits would equal $0.7 million. No long-run adverse impacts are expected. Similar effects occur in Dallam County. Counties with only DDA facilities would potentially have short-run deficits, but no long-run impacts.

Long-term impacts in OB counties would equal 80 percent of total capital expenditure requirements for the region. In Curry County, long-term requirements would equal $36.0 million or about $20 million less peak-year requirements. Dallam County long-run requirements would equal $7.5 million, and Hartley County, $6.3 million; these figures are 3-5 times lower, respectively, than peak-year capital requirements. Long-run outlays would be necessary, but less significant in Roosevelt, Moore, Potter/Randall, and Lubbock counties.

EDUCATIONAL SERVICES (2.10.19)

Requirements for educational services would occur primarily within school districts in Curry, Hartley, and Dallam counties. Other school districts within the deployment area would also receive some impacts.

At the regional level, increases in M-X-induced enrollments would peak in 1987, generating a need for 935 additional teachers (10.8 percent over baseline) versus the peak requirement of 826 (4.1 percent over baseline) with the Proposed Action.

Peak enrollments expected in Curry and Hartley County school districts would generate a need for 250 (48 percent over baseline) and 169 (340 percent) additional teachers, respectively. Other counties in which peak-year additional teacher requirements would represent a significant increase over normal growth baseline are

Dallam with 109 teachers (126 percent over baseline), Harding with 61 teachers (543 percent), Quay, with 55 (41 percent), Roosevelt with 67 (33 percent), Bailey with 26 (26 percent), Parmer with 31 (25 percent), Moore with 35 (20 percent), and Deaf Smith with 47 (19 percent).

Regionally, 434 additonal teachers (4.7 percent over baseline) would be required over the long term, as compared to 386 additional teachers (1.7 percent) under the Proposed Action.

Curry County and Hartley County would account for 53 and 32 percent of the M-X-induced, long-term teacher requirements, respectively. An additional 229 teachers (44 percent over baseline) would be required in Curry County in the long term and 139 teachers (255 percent) in Hartley. Dallam County would need an additional 16 (a 17 percent increase).

HEALTH SERVICES PERSONNEL (2.10.20)

The peak-year health services personnel requirements for the region would be 306, an increase of 6.2 percent over the normal growth baseline. This contrasts with a peak requirement of some 270 personnel for the Proposed Action. Likewise, the long-term requirements would be somewhat greater than under the Proposed Action. For example, 49 would be needed in the long term versus only 15 for the Proposed Action. The shortfall, although not significant, is 5 percent compared to 2 percent for the Proposed Action.

PUBLIC SAFETY (2.10.21)

Construction requirements would peak in 2087 with a need for 281 additional personnel and for operation, 94 additional. Percentages of increases on normal growth would be 10 and 3 percent, slightly higher than for the Proposed Action. Shortfalls will likewise be slightly higher, but are not significant at the regional level.

Significant impacts would be expected in Dallam, Hartley, Moore, Potter/ Randall, Curry, and Roosevelt counties as a result of personnel deficits during construction peaks.

Additional short-term impacts would occur in Harding, Bailey, Parmer, Deaf Smith, and Sherman counties.

Dallam and Hartley would have large shortfalls, 52 percent and 25 percent. Personnel needs would be 39 peak-year and 5 long-term for Dallam and 40 and 26 in Hartley. Curry would need 80 peak-year personnel and 47 long-term, a 13.7 percent deficit; Roosevelt, a 21 percent shortfall.

URBAN LAND (2.10.22)

Curry County would have to meet most of the Clovis OB urban land needs although some land would also be required in Portales, Roosevelt County. Curry County has 2,475 acres of developable vacant land, sufficient for construction phase demands and more than enough for permanent M-X use.

Hartley and Dallam counties would receive a large share of the increased demand for land in urban uses. Moore County and the metropolitan Amarillo area would also be affected. All should be able to meet M-X growth demands.

QUALITY OF LIFE (2.10.23)

Dallam and Hartley, both close to the Dalhart OB, and Harding counties would have significant short and long-term impacts. Because of construction, Roosevelt, Quay, and Parmer would have a significant one-year high growth. Sustained, significant growth would occur in Bailey and Curry counties.

TRANSPORTATION (2.10.24)

Similar impacts as for the Proposed Action would occur in Texas/New Mexico. Within the DDA, accessibility would increase, but, since the road network is already extensive, indirect impacts and benefits would be substantially less. Additions of M-X roads are not likely to encourage more travel or more development.

Traffic at the Clovis OB would be higher than present Cannon AFB traffic, and some congestion may result along U.S. 60 unless improvements are made, especially at intersections. There may be some localized traffic problems within Clovis itself during peak periods. In order to relieve traffic along U.S. 60 an access point directly from State Route 467 may be required.

Near the Dalhart OB, more traffic could result in some problems in Dalhart, Dumas, and Hartley.

ENERGY (2.10.25)

Impacts on energy resources would be similar to those under the Proposed Action. Fewer transmission lines would be required due to the existing infrastructure of the area.

LAND OWNERSHIP (2.10.26)

In contrast to the Nevada/Utah area, significant private ownership of land occurs in the rural areas of Texas/New Mexico. This is particularly true in Texas where almost all land is privately held. Because of the ownership patterns, 19 of the 22 Texas/New Mexico counties would experience a high impact on private lands if M-X is deployed in the area. Two counties would experience a moderate impact and one county would receive a low impact on private land ownership. Where clusters are deployed, 30 to 35 acres of land would be disturbed in a typical section (640 acres) during construction and about 15 to 25 acres would be required during operations. One section out of every three would not be affected. Both OBs would be sited on private land.

The total value of land purchases for Alternative 7 would be approximately $9 million (1980 dollars). Of this, about $6.7 million would be purchased in New Mexico, with the balance acquired in Texas. These figures include all land for DDA facilities as well as for the operating bases at Clovis, New Mexico and Dalhart, Texas. The estimate of land value in Texas is based on $225 per acre for dry cropland, $1,350 per acre for irrigated cropland, and $140 per acre for rangeland.

Comparable figures in New Mexico are $225 per acre for dry cropland, $1,100 per acre for irrigated cropland, and $115 per acre for rangeland (Vickery & Associates, 1980).

IRRIGATED FARMLAND (2.10.27)

About 9,000 acres of irrigated cropland could be disturbed by construction while 6,300 would continue to be required during operations. Four of the 22 Texas/New Mexico counties are projected to experience high impacts, four would experience moderate impacts and 11 would experience low impacts. No impacts are anticipated in three counties. Co-use of upgraded section roads would be maximized and spacing has been adjusted to reflect ownership patterns so that the potential for impacts has already been incorporated in project planning. No impacts on crop dusting are anticipated in the DDA.

Impacts to center pivot irrigation systems would probably be limited to reductions in the radius of some irrigators. In one section out of three, no impacts would occur due to the spacing of protective structures. In two sections out of three, assuming each section had four center pivot irrigation systems, two systems (one per section) would have to be shortened perhaps 50 ft. This would result in the loss of irrigation to perhaps 10 acres within the section. Since one section out of three would not be affected, the average loss per section would be 6 to 7 acres. This loss would be in addition to area disturbed during construction or required long-term for siting system components.

The Clovis OB would require an additional 3,700 acres of irrigated land or about 2.4 percent of the Curry County total. The Dalhart suitability zone is chiefly rangeland and would not impact any irrigated cropland.

RANCHES AND HOMES (2.10.28)

To assure resident safety, no habitable buildings will be allowed within a 2,965 foot radius circle around each Protective Structure. This area is called the explosive safety quantity-distance (QD) zone. This zone provides safety to residents from potential accidental explosion of missile propellant. In the low density Nevada/Utah area, this QD zone has no impact, but in the dispersed private lands of Texas/New Mexico the QD zone has significant potential for impact.

In preliminary design of the conceptual layout used in Alternative 7, habitable dwellings were avoided to the degree possible. Nevertheless, 1,400 homes and ranches fall within the QD zones. Potential relocations in Texas exceed those in New Mexico by about two to one with almost one-half the Texas relocations in Deaf Smith and Parmer counties. Relocation of the residence could include relocation or reconstruction on the existing parcel or relocation to a new parcel.

This relocation will significantly impact the quality of life of those families affected.

Federal land acquisition offers a number of options to minimize inconvenience to the landowner, particularly farmers and homeowners, where relocation is involved. The policies are established by the Uniform Land Acquisition Act, PL 91-646, 42 USC 4601 et. seq. (1972). The federal purchaser must initiate the

process by making a bona fide offer of just compensation. This includes the fair market value of the property taken; compensation for loss in value or utility to the remainder ("severence damage"), and relocation costs.

Fair market value is generally defined as what a willing buyer would pay a willing seller, dealing at arms length and neither being compelled to deal. Neither loss of value to the property, nor enhancement in its value, resulting from the project are taken into account. A common example of severance damage occurs where a road right-of-way is taken through a farm, making plowing and harvesting operations on the remainder slower and less efficient. The government pays a lump sum for the resulting loss of value.

Land need not always be acquired in fee simple (ownership). Easements rather than fee, special conditions in fee purchases, and easements or leases back to the owner are also possible. The Air Force will try to accommodate a landowner as much as possible in order to allow existing farming and ranching activities to continue.

As noted above, QD zone easements could require removing some existing houses. The government will pay the fair market value of the house plus, where necessary, an additional amount (up to $15,000) for a comparable replacement dwelling which is decent, safe, sanitary, reasonably accessible to public services, and available on the private market. Closing costs and moving expenses are also paid on replacement dwellings. The government will pay the difference in interest rates between existing mortgages on replacement housing. Where economically and technically feasible, an existing house can be moved to a new location, if the owner so desires.

Farmers and ranchers receive additional expenses in connection with seeking a replacement farm and up to one year's farm income (in acordance with PL 91-646, not to exceed $10,000). Except on OB and ASC locations, no complete farm operations are expected to be displaced. An individual farmer or rancher may lose a small amount of land for shelters and road right-of-way, or may be required to move his house or build a new one (at government expense) outside the QD zone. The farm or ranching operation itself should not be so seriously affected, since irrigated and dry farming or ranching activities currently continue right up to the shelter fence in similiar Minuteman shelter deployments.

The Air Force expects that most land easements will be acquired by agreement with the landowner. Condemnation (eminent domain) is legally available, but would be used only when attempts to negotiate an equitable purchase agreement were exhausted. "Friendly condemnations" are also entered into when the apparent owner is willing to sell but clear title cannot be conveyed, due to such complications as missing heirs.

GRAZING (2.10.29)

A total of about 14,600 animal units, or about 0.65 percent of the total in the impacted counties could be lost from this alternative. Impacts of these losses may be significant for some operators. Impacts would be concentrated in Texas.

The impact of the project on livestock production in Texas and New Mexico will be substantially reduced by avoidance of feed lots during Tier 2 studies and

decisionmaking. Such avoidance could reduce the losses in some Texas counties by as much as 75 percent and in some New Mexico counties by as much as a third. The avoidance of cropland that is primarily used to raise feed for livestock could also significantly reduce losses.

Livestock losses at the Clovis OB from the contribution of the operating base would vary from about 470 to 800 feedlot cattle. The significance of this loss is unknown. Losses at the Dalhart OB would be approximately 900 animal units, assuming feedlots would not be relocated in the area.

RECREATION (2.10.30)

Increased recreational demand as a result of M-X in-migration into the Texas/New Mexico region is not expected to be significant over the life of the project. Significant impacts may be experienced at various locations near OB sites, however.

The basing at Clovis is expected to increase the population in Curry County by 60 percent over baseline projections by the peak year of 1986. An equivalent increase in recreational demand is expected.

Baseline projections indicate that recreational sites in the region are expected to need added camping and picnicking facilities (New Mexico SCORP, 1976). The added M-X demand is expected to increase the need by at least 50 percent.

With time the increase in population will level off to roughly 43 percent over baseline projections. Although this decrease will reduce recreational demands compared to peak year levels, this still represents a significant demand increase over baseline figures.

The impact associated with M-X is expected to be additive to projected needs, however, by doubling the need, planning alternatives will probably require revision in any attempt to meet these needs. Because some resources, like lake acreages, are dependent upon natural features to provide additional supply, these resources may not be expandable and the demand would then be either transferred to another form of recreation or to sites farther away.

Increased recreational demand is expected in the Dalhart region as a result of the M-X-induced in-migration over the projected baseline increase. This increase in demand attributable to M-X in-migration would be relatively minor when compared to the baseline increase. For instance, 1,540 picnic tables will be needed to meet the demand in Potter and Randall counties in 1987. Of this total, M-X in-migrants are projected to require only about 300 tables per year. Thus 80 percent of the total demand is attributable to baseline growth and two-thirds of the need is a result of baseline growth. Boating facilities are in adequate supply in this region to meet projected M-X demands.

NATIVE AMERICAN CULTURAL RESOURCE (2.10.31)

Alternative 7 has the least potential for negative impacts on Native American cultural resources. No direct or indirect impacts to known aboriginal habitation or sacred sites are indicated in the DDA or at the Clovis and Dalhart OBs.

NATIVE AMERICAN WATER ACCESSIBILITY AND AGRICULTURAL LAND USE (2.10.32)

There are no identified Native American water resources or agricultural land use in the DDA or at the OBs.

NATIVE AMERICAN MIGRATION PATTERNS (2.10.33)

In-migration could be expected from New Mexico reservations and from among Native Americans in Oklahoma. The number and significance of impact of in-migration cannot be predicted.

ARCHAEOLOGICAL AND HISTORICAL RESOURCES (2.10.34)

Dallam County would have 6 mi of high-value resources within one mile of construction, Harding 7.2, Chaves 4.5, Deaf Smith 4.7, and Curry 3.6, the OBs are not included in these figures.

National Register site Anderson Basin Archaeological District in Roosevelt County is near potential gravel quarrying. Indirect impacts could occur from ORV use, looting, vandalism, and more traffic at the National Register site Landergin Mesa Panhandle Aspect Village in Oldham County. The registered Rocky Dell petroglyph site in the same county could also be signficantly impacted.

The Clovis OB would directly impact 10 moderately significant playa lakes. Highly significant direct impacts would occur at the registered Blackwater Draw if quarrying for gravel occurs there, but this is not expected. No predictions of indirect area impacts have been made, but significant impacts are expected in the town of Clovis.

The Dalhart OB is within one mile of two moderately significant playa lakes and highly significant resources in Middle Water. Indirect impacts are expected along Rita Blanca and Punta de Aqua creeks and at the registered Landergin Mesa. Architectural resources, if any, in Dalhart may also be significantly impacted.

PALEONTOLOGICAL RESOURCES (2.10.35)

Pleistocene deposits are scattered throughout the study area. Some deposits are very important to the study of man. Disturbance by construction excavation and by illegal collection would be a significant adverse impact. Tier 2 studies will identify potential fossil impacts.

CONSTRUCTION RESOURCES (2.10.36)

The impact of M-X-related demand is smaller in relative terms than for the Proposed Action, but the large absolute requirements would increase prices 0.5 percent. Peak requirements equal 440,000 tons in 1987, and occur a year later than for the Proposed Action. In general, Texas projected cement supply is greater than that available in Nevada/Utah, explaining why impacts would be less than for the Proposed Action.

Other construction resources could face localized shortages but neither significant short or long-term impacts would occur.

Alternative 8:
Coyote Spring Valley
Clovis

IMPACTS OF ALTERNATIVE 8

In Alternative 8, half the system would be deployed in Nevada/Utah and maintained from an OB at Coyote Spring while half of the system would be deployed in Texas/New Mexico and maintained from an OB at Clovis, New Mexico. Somewhat higher personnel and facilities levels would be necessary. All resource impacts except those described in this section would be substantially the same as for the affected areas of the Proposed Action and Alternative 7.

GROUNDWATER (2.11.1)

In Nevada/Utah impacts in DDA hydrologic subunits would be similar to impacts for the Proposed Action, but fewer hydrologic subunits would be involved. Impacts at the Coyote Spring OB would be the same as for the Proposed Action. In Texas/New Mexico, DDA water use would be reduced, but impacts in the DDA and at the Clovis OB would be about the same as for Alternative 7.

SURFACE WATER (2.11.2)

Impacts on hydrologic subunits in the Proposed Action and Alternative 8, are identical at the Coyote Spring OB and iN the DDA except that fewer hydrologic subunits would be involved. Impacts in Texas/New Mexico and at the Clovis OB would be the same as for Alternative 7.

AIR QUALITY (2.11.3)

Impacts would be the same for the affected DDA areas and the Coyote Spring and Clovis OBs as for the Proposed Action and Alternative 7.

MINING AND GEOLOGY (2.11.4)

Impacts at the Coyote Spring OB would be the same as for the Proposed Action. In Nevada/Utah, mineral areas near Tonopah and in White Pine County would not be impacted. However, the Cave and Patterson hydrologic subunits would receive the same impacts as under the Proposed Action. The remaining 11 hydrologic units would receive moderate or low impact levels. Impacts in Texas/New Mexico are the same as for Alternative 7.

NATIVE VEGETATION (2.11.5)

Split basing would result in the removal of native vegetation from about 85,000 acres in Nevada/Utah and 50,000 acres in Texas/New Mexico. Impacts in Nevada/Utah would be reduced roughly 50 percent compared to the Proposed Action. Impacts on the Coyote Spring and Clovis OBs are expected to be the same as for the Proposed Action and Alternative 7, respectively.

PRONGHORN ANTELOPE (2.11.6)

Impacts in the DDA and at the Coyote Spring OB would be the same as for the Proposed Action since the Nevada/Utah areas of highest pronghorn abundance (Snake, Pine, Spring, and Hamblin hydrologic subunits) would be within the project area; 8 of the 22 subunits have no animals. Indirect effects would be reduced in Cochran and Dallam counties. Impacts at the Clovis OB are the same as for Alternative 7.

SAGE GROUSE (2.11.7)

No impacts are expected at the Coyote Spring OB or in Texas/New Mexico. In the Nevada/Utah DDA, key habitat would be destroyed in three hydrologic subunits -- Lake, Hamblin, and Garden -- compared to 12 for the Proposed Action. These three subunits would have significant adverse impacts, but it is anticipated that the sage grouse might recover to near pre-project levels over time. The comparable Texas/New Mexico lesser prairie chicken will have similar but lesser impacts to those described in Alternative 7.

BIGHORN SHEEP (2.11.8)

Impacts in the Nevada/Utah DDA and at the Coyote Spring OB would be the same as those for the Proposed Action. No impacts occur in Texas/New Mexico.

RARE PLANTS (2.11.9)

Impacts in Nevada/Utah and at the Coyote Spring OB would be the same as for the Proposed Action, but would occur only in half as much area. Thirteen percent of known rare plant locations within the project area could be directly affected. In Texas and New Mexico, no known rare plants will be directly affected.

UTAH PRAIRIE DOG (2.11.10)

Impacts would be less than those for the Proposed Action since no OB would be located near the Utah prairie dog habitats.

AQUATIC SPECIES (2.11.11)

Split basing would reduce Nevada/Utah impacts compared to the Proposed Action. Direct impacts in White River Valley upon the habitats of protected fish are not expected to be significant since these fish occur elsewhere, and impacts could be easily mitigated. Groundwater withdrawal effects are expected to be less in White River Valley. Recreational effects will be on a small scale. Effects of recreation on the Lahontan cutthroat trout will be almost completely eliminated in

Big Smoky hydrologic subunit. Significant impacts are still expected at the Moapa Fish Sanctuary as a result of the Coyote Spring OB.

No significant impacts are expected to occur in Texas/New Mexico.

DESERT TORTOISE (2.11.12)

Impacts in the Nevada/Utah DDA and at the Coyote Spring OB would be the same as for the Proposed Action. No desert tortoise are found in Texas/New Mexico.

WILDERNESS (2.11.13)

Impacts in Nevada/Utah would be reduced in 40 percent of the hydrologic subunits that would have significant impacts under the Proposed Action. Hydrologic subunits with significant impacts are Hot Creek, Garden, Railroad (northern), Lake, and White River. In Texas/New Mexico, impacts would be the same as for Alternative 7.

EMPLOYMENT AND LABOR FORCE (2.11.14)

Drawing from the two bi-state regions would substantially reduce the regional impacts to all human related resources. Regional impacts in Nevada/Utah would be halved, and fewer counties would be impacted compared to the Proposed Action. Similar reductions in impacts would occur in Texas/New Mexico compared to Alternative 7.

For the Nevada/Utah region, employment would peak at 33,600 jobs in 1986, 56 percent of that under the Proposed Action. Over the long run, 10,300 jobs would be created.

Eureka, White Pine, Juab, and Washington counties would experience negligible impacts. Lincoln, Nye, Beaver, Iron, and Millard counties have short-run impacts from DDA construction and assembly and checkout employment.

Over half of all peak-year jobs and most long-term employment would be in Clark County. The net increase in Clark County employment would be just over 10,000 jobs, the same as for the Proposed Action.

For the Texas/New Mexico region, peak M-X-related employment would be 29,400 in 1987, 56 percent of Alternative 7 impacts. Regional employment growth would stabilize at 10,100 jobs in 1992, half that for Alternative 7. Curry, Lubbock, Potter/Randall, Chaves, and Roosevelt counties would experience short-run employment gains. Most long-run employment growth would be concentrated in Curry County, with 8,800 jobs, the same as for Alternative 7. Impacts would be the same in Curry County.

EARNINGS (2.11.15)

In Nevada/Utah, earnings would peak in 1987 at $658.3 million and stabilize at $140.4 million in 1992. The increase should be accommodated without significant growth impacts.

Peak earnings in Clark County would be 78 percent of the peak earnings under the Proposed Action. Over the long-run, net growth would be $7 million less than under the Proposed Action. Short-run growth in earnings would occur in Lincoln, Nye, Beaver, Iron, and Millard counties. In all cases, the increase would induce short-run growth, significantly impacting county-level economies and resident populations.

For the Texas/New Mexico region as a whole, earnings would peak at $598.5 million, about one-half of earnings under Alternative 7. Over the long-run, earnings would be $108.4 million less than under Alternative 7.

Curry County would receive almost as much earnings stimulus as in Alternative 7. Additional counties with long- and short-term earning growth would be Lubbock, Potter/Randall, and Roosevelt. Hartley, Chaves, Harding, and Quay counties would also be significantly impacted in the short run.

POPULATION (2.11.16)

The number of M-X-related in-migrants present in Nevada/Utah is projected to reach a maximum of 37,200 in 1986, about 45 percent of the amount forecasted for the Proposed Action. The major share of the population impact would be experienced in Nevada. Peak year impacts would remain large and significant in Clark, Lincoln, Nye, Beaver, and Millard counties, but would be negligible in other counties. Permanent population growth related to the base, would be limited to Clark County, with a small spillover to adjacent Lincoln County.

In Texas/New Mexico, DDA peak growth would be about 53,400 persons, 56 percent of that forecast for Alternative 7. The construction growth would be significant in Dallam, Deaf Smith, Hartley, Chaves, Curry, Quay, and Roosevelt counties. At the Clovis OB, impacts would be the same as for Alternative 7.

In general, the impacts of population growth would be more widely distributed by split basing, hence, tend to be less at any given location, but in some places they remain significantly large. Whether or not the infrastructure could be built to meet growth at the same time that the project is competing with communities, counties, and states for labor and materials cannot be predicted. This is true for all alternatives.

HOUSING (2.11.17)

Nevada/Utah peak requirements would be 40 percent of those under the Proposed Action, with a similar long-term reduction. Significant differences between Alternative 8 and the Proposed Action occur in Clark, Eureka, Nye, White Pine, Beaver, Iron, Juab, Salt Lake/Utah, and Washington counties. Clark County's peak year housing requirements would be 65 percent of those under the Proposed Action, although the long-term impacts would be the same. Nye County's peak year needs are 50 percent less, and Eureka and White Pine counties would not have significant impacts. In the Utah counties of Beaver, Iron, and Juab, peak year housing needs would be reduced to 26, 20, and 6 percent, respectively, of the Proposed Action.

Texas/New Mexico requirements would be for 12,760 units, a 5 percent increase over normal growth, or 55 percent of the Alternative 7 requirements.

Impacts in Curry County would be similar to those for Alternative 7. Other counties with long-term impacts would be Roosevelt and Potter/Randall. Counties with major construction impacts would be Bailey, Dallam, Hartley, Deaf Smith, and Harding.

In general, however, Alternative 8 has the potential of offsetting the housing construction pressure that would result from the Proposed Action or other alternatives. This mitigation would occur because competition for labor and materials between M-X contractors and housing builders would be distributed over a larger area.

PUBLIC FINANCE (2.11.18)

Regional impacts in each area would be substantially less than in the other alternatives since about half the total population increase would occur in each region. Impacts to communities near the Coyote Spring OB and the Clovis OB would be essentially the same as for the Proposed Action and Alternative 7, respectively.

EDUCATIONAL SERVICES (2.11.19)

Regional requirements for additional teachers would be much less than those of the Proposed Action (348 additional teachers instead of 826 additional teachers). Significant differences between Alternative 8 and the Proposed Action occur in Clark, Eureka, Nye, White Pine, Beaver, Iron, Juab, Salt Lake, and Washington counties. Clark County's peak-year teacher requirements would be 81 percent of those under the Proposed Action, although the long-term impacts remain the same. Nye County's peak needs would be almost halved, while White Pine County would need only one additional teacher. In Beaver, Iron and Juab counties, peak-year teacher requirements are reduced to 21, 14, and 5 percent, respectively, of the Proposed Action's requirements. Four counties can still expect a significant shortfall in teacher requirements: Beaver, Lincoln, Millard, and Nye.

Texas/New Mexico regional requirements would be for 525 teachers, a 6.1 percent increase over the normal growth baseline, in peak year 1987, or 56 percent of Alternative 7 requirements. Curry County's needs would be for 247, a 47 percent increase. Long-term needs would also be considerable, with 226 teachers. Roosevelt and Potter/Randall counties would have minor effects. Counties significantly impacted in the short run would be Hartley, Dallam, Harding, Quay, and Roosevelt.

HEALTH SERVICES PERSONNEL (2.11.20)

Nevada/Utah regional peak requirements would be 36 percent of those under the Proposed Action with no long-term requirements. Peak-year requirements would become 61, 67, and 50 percent of the Proposed Action in Clark, Lincoln, and Nye counties, respectively. In other counties, impacts would be less than 20 percent of impacts under the Proposed Action. With other projects, Juab could also have a significant shortfall.

Peak requirements would be 159 personnel in Texas/New Mexico, or 52 percent of the Alternative 7 peak-year requirements. Harding, Curry, and Hartley counties would have a significant short-run impact.

PUBLIC SAFETY (2.11.21)

Impacts in Nevada/Utah would be reduced compared to the Proposed Action, and in Texas/New Mexico compared to Alternative 7. Clark, Nye, Beaver, and Lincoln counties' needs would be reduced, some substantially, while Millard would remain the same, and White Pine, Eureka, Juab, Salt Lake, and Washington would not be impacted. Curry County's shortfall would be reduced more than 40 percent. Significantly high temporary impacts would occur in Roosevelt, Harding, Quay, Hartley, and Dallam counties.

URBAN LAND (2.11.22)

Impacts in the Nevada/Utah DDA and in Clark County would be substantially the same as for the Proposed Action and at Texas/New Mexico and Curry County, the same as for Alternative 7.

QUALITY OF LIFE (2.11.23)

Impacts in Nevada/Utah counties would be the same as for the Proposed Action except that they would not be significant in White Pine and Juab counties. Significant long-term impacts in Beaver County would continue, but short-term impacts become insignificant, and in Millard, long-term significant impacts would be added as compared to the Proposed Action. Texas/New Mexico impacts would be significantly reduced from Alternative 7.

TRANSPORTATION (2.11.24)

The impacts in each region will be less extensive, although impacts will be the same at the Coyote Spring OB as for the Proposed Action and at the Clovis OB as for Alternative 7.

LAND OWNERSHIP (2.11.26)

In Nevada/Utah little private land would be used for M-X and impacts would not be significant except potentially to an individual landowner. At the Coyote Spring OB, impacts will be the same as for the Proposed Action. In Texas/New Mexico 12 of the 18 affected counties would have a high impact and four would have a moderate to moderately high impact. Impacts at the Clovis OB would be the same as for Alternative 7.

The total value of land which would be purchased for Alternative 8 is about $6.9 million, and includes land necessary for 2,300 shelters as well as that required for the proposed second operating base at Clovis.

RANCHES AND HOMES (2.11.27)

The Texas/New Mexico split basing alternative was designed with the two goals of avoiding inhabitable dwellings and irrigated agriculture. The results are the need for relocation of 141 ranches or farms, only 10 percent of the full-basing alternative. This relocation still will impact the quality of life for those affected.

IRRIGATED FARMLAND (2.11.28)

In Nevada/Utah, 92 acres of irrigated cropland could be disturbed by construction and 57 acres retained for operations. No significant impact is predicted for the DDA nor at the OB. In Texas/New Mexico, 1,780 acres will be disturbed, and in no county is this a significant amount of farmland. Impacts on an individual section would be comparable to Alternative 7 but it may be possible to avoid all center pivot irrigation systems during Tier 2 analyses. Three counties in Texas/New Mexico would receive a high impact for both short and long term. Impacts at Clovis OB are the same as for Alternative 7.

GRAZING (2.11.29)

In Nevada/Utah the split basing layout avoids about half of the hydrologic subunits shown for the Proposed Action that have a high AUM concentration and a like proportion of hydrologic subunits with low AUM concentrations. In hydrologic subunits with a moderate AUM concentration, the comparable reduction is about 25 percent. Overall about 3,650 AUMs, or 0.6 percent of the total in the affected subunits, would be lost in the Nevada/Utah area. Fifty-three percent of the loss will be in Nevada and 47 percent in Utah. Impacts at Coyote Spring would be identical to those for the Proposed Action.

Split basing in Texas/New Mexico would avoid all high animal unit concentration counties except Deaf Smith. Compared to Alternative 7, potential animal unit losses would be reduced by 71 percent in Texas and 35 percent in New Mexico. Impacts at the Clovis Operating Base would be identical to those shown for Alternative 7.

RECREATION (2.11.30)

Impacts would be the same as those described for Coyote Spring (Proposed Action) and Clovis (Alternative 7) Operating Bases.

NATIVE AMERICAN CULTURAL RESOURCES (2.11.31)

Impacts would be considerably less in Nevada/Utah than those for the Proposed Action. Of 212 known ancestral/sacred sites, 17 would be directly impacted by construction, but many of the remainder may be significantly impacted by indirect causes. Impacts at the Coyote Spring OB would be the same as for the Proposed Action. Coyote Spring remains the OB site at which the most significant adverse impacts would occur.

Impacts in Texas/New Mexico are the same as for Alternative 7.

NATIVE AMERICAN WATER ACCESSIBILITY AND AGRICULTURAL LAND USE (2.11.32)

In Nevada/Utah DDA impacts parallel those for the Proposed Action but are less. Short-term impacts on Duckwater Reservation water resources are potentially small in Little Smoky-South hydrologic subunit.

Construction in the White River drainage would occur in Delamar, Dry Lake, Cave, Coal, Garden, and White Pine. The possibility for excessive water use impacting discharge at Muddy River Springs would be reduced from the Proposed

Action, but a series of dry years could produce short-term impacts on Muddy River Springs and Moapa Reservation water resources as serious as those described for the Proposed Action.

Together with possible significant adverse effects resulting from DDA construction on Moapa Reservation water resources, construction and operation of the Coyote Spring OB would have the same significant adverse impacts as does the Proposed Action. No impacts are predicted in Texas/New Mexico.

NATIVE AMERICAN MIGRATIONS (2.11.33)

Impacts in Nevada/Utah would be the same as for the Proposed Action except the Duckwater, Goshute, Ely, and Utah Southern Paiute reservations and colonies would receive fewer in-migrants. Impacts in Texas/New Mexico would be the same as for Alternative 7.

ARCHAEOLOGICAL AND HISTORICAL RESOURCES (2.11.34)

Impacts at the Coyote Spring OB would be the same as for the Proposed Action and at Clovis the same as for Alternative 7. In Nevada/Utah direct impacts on National Register properties would be avoided, although the Topaz, White River, Tybo, Bristol Wells, and Delamar properties could be indirectly impacted as described for the Proposed Action. In Texas/New Mexico, impacts to registered properties would be the same as for Alternative 7.

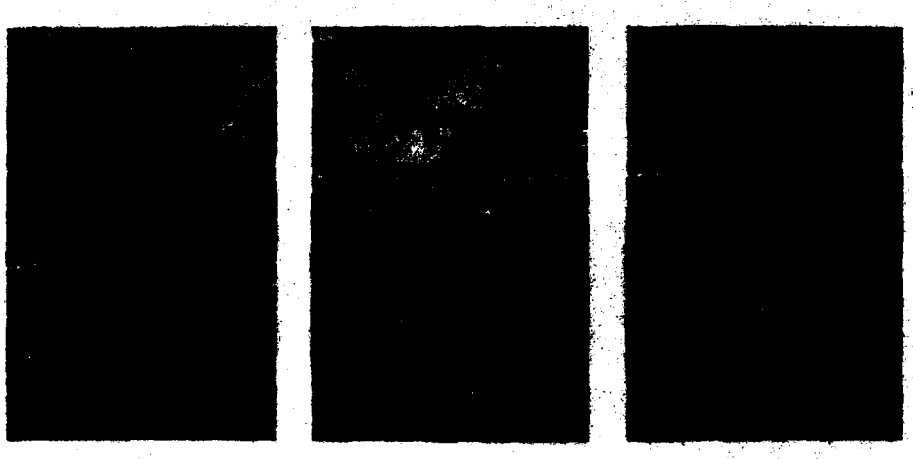
PALEONTOLOGICAL RESOURCES (2.11.35)

Direct impacts in Nevada/Utah, the result of construction activities, would likely be reduced to half the area as for the Proposed Action. This would reduce the absolute numbers of fossil deposits that would be disturbed. Fewer people would also proportionally reduce illegal collection.

Direct and indirect impacts in Texas/New Mexico will be similar, although half as extensive, as for Alternative 7.

CONSTRUCTION RESOURCES (2.11.36)

Peak years are the same as the Proposed Action and Alternative 7, but about half of each region's full-deployment requirements. No impacts are forecast for Texas/New Mexico. Impacts remain low in Nevada/Utah; one percent of regional production capacity would be required. Non-M-X-related cement use would decline 0.5 percent in the region. This alternative in itself will mitigate the impacts on cement supply and price otherwise forecast under the Proposed Action.



Information on Resource Ranking

2.12 INFORMATION ON RESOURCE RANKING

This section briefly discusses the relative impact ranking for each resource summarized in Sections 2.3 through 2.11. The rankings in this section are based upon available data, the analysis contained in Chapters 2 and 4 of this EIS, and scientific judgment.

Summarizing the rank ordering would not be valid. Such compilation would not take into consideration the following:

- o The level of impact significance between resources varies greatly.
- o The overall value of the different resources varies greatly among different individual resources (e.g., groundwater vs. education).
- o The overall value of different resources is highly subjective and a function of the preferences of each evaluator.
- o Rankings would change depending upon the success of mitigation measures at specific locations.

It should be recognized that a determined ordering of environmental variables implies knowledge of the "most probable" impact levels and a proper combination of the significance of these impacts for varying regions of influence.

A variance in these ranking levels is implicit due to uncertainty of some data and combination of variances in available data. This variance in the basic data is stochastic in nature and will most likely be some complex combination of statistical distributions, the most common of which is the bell shaped Gaussian distribution. The result of these rank ordering statistical variations and data uncertainties will result in a probability that the rank order may vary by several levels resulting in an overlapping of the rankings of certain alternatives. The rank level was chosen at the center of a bell shaped distribution curve, but the rank could be at the outer reaches of the bell. Therefore, conclusions about the rank order must be considered qualitative scientific judgements in which overlapping of rank orders probably occurs, thus blurring the ranking process. Selection of alternative choices from these rankings should be made only after consideration of the specific resource impact significance analyses and results included in supporting documents.

This discussion is presented to briefly identify for decisionmakers the relative impacts of different M-X deployment area decisions upon the resources identified by the residents of Nevada, Utah, Texas, and New Mexico as important during the environmental scoping process. Each resource is considered below in the sequence presented in Chapters 2, 3, and 4.

GROUNDWATER (2.12.1)

Alternative 7 was determined to have the lowest potential for impact. This is mainly due to the low M-X use to present use ratio in the DDA. The Clovis area does have some potential for impact but not more than Coyote Spring, Beryl, or Milford. Dalhart is considered to be a good potential base site. When all three factors were considered this alternative appears to be the best alternative.

The rest of the alternatives utilized a DDA in Nevada/Utah so that factor is equal except for Alternative 8 where less area in Nevada/Utah is affected. Alternative 8 would have been rated second except both basing sites and judged to have a high potential for impact and as it is felt that the more significant impacts will probably occur at the base sites, the potential for impacts at the two base sites in Alternative 8 was judged to be worst than the total potential in Alternatives 3 and 5 which use Ely as a second OB. Ely is regarded as the best potential OB site.

The Coyote Spring site is considered to be the worst of all potential sites. It appears to have the largest potential for significant impact which is decreasing the spring discharge in the Moapa area. Therefore, any alternative utilizing Coyote Spring as a base was given a low priority.

Alternative 2 which utilizes Delta as a second base was ranked next or fifth due to the low ratio of M-X use to existing use which made Delta a better base site than Milford or Beryl.

Alternative 6 and the Proposed Action are ranked 6th and 7th respectively. Alternative 6 ranked higher as it utilizes Coyote Spring as a secondary base which lessens the potential for impact somewhat.

Beryl is judged to be poorer basing site than Milford due to its large overdraft situation and the lower amount of storage available. Again, Alternative 4 was ranked higher than 1 as Coyote Spring is a second OB.

SURFACE WATER (2.12.2)

Chapter 2 analysis included consideration of road construction densities, disturbances to the natural drainage channels, topography, soil erodibilities, and annual volume to runoff from the mountains to the bajadas. Alternative 7, Texas/New Mexico full basing, has lower potential for water erosion impacts. This was followed by Alternative 8, split basing, which is intermediate between Texas/ New Mexico full basing and Nevada/Utah full basing. The Nevada/Utah full basing alternatives have approximately the same potential for impacts differing only in OB impacts. The Delta and Milford OBs both have low potentials for impacts while Beryl, Coyote Spring, and Ely all have moderate potential water erosion impacts. Based on this, Alternative 5 (Milford/Ely) and Alternative 6 (Milford/Coyote) were ranked 3 and 4 as Milford, with its low impact rating is the main base in both alternatives. Alternative 2 (Coyote/Delta) and the Proposed Action (Coyote/ Milford) were ranked next since Milford and Delta (both having low impact ratings) are secondary bases. Alternative 3 (Beryl/Ely), Alternative 4 (Beryl/Coyote Spring) and Alternative 1 (Coyote/Beryl) were ranked at the bottom of the list since both OBs in each alternative have moderate potential erosion impacts.

AIR QUALITY (2.12.3)

The following factors were considered in order to rank the alternatives according to the potential severity of air quality impacts: the intensity of construction activity and the location of construction activity and operating bases with respect to EPA Class I or nonattainment areas. Full basing in Texas/New Mexico, Alternative 7, ranks first (i.e , least impact) (1) since any nonattainment or Class I areas are a significant distance from the locations of the operating bases and

the deployment area. Alternatives 5 and 3 are tied and were rated second. Ely, the secondary OB for Alternatives 5 and 3, is in Steptoe Valley which is designed as a nonattainment area for SO_2, however SO_2 is not a significant M-X related pollutant.

No data are available for the electrical energy supply for the operating base. If the source is from fossil-fuel combustion SO_2 may become a significant pollutant. The remaining alternatives with Coyote Spring as one of the operating bases were rated third, fourth, and fifth (least preferable) since the Coyote Spring area is near the Las Vegas Valley CO, TSP, and O_3 nonattainment area. The split basing alternative (Alternative 8) occupies the third ranked position, followed by Alternative 2. With Coyote Spring as the primary base and Delta as the secondary base. The four alternatives tied for lowest ranked position, alternatives 1, 4, 6, and the Proposed Action, reflect a proximity to Class I areas in Utah as well as the Las Vegas nonattainment area.

MINING AND GEOLOGY (2.12.4)

Factors included in this analysis were the presence of mining claims, active or inactive mines, and potential mineralized zones. The DDA for Texas/New Mexico has less impact than the DDA for Nevada/Utah and thus obtains a hgher rating. In comparing the Nevada/Utah alternatives the OB sites were the only differentiation. Sites at Milford, Ely, and Delta have potential for affecting mining.

NATIVE VEGETATION (2.12.5)

The impact to native vegetation would be substantially lower in the Texas/New Mexico alternative deployment area because this resource covers a much smaller percentage of the land area and this area has greater rehabilitation potential. With one-half the system in Texas and New Mexico, the split basing alternative (#8) would also have a lower impact to native vegetation.

The Proposed Action and alternatives 1 through 6 would have a larger impact to native vegetation in that most of the siting areas are covered by the resource. The impact of alternatives 3 and 5 may be somewhat lower because much of the vegetation of the Ely base site is likely to recover more rapidly because of better soil and climatic conditions in the Ely area compared with the other OBs.

PRONGHORN ANTELOPE (2.12.6)

Alternative 7 would have the smallest impact potential because direct and indirect effects are predicted to be low for the DDA and OB locations. Split basing (Alternative 8) would be the next best since impact potential would be low in the Texas/New Mexico area and slightly less than for full basing in the Nevada/Utah area. The impact potential would be equally high for the DDA in the Proposed Action and alternatives 1-6. Thus, differences would relate to OB location. Pronghorn are not present in the vicinity of the Coyote OB so the other bases are the determining factors. Impact potential would be lowest for Alternative 2 because the Delta OB is located at the edge of pronghorn range and no key habitat exists within the OB suitability zone. Alternatives 1 and 4 rank next since the Beryl OB occupies the edge of pronghorn range and the OB suitability zone contains portions of two key habitats. The Milford OB suitability zone includes portions of four key pronghorn habitats and the conceptual OB layout is located in key habitat.

Alternative 6 and the Proposed Action are expected to cause greater impact to pronghorn than alternatives 1, 2, and 4 because they include an OB at Milford.

Alternative 3 would have greater impacts because of the combined impacts of OBs at Beryl (discussed above) and Ely. The northern end of the Ely OB suitability zone include a portion of range and key habitat and is near several other very important pronghorn habitats. Finally, the highest impact potential would occur for Alternative 5 due to the combined effects of Milford and Ely OBs.

SAGE GROUSE (2.12.7)

No sage grouse occur in the Texas/New Mexico area so Alternative 7 will cause the least impacts. Alternative 8 has only half the clusters in sage grouse range as compared to the remaining alternatives and the Nevada OB (at Coyote Spring Wash) does not impact sage grouse habitat. Alternative 2 has clusters throughout sage grouse habitat (as do all the remaining alternatives) but neither base is near sage grouse habitat. Alternative 1, 4, and 6 and the Proposed Action share an OB at Coyote Spring but have one base next to sage grouse habitat (Beryl and Milford) where impacts to the species are expected. Alternatives 3 and 5 have the highest impacts to sage grouse because they have a base adjacent to sage grouse (Beryl or Milford) and a base that directly impacts sage grouse habitat (Ely).

BIGHORN SHEEP (2.12.8)

Alternative 7 would have by far the lowest potential for impact to bighorn sheep; none are present in the Texas and New Mexico potential deployment area. Since potential impacts in the DDA would be the same for all full basing alternatives and similar for split basing in Nevada/Utah, alternative ranking is based upon OB location. For Alternatives 3 and 5, neither OB is near bighorn habitat and impact potential would be low. Bighorn sheep inhabit most of the mountain ranges in the vicinity of the Coyote Spring OB, and consequently, impact potential for all alternatives sharing this OB would have similar impact potential.

RARE PLANTS (2.12.9)

The greatest impact to rare plant species would occur from construction of the DTN and clusters in Nevada and Utah. Twenty-eight species and 20 percent of the known rare plant locations within the project area are intersected by the conceptual layout of these facilities. The base locations in alternatives 2, 3, and 5 would have a similar potential impacts to rare plants, based on the number of species that could be affected and their proximity to the suitability zone. Fewer rare plant locations are known in the vicinity of the base locations of alternatives 1, 4, and 6, and the Proposed Action, so a lower impact is expected. Very few rare plant locations are known from the Texas/New Mexico project area, so impacts to rare plants would be lower for split basing and lower still for full deployment in Texas and New Mexico.

UTAH PRAIRIE DOG (2.12.10)

The Utah prairie dog, an endangered species, is not present in Texas or New Mexico, therefore, Alternative 7 is the preferred alternative because no impacts would occur. Alternative 8 is the second most preferred alternative because

impacts from the DDA and OB site in the Nevada/Utah area would have low impacts overall. The only impacts would be short-term indirect impacts from a construction camp in Pine Valley. The impacts of the DDA for the Proposed Action and alternatives 1 through 6 (full basing, Nevada/Utah) would be low. Therefore the ranking of alternatives was dependent upon the OB locations. The following basing configurations are discussed in order of impact potential, from least to greatest. Alternative 2 would have low impacts because of the large distance between the OBs at Coyote Spring Valley and Delta and Utah prairie dog habitat. The Proposed Action would have a moderate indirect impact because of the OB at Milford. Alternatives 5 and 6 would both have moderate indirect impacts because of an OB site at Milford. These alternatives would be somewhat greater than the Proposed Action because under alternatives 5 and 6 Milford would be a first base with a larger population than under the Proposed Action, where Milford is a second base. Alternative 1 would have significant indirect impacts upon prairie dogs because of a second OB at Beryl, which is within 15 to 20 mi of a Utah prairie dog population. Finally, alternatives 3 and 4 would have significant direct and indirect impacts upon prairie dogs. Under these project configurations Beryl is a first OB site with a portion of DTN passing up through Pine Valley and bisecting prairie dog habitat.

AQUATIC SPECIES (2.12.11)

For protected aquatic species, alternatives were ranked based upon potential project impacts. The concentration of protected aquatic species in a study area and their sensitivity to potential project impacts govern the level of impact predicted for each alternative. The Nevada/Utah study area contains more protected species than Texas/New Mexico. Thus, full basing of the project in Nevada/Utah would exceed impacts expected for full basing in Texas/New Mexico. Split basing reduces the affected area in Nevada/Utah and, therefore, the impact rank of this alternative. In Nevada/Utah, since impact potential in the DDA is approximately equal for full basing alternatives, impact rank is determined based upon OB locations. Alternatives with Coyote Spring as an OB rate higher in impact potential than other OB selections, since protected aquatic species are more concentrated near this OB site. The nearer an OB to protected species locations, the more likely adverse impacts will occur. These may result from such pressures as groundwater withdrawal or recreation. The Milford and Beryl OBs would be remote from protected species habitats and, consequently, would exert less pressure upon these sensitive habitats.

DESERT TORTOISE (2.12.12)

The principal impacts to the desert tortoise from system deployment are associated with the OB location at Coyote Spring Wash. Habitat destruction and impacts of people including collection of pets and roadkills are the principal sources of impact. No desert tortoises occur in the Texas/New Mexico area so full basing there (Alternative 7) would create no impacts to the desert tortoise. Alternative 5 does not have a base in Coyote Spring Wash and would not negatively impact desert tortoises. Alternative 3 also does not have a base in Coyote Spring Wash but the base at Beryl would possibly bring more people in contact with tortoises at the northern extent of their range in southwestern Utah. All the other alternatives involve a base in Coyote Spring Wash and would cause adverse impacts to desert tortoises. Alternatives 4 and 6 involve Coyote Spring Wash as a second OB with slightly fewer (13,000 vs 17,000) people than the other alternatives. Thus somewhat

less impact is anticipated. Alternatives 1, 2, 8 and the Proposed Action, all involve a first base in Coyote Spring Wash and would have the largest impact on the desert tortoise.

WILDERNESS (2.12.13)

Alternative 7 is the preferred alternative from the standpoint of the wilderness resource since (1) there are only three wilderness areas in the Texas/New Mexico study region -- the Salt Creek Wilderness and the Sabinosa and Mescalero Sands wilderness study areas, and (2) of these, according to the present conceptual layout, only the Mescalero Sands Wilderness Study area in southern Chaves County, New Mexico stands to be substantially impacted by project-related activity. Alternatives 5 and 3, in that order, would be the best overall with respect to the Nevada/Utah wilderness resource since no potential wilderness areas lie within the proposed OB suitability zones.

The ordinal ranking of these alternatives was based upon the indirect effects model (ETR 30) developed to predict potential wilderness areas most likely to be impacted by recreation-related impacts. The model assumes the potential effects of basing sites to be a function of OB population as well as the distance from the base to the resource and recreational appeal of the area. The split basing Alternative 8 would be the next preferred despite the fact that the Coyote Spring base suitability zone overlaps surrounding designated wilderness study areas since it reduces project-related population growth and reduces the number of hydrologic subunits containing project elements by approximately 40 percent over full basing. Since there is the potential for direct project overlap with widerness areas under review at the Coyote Spring site the remaining full-basing alternatives, which share this OB site are considered essentially equivalent. However, the ranking according to the indirect effect index discussed above shows some differentiation between these remaining full basing alternatives with the smallest population-related effects on the wilderness resource under Alternative 2 (Coyote/Delta) followed by alternatives 6, Proposed Action, 4, and 1, in order of increasing potential for recreational impacts.

EMPLOYMENT, LABOR FORCE, AND EARNINGS (2.12.14 and 2.12.15)

Total employment earnings, and labor force impacts would be least under the split deployment alternative. This results from the larger geogrpahic distribtuion (across both Nevada/Utah and Texas/New Mexico) of the project and from siting the bases as locations most able to assimilate the very large employment growth. The first operating base would be located in Clark County, Nevada, which is already a large well-developed economy; of all potential operating base counties, Clark is most able to supply project floor and support-induced economic growth. Curry County, New Mexico, the location of the second operating base, already has trade and service support industries for Cannon AFB. Growth induced by other potential projects would not be large enough to significantly affect these two counties.

The Proposed Action and alternatives 1 and 2 were ranked second. Under all three, Clark County would contain a first operating base with high direct and indirect employment. Other alternatives would site the larger base in smaller, essentially rural counties, none of which would supply requisite labor or assimilate employment growth so readily as Clark. Alternatives 4 and 6 select Clark County as the location of a smaller operating base

Alternative 7, full deployment in Texas/New Mexico was ranked fourth; although DDA and base employment impacts would be significant, Curry County has some supporting industries and impacts would be less than under Alternatives 3 or 5. The latter two alternatives would site both bases in rural counties, and generate very large and significant employment growth; a complete tranformation of pre-existing economies would result.

POPULATION (2.12.16)

Rankings were estimated judgmentally by assessing the magnitude and rapidity of population changes induced by the M-X project, in the peak year and permanently, in: (1) the county containing the first OB, (2) the county containing the second OB, and (3) DDA counties. Magnitude of population change was measured as the number of M-X related in-migrants present, while rapidity of change was determined by computing the equivalent annual compound growth rates during the "boom" and post-construction "bust" periods. Effects in DDA counties were weighted less since these impacts are temporary during the construction period, with no permanent population change. Effects in the DDA are evaluated as the average change at the county level and the number of counties substantially affected.

The rankings are: (1) Alternative 1: Effects of first OB are the least (Coyote), effects of around OB are lowest except for Coyote, and DDA effects are same as for all NV/UT full deployment alternatives. (2) Alternative 4: Effects of first OB are greater than when at Coyote but less than any other alternative, effects of around OB (Coyote) are lowest of any alternative, DDA effects are the same as for all NV/UT full deployment alternatives. (3) Alternative 8: Total population effects greater than full deployment in NV/UT but less than full deployment in TX/NM; effects of Coyote OB lowest of all 1st OB alternatives; effects of Clovis OB greater than that at Beryl; more DDA counties affects. (4) Proposed Action, Alternative 2, Alternative 6: DDA effects the same as for all NV/UT full deployment alternatives; low effects from base at Coyote, but large effects in county containing second OB (because of small size of county population). (5) Alternative 3, Alternative 7: Effects of 1st OB about the same, but more than when at Coyote; substantial effects at location of second OB, average DDA effects are larger at county level in NV/UT but more counties in TX/NM are affected. (6) Alternative 5: Effects at both 1st and 2nd OB are longer; effects in DDA counties the same as for all NV/UT full deployment alternatives.

HOUSING (2.12.17)

The ranking of housing impact levels for the various alternatives was accomplished by making a judgment on the basis of two criteria over both the short-and long-term. These were: a ranking of the relative magnitude of the M-X related housing requirement increase over the normal growth baseline needs; and a ranking of M-X's share of additional housing units required over the construction period. This procedure was carried out for (1) the two operating base counties and (2) for the DDA facility counties.

PUBLIC FINANCE (2.12.18)

Proposed operating base locations where the tax bases are relatively strong are assumed to be able to deal with the potential fiscal imbalances estimated for

the areas better than those areas with weak tax bases. As such, alternatives with the Coyote Spring area (Clark County) proposed for an operating base are the second, third, and fourth preferred alternatives. These have been ranked by evaluating the strength of the tax bases of the county areas where the second operating base is propsoed under each alternative. Split basing spreads the impacts among four states. Alternative 7 follows the alternatives where the Coyote Spring area is proposed as the location of the first operating base. This alternative has the Curry County area as the proposed location of the first operating base and whose tax base and relatively developed economy rnaks behind that of Clark County but ahead of the remaining alternatives where particularly rural areas are proposed for operating base locations. The impacts associated with these remaining alternatives are quite high and have been similiarly ranked based upon the relative size of the tax bases of each county area proposed for operating base locations.

EDUCATION, HEALTH SERVICES, AND PUBLIC SAFETY (2.12.19, 2.12.20, 2.12.21)

The OB counties were analyzed and ranked according to the projected percentage change over baseline that M-X requirements represent under the respective alternatives. The ranking of the DDA regional impacts was determined by averaging these percentages across all counties in the region for each alternative.

Alternatives with a base in Clark County were preferred above other alternatives, because impacts would be low in Clark County, compared to high impacts expected in all other base location counties. Thus, alternatives with the first base in Clark County were preferred to those with the second base in Clark County.

At the regional level, impacts would be high in the peak year and low in the long term under all Nevada/Utah alternatives, except Alternative 8. Under Alternative 8 regional impacts would be low in the peak year with low to no impacts in the long term. Thus, Alternative 8 was most preferred, given the first operating base in Clark County and low regional impacts. Under alternatives 3 and 5, impacts would be highest at both the regional and OB levels.

URBAN LAND (2.12.22)

The criteria used for ranking the alternatives on the basis of urban land use requirements include: total land required in the communities affected by the location of operating bases; land requirements as a proportion of developed land in the affected county; and land requirements as a proportion of vacant land in the communities of the affected counties.

On the basis of these criteria, the following ranks were assigned: current developed land in Iron and White Pine counties, respectively, while long-term requirements would necessitate annual growth rates of 2.1 percent and 2.9 percent, respectively. Alternative 6 proposes a first OB in Beaver County which would cause the most adverse impact levels of any OB location. Peak requirements would equal 203 percent of the developed land and long-term requirements would need a 5.7 percent annual growth rate.

Alternative 5 combines Beaver County, noted above, and White Pine County (which has the second-lowest urban acreage of the potential OB counties). Impacts

in White Pine County are identical to those referenced above for Alternative 3. The combination of these adverse impact levels make Alternative 5 the least preferred option.

QUALITY OF LIFE (2.12.23)

The ranking of quality of life impacts for the various alternatives considered three criteria over both the short-and long-term. These were: a ranking of the relative magnitude of population relocation, growth in the operating base county, and a judgment of the comparative ability of each operating base county to cope with a given population influx that was based on population size and heterogeneity.

TRANSPORTATION (2.12.24)

There are no major DDA differences among the alternatives in terms of transportation and traffic issues. The major differences among the alternatives lies in the impacts surrounding the operating bases. In general the increased traffic associated with construction and operation of the system can more easily be absorbed in areas with large existing populations and extensive street networks as at Coyote Spring near Las Vegas and at Clovis. Small communities would be impacted more severely by large increases in traffic. Therefore Alternative 8 (split basing) gets the best ranking followed by Alternative 7 with a well established road network.

The Alternatives with full basing in Nevada/Utah were considered about the same.

The two alternatives with Coyote Spring as the second base (Number 4 and 6) follow in the ranking because they place the larger operating base in the small community. The remaining alternatives (Numbers 3 and 5) are last in the ranking because both bases would be near small communities.

ENERGY (2.12.25)

Although the overall impact of the M-X on energy resources is not significant, there are regional differences in resource availabiliity which allow ranking of the alternatives. There is sufficient electrical power in both the Nevada/Utah and the Texas/New Mexico regions; however, power transmission capacity in the proposed deployment areas is a constraint. Because the Texas/New Mexico area has a more extensive existing power distribution system, it could more easily accommodate the M-X. A similar advantage is enjoyed by the Texas/New Mexico region with regard to the petroleum distribution network. M-X-related petroleum demand would create localized imbalances in fuel availability. These imbalances could be mitigated through adjustments in the regional fuel allocation plans. Because Texas/New Mexico has a more extensive fuel distribution network, it is more flexible and less affected by reallocation of fuel supplies. Therefore, with regard to energy, the M-X system would have least impact on the Texas/New Mexico region.

The split basing alternative would have somewhat greater impact. And full deployment in the Nevada/Utah region would have the greatest impact.

LAND OWNERSHIP (2.12.26)

Deployment alternatives were ranked on the basis of private land utilized for DDA facilities and for operating basis under each alternative. Total area of private land likely to be utilized under the Proposed Action and all alternatives was calculated. Nevada/Utah potential alternatives utilizing the least amount of private land were ranked 1 through 5 followed by Texas/New Mexico alternatives with substantially larger amounts of private land. Private land potentially utilized by each alternative is listed below:

	DDA	OBS		TOTAL
		1st	2nd	
P.A.	895	0	640	1,535
Alt.1	895	0	5,200	4.095
2	895	0	0	895
3	895	3,200	1,300	5,395
4	895	3,200	0	4,095
5	895	640	1,300	2,195
6	895	640	0	1,535
7	91,507	6,400	6,400	104,307
8	47,204	0	6,400	53,604

IRRIGATED FARMLAND (2.12.27)

Alternatives were ranked on the basis of the total area of irrigated cropland likely to be disturbed by the DDA facilities and operating bases. Alternative 7 has the greatest impact with nearly 10,000 acres followed by Alternative 8 with 4,700 acres. The Proposed Action and all other alternataives potentially impact approximately 100 acres.

RANCHES AND HOMES (2.12.28)

Ranking of alternatives under this variable is based upon the number of probable relocation of homes and ranches which lie within the QD zones. All alternatives including Proposed Action in Nevada/Utah would result in the minimum but more or less equal number of relocations; hence are ranked 1. Alternative 7, on the other hand, would result in the maximum relocations with Alternative 8 falling in between.

GRAZING (2.12.29)

Differences in impact among Nevada/Utah alternatives are due to marginal differences in livestock production potential between OB sites. Operating bases located in more productive areas have larger potential losses.

The Texas/New Mexico area is about ten times more productive than the Nevada/Utah areas. Consequently, alternatives utilizing this wholly or partially, have greater impact than those using only Nevada and Utah.

RECREATION (2.12.30)

Impact rankings depend upon OB siting since DDA impacts for both Nevada/Utah and Texas/New Mexico alternatives are expected to be

insignificant. A low impact ranking was assigned to the Proposed Action, alternatives 2 and 6, because the OBs are expected to have a minimal impact on outdoor recreational sites in the vicinity. Alternative 1 is preferred over Alternative 4; the moderate impact at Beryl, Utah is expected to be somewhat higher as a first base due to a higher population in-migration and consequently a higher demand on sites. Alternatives 5 and 8 are of equal ranking but less preferred because in each case a highly significant impact is expected at the second base. Alternative 7 is less preferred because a highly significant impact is expected at the larger first base. The least preferred alternative is Alternative 3 where a moderate impact is expected at the first base, Beryl, and a high impact is expected at the second base, Ely.

NATIVE AMERICAN CULTURAL RESOURCES (2.12.31)

Impacts to Native American cultural resources were assessed by comparing both known and predicted locations of culturally sensitive sites and areas with the proposed DDA and OB layouts. Over 300 such sites appear in the archaeological record, and may be precisely located. These, however, represent only a small fraction of the total cultural resource base. Areas of predicted site densities were identified for the DDA on the basis of historic and ethnographic accounts, and from information provided by local Native Americans.

Two general criteria were applied in the impact assessment: (1) proximity (the geographical relationship of significant sites and resource zones to areas slated for project construction and operations) and (2) accessibility (the likelihood of areal penetration and resultant damage or loss by either construction activity or public vandalism). Direct impacts are projected for sites and resource zones which lie within a one-mile radius of proposed disturbance areas. Indirect impacts to Native American cultural resources are expected to extend considerable distances from new population centers. It is estimated that these impacts will be most concentrated within 35 mi of construction camps and within 50 mi of OBs, and that these impacts will decrease proportionately with distance.

On the basis of these criteria, the following ranks were assigned: Native American cultural resources in Texas/New Mexico (Alternative 7) are predicted to have low density in the deployment area, and no impacts to known sites are indicated. Additionally, Native American groups indigenous to the region were relocated to other areas in the 19th century.

Alternative 8 has one-half the system in Texas/New Mexico lands where cultural resources are less densely distributed, and where historical factors have contributed to a decrese in Native American sensitivity regarding these resources. Major impacts at the Coyote Spring OB are anticipated.

Alternatives 3 and 5 more evenly balance the potential indirect impacts associated with population in-migration to the cultural resource bases of Southern Paiute (Beryl or Milford) and Shoshone (Ely) peoples. An OB at either Beryl or Milford with a secondary OB at Ely avoid utilization of Coyote Spring, which is regarded as the most sensitive of all OB options n the basis of present data.

Alternatives 4 and 6 which place a primary OB at either Beryl or Milford, and secondary OB at Coyote Spring are ranked fourth. Of all the OB alternatives,

Coyote Spring has the greatest impact potential to known Native American cultural resources. Utilization of the Coyote Spring site for a secondary base, and hence the elimination of the DAA and OBTS, will substantially reduce the magnitude of impacts, particularly in the areas of Pahranagat Wash, Kane Springs Wash, and the Lower Pahranagat Valley.

The least preferred, Proposed action and alternatives 1 and 2, utilize Coyote Spring for the primary OB location. The Coyote Spring area lies on a major seasonal migration route of ancestral Southern Paiutes, and is associated with both temporary and permanent habitation sites, gathering areas, burials, and a wide variety of other sacred features. The potential for direct and indirect impacts to significant cultural resources during both the construction and operations phases is great.

NATIVE AMERICAN WATER ACCESSIBILITY AND AGRICULTURAL LAND USE (2.12.32)

Impact rankings were based upon the degree of overlap between project construction and operation water requirements and Native American water resources. Water resources are essential to productivity in the arid Great Basin. A dimunition of Native American water resources would, therefore, cause a decline in Native American land and herd productivity. The Proposed Action and any of the alternatives containing the proposed Coyote Spring option were judged worse than other potential alternatives because of the importance of groundwater, passing through the Coyote Spring area, to the Moapa Reservation. In the Nevada/Utah DDA the Duckwater Reservation water resources are always at risk of impact, although this risk declines under Alternative 8, split basing.

There are no known Native American water or land resources in the Texas/ New Mexico full deployment DDA or possible OB sites. No impacts would occur.

All Nevada/Utah DDA, either full or split deployment have similar impacts on Duckwater Reservation and Moapa Reservation water and land resources. Impact ranking among these alternatives is therefore dependent on the effects of OB siting. Alternative 5 OB basing at Ely and Milford would not impact any known Native American land or water resources.

OB siting at Ely (Alternative 3) would impact no known Native American land or water resources. OB siting at Beryl is more likely to compete with scheduled Native American land withdrawals than is either the Milford or Delta OB siting options.

Alternative 8, split basing, would reduce Nevada/Utah DDA impacts for the Duckwater Reservation. There are no impacts on native American land and water in the Texas/New Mexico DDA or OB siting. The Coyote Spring OB site provides the most potential for impact on Native American land and water resources.

OB siting at Delta (Alternative 2) is the Utah OB siting option least likely to compete with scheduled Native American land withdrawals. OB siting at Coyote Spring would significantly impact the water resources of the 71,000 acre Moapa Reservation and limit its future development and threaten its present productivity.

OB siting at Milford is more likely than the Delta option to impact scheduled Native American land withdrawals in Utah. OB siting at Coyote Spring provides the most potential for impact on Native American land and water resources.

The Beryl OB (Alternatives 1 and 4) site is more likely to compete with scheduled Native American land withdrawals than other Utah siting options. The Coyote Spring OB site provides the most potential for impact of all OB siting options. Moapa Reservation water resources are directly threatened as are their current productivity and future development.

NATIVE AMERICAN MIGRATION PATTERNS (2.12.33)

Impact rankings were based upon the proximity of Native American reservations and colonies to system construction and operation localities. It was assumed that Native Americans would migrate in large numbers to reservations and colonies close to DDA construction activities, and OB site construction and operation activities. The effect of in-migration would be greatest on those reservations and colonies most central to M-X generated eocnomic foci, and this effect would fall off with distance with reservations on the fringe of the DDA being less affected than those in the center of the DDA or immediately adjacent to an OB site.

There are no Native American reservations or colonies in the potential Texas/New Mexico DDA (Alternative 7).

Split basing (Alternative 8) potentially minimizes Native American migration with the Nevada/Utah DDA while there are no anticipated impacts on migration from the Texas/New Mexico DDA.

Full deployment in the Nevada/Utah DDA would completely surround the Duckwater Reservation and construction opportunities would make that reservation a prime attraction to Native American economic migrants. The Delta OB site (Alternative 2) would be less likely to promote in-migration to Utah Southern Paiute reservations and colonies than the other two Utah OB siting options.

Other reservations and colonies including the Ely Colony, Goshute Reservation and the Utah Southern Paiute reservations and colonies, while more peripheral to the DDA, would also attract eocnomic migrants from all over the Great Basin. The Moapa Reservation would attract migrants drawn toward economic opportunities at the Coyote Spring OB site. The Proposed Action and alternatives 1, 3, 4, 5, and 6 potentially have the largest impact.

Full deployment in the Nevada/Utah DDA would generate significant in-migration to nearby Native American reservations and colonies from all over the Great Basin. An OB site at Ely would generate significant in-migration to the Cedar City Colony and the Kanosh Reservation and marginally to the Shivwits Reservation. OB siting at Coyote Springs would generate significant in-migration to the Moapa Reservation.

ARCHAEOLOGICAL AND HISTORICAL RESOURCES (2.12.34)

The following criteria were used to assess the relative ranking of impacts to archaeological and historical resources from the various M-X alternatives.

- o Relative archaeological sensitivity. This was determined by assessing the density, diversity, and integrity of archaeological resources known or predicted to occur within a study region.

- o Predicted direct impacts. Project land disturbance data were utilized to determine the amount of land area likely to be disturbed in areas of high, moderate, and low sensitivity.

- o Predicted indirect impacts. These are expected to occur primarily as a result of increased population and increased accessibility to remote areas.

- o Potential mitigation measures. Avoidance is the most desirable mitigation measure, but data recovery programs will be necessary where avoidance is not feasible.

Based on these criteria, Alternative 8 was found to have the lowest overall impacts. The impacts for this alternative are high, but the distribution of the project over two different regions increases the feasibility of implementing successful mitigation programs. The overall sensitivity of the Texas/New Mexico study area is somewhat lower than is the Nevada/Utah area. High impacts are still expected for Alternative 7.

Impact levels for the Proposed Aciton and alternatives 1-6 are higher than for alternatives 7 or 8. The current data base is inadequate to allow defensible rankings among the Nevada/Utah full basing alternatives.

PALEONTOLOGICAL RESOURCES (2.12.35)

Factors included in this analysis included proximity to known fossil deposits and potentially fossil bearing geologic units. The DDA for Texas/New mexico has less impact than the DDA for Nevada/Utah and thus obtains a higher rating. In comparing the Nevada/Utah alternatives the OB sites were the only differentiation. Sites at Delta, Coyote Spring, and Ely have, in decreasing magnitude, a greater potential for affecting paleontological resources and the alternatives are rated with this in mind.

CONSTRUCTION RESOURCES (2.12.36)

Split deployment (Alternative 8) allows the construction activity to be distributed over four states with considerable physical distance between the Nevada/Utah and Texas/New Mexico region. In each deployment area, the cement plants are located within reasonable distances. This would avoid long hauls which would be required if the system is deployed entirely in the Nevada/Utah area. Overall costs would, therefore, be the least under Alterna tive 8. Full deployment in Texas/New Mexico (Alternative 7) is ranked second since the local supply of cement is relatively larger in this region than in Nevada/Utah. This reduces competition for cement from other projects and is likely to result in smaller price inflation than in Nevada/Utah which is ranked third.