DOE/EA-1170

November 1997

Environmental Assessment for the Area 5 Radioactive Waste Management Site Access Improvement at the Nevada Test Site

U. S. Department Of Energy Nevada Operations Office

DISCLAIMER

U.S. DEPARTMENT OF ENERGY
FINDING OF NO SIGNIFICANT IMPACT

AREA 5 RADIOACTIVE WASTE MANAGEMENT SITE (RWMS)
ACCESS IMPROVEMENT
AT THE NEVADA TEST SITE (NTS)

The United States Department of Energy has prepared an Environmental Assessment (DOE/EA-1170) (EA) which analyzes the potential environmental effects of improving access to its Area 5 RWMS at the NTS. The EA evaluates the potential impacts of constructing an extension of the Cane Springs Road between Mercury Highway and the 5-01 Road. Three alternative actions are also evaluated: (1) Construction of a new road along the existing alignment of the Powerline Road between Mercury Highway and the 5-01 Road, (2) upgrading the existing 5-01 Road, and (3) taking no action. The purpose and need for improving access to the RWMS are addressed in Section 1.0 of the EA. A detailed description of the proposed action and alternatives is in Section 2.0. Section 3.0 describes the affected environment and Section 4.0 the environmental effects of the proposed action and alternatives. Health and transportation effects, accident scenarios, cumulative effects, and other relevant information are found in Sections 5.0 through 12.0 of the EA.

DOE determined that the alternative action of upgrading the existing 5-01 Road would best meet the needs of the agency.

FINDING:

Based on the information and analyses in the EA, DOE finds that neither the proposed action nor any of the alternatives would constitute a major federal action significantly affecting the quality of the human environment within the meaning of the National Environmental Policy Act of 1969 (42 U.S.C. 4321 *et seq.*). Thus, an environmental impact statement is not required.

Signed in Las Vegas, Nevada, this 21st day of November, 1997.

G. W. Johnson, Manager
Nevada Operations Office

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DOE/EA-1170

ENVIRONMENTAL ASSESSMENT

for the

AREA 5 RADIOACTIVE WASTE MANAGEMENT SITE

ACCESS IMPROVEMENT

at the Nevada Test Site

November 1997

Prepared by
U.S. Department of Energy
Nevada Operations Office
Las Vegas, Nevada

Contents

Contents (Concluded)

List of Figures

List of Acronyms

AASHTO	American Association of State Highway and Transportation Officials
CFR	Code of Federal Regulations
CWA	Clean Water Act
DOE	U.S. Department of Energy
EA	Environmental Assessment
EIS	Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada
LLMW	Low-Level Mixed Waste
LLW	Low-Level Radioactive Waste
MW	Mixed Waste
NAC	Nevada Administrative Code
NDHPA	National Division of Historic Preservation and Archeology
NEPA	National Environmental Policy Act
NRHP	National Register of Historic Places
NTS	Nevada Test Site
NV	Nevada Operations Office
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
RWMS	Radioactive Waste Management Site
SDWA	Safe Drinking Water Act
SHPO	State Historic Preservation Officer
TRU	Transuranic Waste

1.0 INTRODUCTION

This Environmental Assessment (EA), in accordance with the National Environmental Policy Act (NEPA) of 1969, as amended in Title 42 U.S.C. (4321), Council on Environmental Quality Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act (40 CFR Parts 1500-1508), and U.S. Department of Energy (DOE) policies and procedures set forth in 10 CFR Part 1021, and DOE Order 451.1A, "NEPA Compliance Program," examines the potential impacts to the environment from improving access to the Area 5 Radioactive Waste Management Site (RWMS) at the Nevada Test Site (NTS). Four alternatives, including the proposed action, are described and their environmental impacts assessed in this EA.

The DOE Nevada Operations Office (DOE/NV) prepared *Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada* (EIS) and issued a Record of Decision (ROD) on December 9, 1996. The ROD identified Alternative 3, Expanded Use, as the alternative DOE would implement for almost all of its activities at the NTS. Included within the portion of Alternative 3 implemented in the ROD is rebuilding either the 5-01 Road or the 5-07 Road and part of the 5-01 Road to meet current American Association of State Highway and Transportation Officials (AASHTO) standards. The Proposed Action in this EA would fulfill the stated need but differs from the two options identified in the EIS. This EA incorporates the analysis from the EIS for upgrading the northern portion of the 5-01 Road and provides specific analysis of potential environmental impacts for the proposed action, for upgrading the Powerline Road, and for the No Action Alternative.

1.1 Purpose and Need For Action

The RWMS is located about 16 miles north of Mercury, Nevada, at the NTS in Nye County (Figures 1 and 2). The existing primary route to the RWMS is the 5-01 Road, which extends north from the Mercury Highway to the RWMS. The 5-01 Road was constructed in 1965 as a limited access route to the Defense Nuclear Agency compound northeast of the RWMS.

Approximately 750 vehicles, including about 24 semi-trailers and eight buses, use the 5-01 Road every week to access the RWMS (Poggemeyer Design Group, 1994). Shipments of low-level radioactive waste (LLW) are transported to the RWMS on the 5-01 Road almost every work day. It is anticipated that LLW and possibly mixed waste (MW) generated by DOE/NV Environmental Restoration activities within the state of Nevada will be transported to the RWMS for the forseeable future. It is also possible that LLW and MW from out-of-state generators may be transported to the RWMS in the future and the proposed improved access would accommodate those shipments; however, the need for access improvement is not based on possible future shipments from off-site generators but on the present levels of traffic and the condition of the 5-01 Road. In addition, improved access to the RWMS would not cause off-site generated waste to be shipped to the NTS. The issues and analyses for such activities are addressed as part of *Final Waste Management Programmatic Environmental Impact Statment for Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Waste* (DOE/EIS-0200-F), for which a ROD has not yet been issued.

The 5-01 Road has two narrow 3.05 m (10.0 ft) wide or less traffic lanes and insufficient roadway shoulders. Also, standing water is sometimes present in low lying areas of the road during winter storms and summer thundershowers. The road does not meet current AASHTO structural specifications for

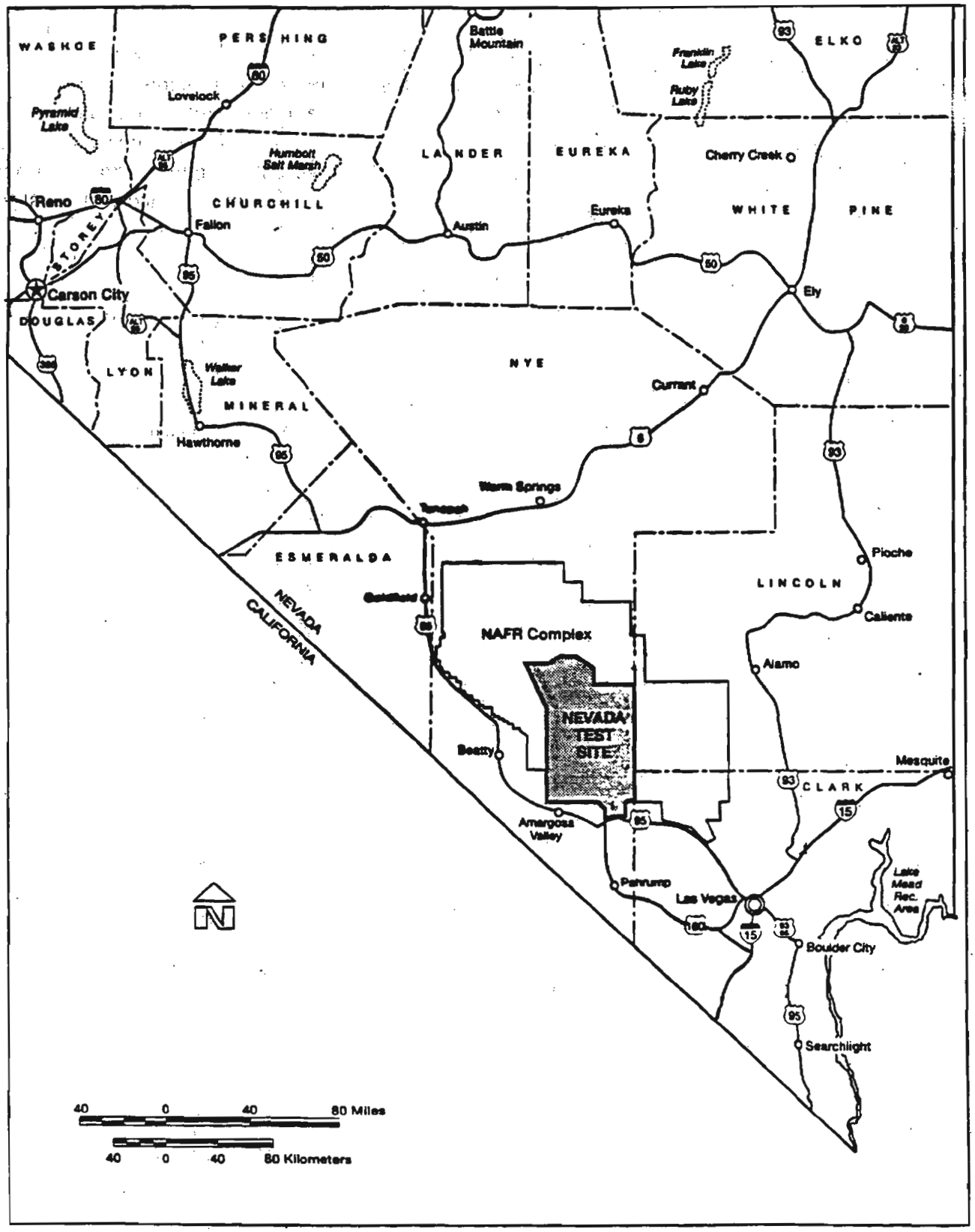

Figure 1. Location of the Nevada Test Site in the State of Nevada

Table A2. Annual U.S. Macroeconomic and Weather Indicators

	Year														
	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Macroeconomic															
Real Gross Domestic Product (billion chained 1992 dollars)	5324	5488	5649	5865	6062	6136	6079	6244	6390	6611	6742	6928	7187	*7345*	*7465*
GDP Implicit Price Deflator (Index, 1992=1.000)	0.786	0.806	0.831	0.861	0.897	0.936	0.973	1.000	1.026	1.051	1.078	1.102	1.125	*1.144*	*1.164*
Real Disposable Personal Income (billion chained 1992 Dollars)	3972	4101	4168	4332	4417	4498	4500	4627	4704	4805	4964	5077	5220	*5398*	*5519*
Manufacturing Production (Index, 1987=1.000)	0.857	0.881	0.928	0.971	0.990	0.985	0.962	1.000	1.037	1.094	1.132	1.164	1.224	*1.262*	*1.272*
Real Fixed Investment (billion chained 1992 dollars)	799	805	799	818	832	806	741	783	843	916	962	1042	1125	*1201*	*1234*
Real Exchange Rate (Index, 1990=1.000)	NA	NA	NA	NA	NA	1.000	1.006	1.012	1.056	1.033	0.960	1.015	1.097	*1.086*	*1.050*
Business Inventory Change (billion chained 1992 dollars)	-4.5	-4.2	5.1	9.5	19.2	6.6	-6.1	-9.2	6.1	11.1	7.8	9.9	20.2	*4.7*	*-3.4*
Producer Price Index (index, 1980-1984=1.000)	1.032	1.002	1.028	1.069	1.122	1.163	1.165	1.172	1.189	1.205	1.248	1.277	1.275	*1.276*	*1.286*
Consumer Price Index (index, 1980-1984=1.000)	1.076	1.097	1.137	1.184	1.240	1.308	1.363	1.404	1.446	1.483	1.525	1.570	1.606	*1.634*	*1.668*
Petroleum Product Price Index (index, 1980-1984=1.000)	0.832	0.532	0.568	0.539	0.612	0.748	0.671	0.647	0.620	0.591	0.608	0.701	0.679	*0.611*	*0.624*
Non-Farm Employment (millions)	97.4	99.3	102.0	105.2	107.9	109.4	108.3	108.6	110.7	114.1	117.2	119.5	122.2	*124.6*	*126.0*
Commercial Employment (millions)	60.8	62.9	65.2	67.8	70.0	71.3	70.8	71.2	73.2	76.1	78.8	81.0	83.5	*85.5*	*86.9*
Total Industrial Production (index, 1987=1.000)	0.880	0.890	0.931	0.973	0.990	0.989	0.969	1.000	1.034	1.086	1.121	1.152	1.206	*1.239*	*1.249*
Housing Stock (millions)	96.3	98.0	99.8	101.6	102.9	103.5	104.5	105.5	106.8	108.2	109.8	111.2	112.7	*114.2*	*115.6*
Weather [•]															
Heating Degree-Days															
U.S.	4642	4295	4334	4653	4726	4016	4200	4441	4700	4483	4531	4713	4675	*4576*	*4576*
New England	6571	6517	6546	6715	6887	5848	5960	6844	6728	6672	6559	6679	6894	*6621*	*6621*
Middle Atlantic	5660	5665	5699	6088	6134	4998	5177	5964	5948	5934	5831	5986	6040	*5839*	*5839*
U.S. Gas-Weighted	4856	4442	4391	4779	4856	4139	4337	4458	4754	4659	4707	5040	4912	*4732*	*4732*
Cooling Degree-Days (U.S.)	1194	1249	1269	1283	1156	1260	1331	1040	1218	1220	1293	1180	1091	*1193*	*1193*

[•]Population-weighted degree days. A degree day indicates the temperature variation from 65 degrees Fahrenheit (calculated as the simple average of the daily minimum and maximum temperatures) weighted by 1990 population. Normal is used for the forecast period and is defined as the average number of degree days between 1961 and 1990 for a given period.

Notes: Historical data are printed in bold; forecasts are in italics.

Sources: Historical data: latest data available from: U.S. Department of Commerce, Bureau of Economic Analysis; U.S. Department of Commerce, National Oceanic and Atmospheric Administration; Federal Reserve System, *Statistical Release* G.17(419); U.S. Department of Transportation; American Iron and Steel Institute. Macroeconomic projections are based on DRI/McGraw-Hill Forecast CONTROL1297.

semi-trailers and heavy truck traffic (Poggemeyer Design Group, 1994). The 5-01 Road is already five years beyond the normal 25 year expected service life of a well designed, constructed, and properly maintained road and severe deterioration is progressing. Continued use of the 5-01 Road without major rebuilding will result in a continuously escalating hazard to safe transportation. A need exists for DOE/NV to provide a safe, cost effective, and environmentally sound means of accessing the RWMS.

2.0 PROPOSED ACTION AND ALTERNATIVES

Each of the action alternatives analyzed in this EA would provide for access to the Area 5 RWMS complex by trucks and/or other vehicles transporting LLW, LLMW, TRU, MTRU, hazardous, and non-hazardous waste. Under the Proposed Action and the Powerline Road Alternative, the 5-01 Road would continue to be used by light vehicles and occasional heavy vehicles, such as buses and trucks hauling materials to the Hazmat Spill Center (formerly known as the Liquified Gaseous Fuels Spill Test Facility). This reduced level of traffic would relieve much of the concern for safety posed by the present condition; however, it would likely become necessary in the future to conduct maintenance on portions of the 5-01 Road. That maintenance could consist of chip-sealing, filling potholes, and resurfacing. One of the alternatives to the Proposed Action is to reconstruct and upgrade the 5-01 Road.

2.1 Description of the Proposed Action

DOE/NV proposes to construct an alternate access route to accommodate traffic enroute to the RWMS. Under the Proposed Action, Cane Spring Road would be extended east from the Mercury Highway, across the Barren Wash alluvial fan to the 5-01 Road (Figure 3). This action would involve construction of approximately 5.0 km (3.1 mi) of a heavy truck traffic Class HS-20-44 wheel loading (AASHTO, 1990) all weather highway that would connect the Mercury Highway to the 5-01 Road about 0.32 km (0.2 mi) south of the RWMS. The road would consist of 62.5 millimeters (mm) (2.5 inches (in)) of bituminous surface course on a 152 mm (6 in) aggregate base course (processed, imported material) overlaying a subbase of compacted native material.

The proposed road would be constructed in an undisturbed area. Preconstruction activities would include clearing and grubbing away vegetation during the initial grading and leveling operations. In addition to the road, six areas (one every 0.81 km (0.5 mi)) with dimensions of 30.5 m x 30.5 m (100.0 ft x 100.0 ft) would be cleared for staging construction equipment and for turnaround areas. The road would consist of two 3.7 m (12.0 ft) wide lanes with 2.4 m (8.0 ft) shoulders and side slopes built up using a balanced cut and fill method from a ditch excavated along the north side of the road alignment. The side slopes would be 0.02:1 on the north side of the road and 6:1 on the south side.

The proposed road would require a drainage control system consisting of two channel reaches along the north side of the road. The first channel reach would extend east for approximately 4.4 km (2.71 mi) from Mercury Highway to the existing RWMS flood control channel. This reach would be designed to carry, at a minimum, flow from an approximately 10-year, 6-hour storm along the road alignment to the RWMS channel.

The second channel reach would extend east for approximately 0.7 km (0.4 mi) from near the east side of the RWMS flood control channel to the existing 5-01 Road. This reach would be designed to carry flow

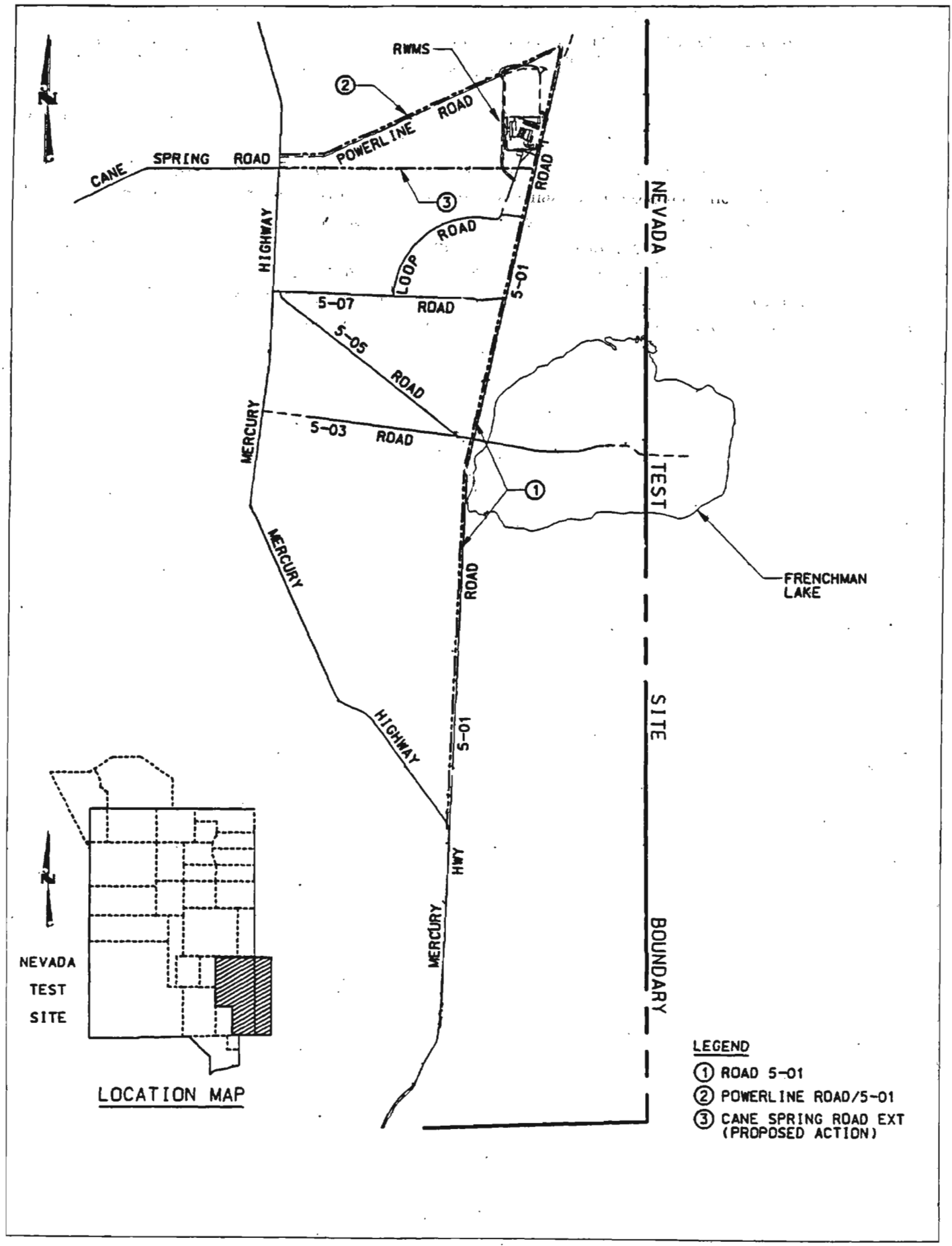

Figure 3. Location of the Proposed Action and Alternatives

from an approximately 25-year, 6-hour storm to an appropriately sized culvert under the 5-01 Road, to daylight on the east side of the road in an existing swale.

2.2 No Action Alternative

The No Action Alternative would not meet the need of DOE/NV for adequate safe access for transport of waste to the RWMS. An assessment of the no action alternative is required, however, under Section 1021.321 of the DOE NEPA implementing procedures and guidelines (10 CFR 1021). Under this alternative, LLW would continue to be transported on the 5-01 Road in its existing condition. This would result in an unnecessary safety hazard, and as such, is not an acceptable or reasonable alternative. There are no design or construction costs associated with the No Action Alternative. Maintenance and repair costs, however, would be incurred and would most likely increase as deterioration of the 5-01 Road progressed. In addition to the safety concerns, there would be potential environmental cleanup costs associated with an accident involving a vehicle transporting LLW to the RWMS.

2.3 5-01 Road Reconstruction Alternative

This alternative would provide for the reconstruction of the existing 15.3 km (9.5 mi) 5-01 Road into a widened, well marked, all weather highway that meets the minimum requirements for heavy truck traffic, Class HS-20-44 Highway wheel loading (AASHTO, 1990). Engineering studies were conducted to evaluate improvements that would be required to make the 5-01 Road a safe, properly designed and cost effective roadway for transporting low level, hazardous, and mixed wastes to and from the RWMS (Zabych et al, 1995 and Raytheon Services Nevada, 1994). The improvements would allow the 5-01 Road to continue as the direct route to the RWMS for northbound traffic. Reconstruction would improve conditions on the existing road, which currently follows the land contours. The possibility of closure or damage due to flash floods would be minimized by the addition of properly designed drainage structures.

The reconstruction of the 5-01 Road would likely be completed in up to three phases. Phase 1 would include the northern approximately 4.83 km (3 miles) of the road from the RWMS southward; Phase 2, the middle approximately 4.83 km (3 miles); and Phase 3, the southern approximately 4.83 km (3 miles). Generally, the existing oil and chip pavement would be pulverized and re-emplaced as part of the subgrade preparation. A minimum 76.2 mm (3 inch) thick Type II aggregate base would be placed on the subgrade to provide a 2% slope from centerline to edge of pavement for proper roadway crown. The roadway surface would consist of 63.5 mm (2-1/2 inches) of asphaltic concrete pavement over a bitumen coating to form two travel lanes, each 3.64 m (12 feet) wide. Compacted shoulders 1.22 m (4 feet) wide with side slopes to graded roadside ditches would also be constructed. Improvements would also be made to the intersections of the 5-01 Road with the 5-07 Road, the 5-05 Road, and the Hazmat Spill Test Facility (Frenchman Flat) access road.

No alignment or grade changes or drainage structures are anticipated for the Phase 1 portion of the reconstruction. The middle three miles (Phase 2) crosses several washes. Metal culverts would be installed under the roadway at the washes. The number and size of the culverts would be sufficient to carry a 25 year 6-hour flood. Phase 3 would involve total regrading of the roadway to eliminate major safety and driving hazards due to lack of vertical sighting distances, insufficient lane and shoulder widths, poor drainage, and deteriorated pavement. An estimated 37,037 cubic meters (50,000 cubic

yards) of balanced cut and fill would be used as part of the regrading in Phase 3. Material for Type II aggregate base course under the pavement would be obtained from existing sources nearby. Near the intersection of the 5-01 Road with Mercury Highway, regrading could require removal of substantial amounts of rock. For this reason and to improve the level of safety for access to and from Mercury Highway, the southern one-quarter to one-half mile of the 5-01 road might need to be realigned. In order to carry 25 year 6-hour flood flows under the road, 8 to 10 drainage areas would be designed using metal culverts. The number and size of culverts would be determined and collector channels and concrete head walls would be provided at these locations, as necessary.

During reconstruction of the 5-01 Road, an alternate route to the RWMS would be needed. A temporary detour might be created using the 5-07 Road, which extends east from the Mercury Highway to the 5-01 Road. As an alternative, temporary detours might be provided around construction areas by grading access roads adjacent to the 5-01 Road. These detour access roads would be decommissioned following construction.

2.4 Powerline Road Corridor Alternative

This alternative would utilize the existing gravel surfaced Powerline Road corridor to connect Mercury Highway and the 5-01 Road. The Powerline Road intersects the 5-01 Road 2.0 km (1.2 mi) north of the RWMS and is approximately 7.9 km (4.9 mi) long. The current Powerline Road would need to be widened, paved, and have drainage structures added to it. This alternative could interfere with the northern section of the 25-year storm channel and berm that were constructed around the RWMS. The potential for relocation of utilities to provide sufficient right-of-way for the road would be great.

3.0 AFFECTED ENVIRONMENT

This section describes the environment that could potentially be affected by the proposed action and alternatives discussed in Section 2.0.

3.1 Land Use

The main entrance to the NTS is located at Mercury, approximately 105 km (65 mi) northwest of Las Vegas in southern Nye County, Nevada (Figure 1). The NTS consists of 3,496 km^2 (1,350 mi^2) of land that are withdrawn from public use. The NTS is bordered on the north, west, and east by the Nellis Air Force Range Complex and consists mostly of broad alluvial valleys separated by mountain ranges that trend north to south. The roads described in the Proposed Action and alternatives are located in Area 5 in the southeast corner of the NTS. The proposed action and Powerline Road Corridor alternative are situated northwest of Frenchman (Dry) Lake on an alluvial fan that slopes toward the lake. The 5-01 Road Reconstruction and No Action alternatives run along the western side of Frenchman (Dry) Lake and extend south from the RWMS to Mercury Highway.

The Proposed Action and Powerline Road alternatives both cross an area designated as a Reserved Zone in the NTS EIS. The 5-01 Road crosses through a Reserved Zone, a Research, Test, and Experiment Zone, and a Radioactive Waste Management Zone. Major land uses in the area include the RWMS, the Hazardous Waste Storage Site, and the Hazmat Spill Test Center. In addition to these major land uses, there are other activities conducted in the area, such as the Desert Free Air CO^2 Enrichment experiment

being conducted by the University of Nevada, Reno.

3.2 Geology and Hydrogeology

The NTS is located in the southern part of the Great Basin, the northernmost subprovince of the Basin and Range Physiographic Province. The Basin and Range Province is characterized by more or less regularly spaced, generally north-south trending mountain ranges separated by alluvial basins that were formed by faulting.

The RWMS is located in a valley on an alluvial formation. The alluvium at the RWMS ranges from 370 to 460 m (1,215 to 1,510 ft) thick; the upper approximately 235 m (770 ft) being unsaturated. Detailed mapping of the walls of four excavations at the RWMS showed that the alluvium consists of conglomeritic to fine-grained sediment (Snyder, 1994). The sediment is typically either stratified or shows evidence of stratification. Laterally, the sedimentological characteristics of the alluvium may vary greatly. The alluvium is underlain by volcanic rock approximately 900 m (2,950 ft) thick, which is underlain by carbonate rock.

Seismic activity in the region around the NTS was recently characterized (Vortman, 1991). Within 193 km (120 mi) of the NTS, since 1868 there had been 8,161 natural and 3,827 human-induced seismic events. Naturally occurring seismic events are associated with extensional tectonic activity characteristic of the province (Sinnock, 1982; Vortman, 1991). Human-induced seismic events include those resulting from (1) filling Lake Mead, (2) high-explosive tests, (3) underground nuclear-explosive tests, (4) postnuclear explosion cavity collapses, or (5) aftershocks from nuclear explosions (Vortman, 1991). The NTS is within Seismic Zone 2B, as defined in the Uniform Building Code (ICBO, 1991). Zone 2B is defined as an area with moderate damage potential. Current design practices at the NTS require facilites to be build to more stringent Seismic Zone 4 standards (DOE, 1996).

Water content and potential in the near surface alluvium are very low which implies that the sediments are dry and subsurface water fluxes are extremely small. In the upper 30 m (99 ft) of alluvium, except for a short time period following a precipitation event, the direction of water flow is upward. The water table is within the alluvium, approximately 235 m (770 ft) below ground surface.

3.3 Biological Resources

The NTS is in the transition zone between the Mojave Desert and the Great Basin Desert (O'Farrell and Emery, 1976, as cited in DOE 1994c). Because of this, vegetation associations typical of the Great Basin Desert are often found in cooler, high-elevation areas above 1,494 m (4,900 ft) while those characteristic of the Mojave Desert usually occur at lower elevations below 1,189 m (3,900 ft).

On October 16, 1995 DOE conducted a biological survey which included a significant portion of the area of the Proposed Action (EG&G, 1995). The vegetation in this area was found to be typical of large areas of the Mojave Desert in southern Nevada and is characterized by creosote bush (*Larrea tridentata*) and bursage (*Ambrosia dumosa*). There are several small Joshua trees (*Yucca brevifolia*) and cacti (members of the Cactaceae family) scattered throughout this area. Joshua trees and cacti are protected from commercial exploitation by the state of Nevada. Typical animals found in the vicinity of the project area are side-blotched lizards (*Uta stansburiana*), black-throat sparrows (*Amphispiza bilineata*),

coyotes (*Canis latrans*), and kangaroo rats (*Dipodomys* spp.). There are no indigenous fish on the NTS.

The Proposed Action and all of the alternatives are within the northern portion of the range of the desert tortoise (*Gopherus agassizii*), which is a federally listed threatened species (Title 50 CFR Part 17.11) and is also listed by the state of Nevada as protected and rare (Nevada Administrative Code §503.080). The Proposed Action area, however, is considered poor tortoise habitat. Since 1989, 29 preconstruction surveys, totalling 663.5 ha (1,639 ac), and 8 tortoise surveys have been conducted in the area between Mercury Highway, 5-01 Road, 5-07 Road, and Massachusetts Mountain. No tortoises or their sign have been found. Because of the lack of tortoises and sign, the U.S. Fish and Wildlife Service concurred with DOE/NV that tortoises are absent and not expected to occur within this area (FWS, 1996).

3.4 Cultural Resources

Human occupation of the NTS and its environs extends back to about 10,000 B.C. A number of aboriginal hunting and gathering cultures were present during this long prehistoric period. When the first European settlers entered the area in 1849, it was occupied by the Paiute Indians. From about 1849 until the establishment of the NTS, the land was mainly used for livestock grazing and mining (ERDA, 1977, as cited in DOE, 1994).

All areas of the NTS have the potential to contain archaeological sites that are considered significant. Current knowledge of cultural resources at the NTS is the result of over 20 years of surveys and data recovery. Approximately 4.68 percent of the NTS (40, 491 acres) has been surveyed for cultural resources (DOE, 1996). These surveys have identified over 1,700 prehistoric and historic archaeological sites on the NTS. These range from sites associated with the earliest prehistoric people in the New World to structures associated with the development of nuclear testing. Prehistoric sites include temporary camps, extractive localities, processing localities, localities, caches, and stations. Historic sites include mining, ranching, transportation and communications sites, and sites related to nuclear testing and research.

All of the sites identified on the NTS have been recorded in the Site Record File of the Nevada State Museum. Both historic and prehistoric sites on the NTS tend to be located near springs, in canyons, and at or near the bases of mountains. The larger valleys show little sign of early human occupation.

Although the area of potential effect for the Proposed Action has not been completely inventoried, on September 21, 1995, a Class III cultural resources inventory was conducted for a significant portion of the area (Jones, 1995). Three prehistoric sites, one historic isolated feature, and two isolated artifacts were recorded. DOE applied the criteria for evaluation at 36 CFR 60.4 and determined that the three prehistoric sites are not eligible for inclusion on the National Register of Historic Places (NRHP). The Nevada State Historic Preservation Officer (SHPO) concurred with that determination. Isolated artifacts are not considered eligible for the NRHP under 36 CFR 60.4. No other buildings, structures, or facilities were found. Before initiating ground disturbing construction activities for the Proposed Activity or either of the action alternatives, DOE would complete a cultural resources inventory of the area of potential effect for any undisturbed area that has not been previously inventoried and comply with the requirements of Section 106 of the National Historic Preservation Act.

3.5 Air Quality

Except for fugitive air emission of particulate matter, the NTS has no significant known sources of pollutants for which air quality standards exist. Comparisons between the NTS and other facilities in the remote areas of the southwest have suggested that the present air quality on the NTS is good. Instances of high concentrations of fugitive dust are common and are proportional to the wind velocity and to the number of land disturbances in the area.

3.6 Surface Water

There are no perennial surface waters on the NTS. Surface waters are ephemeral, occurring only after significant precipitation events. Eventually, any drainage in the study area would flow towards Frenchman (Dry) Lake. Any water reaching the dry lake would accumulate in shallow ponds and evaporate from within a few hours to a few weeks. Although Frenchman (Dry) Lake does not meet the federal definition of a surface water, it is included in the state of Nevada definition.

3.7 Floodplains

Floodplains and wetlands are environmentally sensitive resources, as listed in 10 CFR 1021 B(4)(iii). No wetlands exist at the location of the Proposed Action or any of the alternatives. However, the location of the Proposed Action, the Powerline Road Corridor alternative, and portions of the 5-01 Road alternative are within a 100-year flood zone, with flow towards Frenchman Lake (Raytheon, 1993). The Proposed Action and Powerline Road Corridor alternative would extend across a portion of the Barren Wash Alluvial Fan. The reconstruction of the 5-01 Road and No Action alternatives would not affect the Barren Wash Alluvial Fan. All of the actions, except the No Action alternative, would require the construction of drainage devices capable of handling the 25-year, 6-hour flood. Any flows greater than the 25-year, 6-hour would be allowed to flow over the road.

4.0 ENVIRONMENTAL EFFECTS

This section discusses the potential environmental effects the Proposed Action and alternatives could have on the environment described in Section 3.0.

4.1 Land Use

Existing land uses would not be affected by the Proposed Action or any of the alternatives. All of the existing land uses in Area 5 would continue.

4.2 Geology and Hydrogeology

The geology and hydrogeology of the subject sites would not be affected by the Proposed Action or any of the alternatives. Potential effects of seismic events are addressed in Section 8.2 of this EA.

The topography of the subject sites would not be dramatically affected by any of the proposed alternatives. Approximately 29 ha (72 ac) of previously undisturbed land would be disturbed by the Proposed Action. The Proposed Action could, however, affect the topography to the south east of the

RWMS. The road and channel flood protection system would divert runoff from precipitation events up to the 25 year 6-hour flood to the east under 5-01 Road to the exit point of the drainage structure. The flow would spread out after exiting the drainage structure and likely follow existing drainage patterns, although it could find new preferential drainage pathways toward Frenchman Lake. These new pathways would alter the current erosion and deposition patterns. The reconstruction of the 5-01 Road and the Powerline Road corridor would disturb about 14 ha (35 ac) and 7 ha (18 ac), respectively. The reconstruction of the 5-01 Road would not affect the current drainage patterns and the Powerline Road corridor would have effects similar to the Proposed Action. The No Action alternative would have no effect.

4.3 Biological Resources

About 29 ha (72 ac) of wildlife habitat would be permanently lost as a result of the Proposed Action. The 5-01 road reconstruction alternative would result in the loss of 14 ha (35 ac) of existing marginal roadside wildlife habitat. About 7 ha (18 ac) of habitat would be permanently lost if the Powerline Road Corridor alternative were implemented. No habitat would be disturbed under the No Action alternative. The loss of habitat under any of the alternatives would not affect the viability of any plant species or communities or wildlife populations in the region. Potential changes in erosion and deposition patterns might result in areas of water accumulation at the base of the diversion channel and new drainage patterns might occur where water flows are concentrated at the exit point of the channel. These changes are not expected to adversely impact wildlife within the area, including the desert tortoise (see discussion in the next paragraph). Another expected long-term effect of changed runoff patterns caused by the Proposed Action and the Powerline Road alternative would be lower densities and biomass of the dominant perennial shrubs (*Larrea tridentata* and *Ambrosia dumosa*) down slope of the road. Shrub communities in the Mojave Desert have been shown to depend on soil moisture from overland runoff as well as precipitation. Field studies in similar Mojave Desert vegetation have shown lower shrub densities and biomass down slope of runoff diversion ditches (Schlesinger and Jones, 1984) and roads crossing bajadas (Johnson et al., 1975). These expected changes in vegetation and in erosion, deposition, and overland flow patterns are not expected to affect the viability or diversity of vegetation or wildlife in the region.

Although some changes in local distribution of vegetation may occur, no changes in the amount or composition of the vegetation is expected. The new preferential drainage pathways that may result would occur in a relatively small area and would not adversely impact wildlife, including the desert tortoise. Due to insufficient data on drainage patterns effected by the other roads in this area, the actual amount of habitat which could be altered is not known.

Based on the results of the biological survey it is unlikely that any endangered or threatened animal species would be affected by the proposed action or any of the alternatives. A complete survey of the area that would be impacted by implementation of any of the action alternatives would be completed prior to any construction activities. Since Area 5 is within the known range of the desert tortoise, all construction and maintenance activities would be conducted in accordance with the terms and conditions of the Biological Opinion. All workers would be required to read and implement the DOE/NV Desert Tortoise Protection brochure.

4.4 Cultural Resources

Construction of the Proposed Action would involve disturbance of 29 ha (72 ac) of previously undisturbed ground. The Powerline Road and 5-01 Road Reconstruction alternatives would disturb 7 h (18 ac) or 14 ha (35 ac), respectively. Ground disturbance for road construction or reconstruction would affect any surface or subsurface cultural remains in the disturbed area. There would be no effect to surface or subsurface cultural remains under the No Action alternative. A cultural resources reconnaissance survey of most of the area of potential effect for the Proposed Action did not find any significant sites. The remainder of the areas of potential effect for the Proposed Action and the two action alternatives have not been surveyed to date. A complete survey of the area of potential effect would be completed prior to any construction activities.

Pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended, the effects on historic properties (i.e., sites eligible for the National Register of Historic Places) that could result from any Federal undertaking to improve access to the RWMS will be taken into account. In order to take these effects into account, cultural resources within the area of potential effect would have to be identified by means of reconnaissance surveys conducted by qualified professionals. The area of effect would be defined as any previously undisturbed areas that would be disturbed by construction or reconstruction activities plus a reasonable buffer zone.

DOE would apply the Criteria of Effect and Adverse Effect (36 CFR 800.9) to determine if implementation of any action described in this EA would affect historic properties. If it is determined through consultation with the Nevada State Historic Preservation Officer (SHPO) that any historic property could be affected, and the property meets the requirements of 36 CFR 800.9(c)(1), a determination of no adverse effect would be sought through implementation of a data recovery plan formulated to address research goals important to an understanding of Nevada prehistory and history (Lyneis, 1982). Data recovery for prehistoric and historic archaeological sites may include, but not be limited to archival research, surface collection, photodocumentation, site excavation, feature and artifact analyses, and specialized analysis such as radiocarbon dating, and obsidian sourcing and hydration.

To ensure that previously undiscovered archaeological resources that may be present are not adversely impacted, construction crews would be instructed to stop all activities in the immediate vicinity of a discovery of cultural resources or artifacts and notify DOE/NV. An analysis of the find would be made by qualified archaeologists, and the SHPO would be consulted so that a concurrence could be made regarding the significance of the discovery. If the discovery were found to be an historic property, DOE and the SHPO would determine the proper steps needed to mitigate the effect on the cultural resource.

4.5 Air Quality

Each of the proposed alternatives, except the No Action alternative, would cause a temporary degradation of the air quality in Area 5. The construction activities associated with these alternatives could cause particulates to become entrained in the air and additional vehicular exhaust from the construction vehicles would be released. It is estimated that approximately ten tons of total suspended particulates would be emitted into the air from the construction of the Proposed Action or alternatives (DOE/NV, 1993). This would be minimized as much as possible by spraying water on the construction area. The operation of the Proposed Action and alternatives would not cause an increase in the amount

of vehicular emissions in Area 5 once construction is completed. The volume of traffic in Area 5 is not expected to increase due to improvement of access to the RWMS.

4.6 Surface Water

The quality of surface waters would not be affected by the Proposed Action or any of the alternatives. The Proposed Action and the Powerline Road corridor alternative would affect the current drainage patterns, but this would not affect ~~on~~ the surface water quality. All drainage would still flow to Frenchman Lake and the quality would not change. The runoff from the Proposed Action and alternatives would have a high sediment loading, at least initially. The majority of this sediment loading would be deposited prior to reaching the dry lake. The amount of sediment that did reach the dry lake would be very small when compared to the total amount deposited in the dry lake by the entire drainage basin.

4.7 Floodplains

The existing Barren Wash Alluvial Fan floodplain could be affected by either the Proposed Action or Powerline Road Corridor alternative. The Proposed Action and Powerline Road Corridor alternative would alter the current flowpaths by redirecting and concentrating flows within the floodplain. The area of the Barren Wash Alluvial Fan would decrease as the flow is redirected, and flood storage on the fan would probably be reduced. This would cause changes in erosion and deposition patterns. The 5-01 Road reconstruction and No Action alternative would not traverse the Barren Wash Alluvial Fan and would not affect the existing floodplain. A floodplain assessment was performed to evaluate the impacts of the Proposed Action and alternatives on the floodplain. This assessment can be found in Appendix A.

5.0 HEALTH EFFECTS

Direct effects to workers during construction of any of the action alternatives would be minimal and temporary. The use of heavy equipment could produce a temporary noise hazard. Any workers potentially exposed to noisy conditions would use hearing protection, as specified in DOE/NV 54XH.1 and 29 CFR 1920.52. There are no areas of radiological contamination in the areas of the Proposed Action or any of the alternatives.

6.0 TRANSPORTATION EFFECTS

The transportation impacts during the construction and operation of the Proposed Action and alternatives would be minimal. The operation of a new or reconstructed road would not result in an increased amount of traffic to the RWMS or an increased amount of waste being disposed of at the RWMS.

At this time it is anticipated that if the Proposed Action or Powerline Road alternative were implemented, the 5-01 Road would remain open to passenger cars. Construction of the Proposed Action or the Powerline Road alternative for truck use would reduce the amount of traffic on the 5-01 Road and would provide a more direct route for traffic accessing the RWMS from the northern portions of the NTS. The no action alternative would result in increased deterioration of the 5-01 Road and an increase in the potential for transportation-related accidents.

7.0 CUMULATIVE EFFECTS

LLW disposal is an ongoing operation at the RWMS. The construction of a new road or upgrading the 5-01 Road would not add to the hazardous, chemical, or curie count of the RWMS nor would it cause the amount of traffic to the RWMS to increase. The construction of a new road or reconstruction of an existing road would, however, cause a temporary increase in the amount of particulate matter entrained in the air and in the amount of diesel emissions in the area.

Disturbance of habitat is the main cumulative impact of the proposed project. The NTS covers a total area of 347,523 ha (858,729 ac). Presently, 23,668 ha (58,483 ac) are disturbed due to human activities. 7,899 ha (19,517 ac) are disturbed for roads. For Area 5 of the NTS the figures are: 28,520 ha (70,720 ac) total area, 2,166 ha (5,353 ac) total disturbance, and 662 ha (1,636 ac) roads (Donovan, 1996). The construction of the Proposed Action road would permanently destroy about 29 ha (72 ac) of habitat. This would represent a 0.12% increase in disturbance for the NTS and 1.35% increase for Area 5. The land disturbance identified for potential future activities at the NTS is not expected to add measurably to the loss of desert tortoise habitat and either the Proposed Action or the Powerline Road alternative would result in a very small increase in the level of land disturbance anticipated at the NTS. Land clearing for the reconstruction of the 5-01 Road was included in the analysis performed for both Alternatives 1 and 3 of the NTS EIS.

8.0 ACCIDENT ANALYSIS

The accidents that are most likely to occur are described below.

8.1 Accidents During Construction and Operation

During the construction of the new road, injuries could occur due to heavy equipment accidents. Building 650 in Area 23 houses a medical facility for treatment of minor injuries. For serious injuries, ambulances stationed at the medical facility can provide quick access to hospitals located in Las Vegas. Proper work practices and regular safety meetings would be used to minimize the chances of an accident occurring during construction of the new road.

In the event of an accident during operations, it is possible that LLW or hazardous waste being transported to the RWMS could be spilled. Any spill would be cleaned up in an expeditious manner in accordance with existing DOE procedures and applicable regulations. The probability of such an accident would be reduced by the construction of a new road or reconstruction of the 5-01 or Power Line Roads. The 5-01 Road in its present condition does not meet current AASHTO standards and poses an ever-increasing hazard to safe operations.

8.2 Natural Events

Natural events which could occur include flooding and earthquakes. These could result in structural damage to the Proposed Action and alternatives. The Proposed Action, Powerline Road Corridor alternative, and portions of the 5-01 Road reconstruction alternative are located within a delineated 100-year, 6-hour flood hazard zone. The flood hazard depth would be 0.3 m (1 ft) with velocities ranging from 1 to 2 m per second (3 to 6 ft per second). This hazard would be mitigated in the Proposed Action

and the two action alternatives through the construction of drainage devices. The drainage devices would be designed to convey the 25-year, 6-hour flood. The 100-year, 6-hour flood would be allowed to flow over the proposed roads.

The NTS is located in Seismic Zone 2B, an area with moderate damage potential. Based on current design practices for facilties at the NTS, it is doubtful that any anticipated seismic event would cause serious damage to a newly constructed or upgraded roadway. In addition, road construction is not a known cause of human-induced seismic events. Therefore, construction of a new road or upgrading an existing road would not be expected to cause a seismic event.

9.0 COMPLIANCE WITH REGULATIONS

9.1 State/Federal Clean Water Act (CWA) Regulations

CWA regulations do not apply to the proposed action or any of the alternatives since it would not impact any water sources.

9.2 Resource Conservation & Recovery Act (RCRA)

RCRA does not apply to the proposed action or any of the alternatives since no hazardous wastes would be generated.

9.3 State/Federal Clean Air Act

During construction of the proposed road, fugitive dust must be controlled in accordance with the Nevada Administrative Code (NAC) 445B.365: "No person may cause or permit the handling, transporting, or storing of any material in a manner which allows or may allow controllable particulate matter to become airborne." Particulate emissions generated during construction would be minimized through watering. Air permits may be required for material screening and handling equipment.

The NTS Class II Air Quality Operating Permit AP9711-0549 states that, "fugitive dust from all disturbed areas will be controlled at all times." Also, all unpaved haul roads and access roads would be watered, stabilized chemically, or controlled by another method approved by the Nevada Bureau of Air Quality. All surface disturbances greater than or equal to five acres must be reported annually to the Nevada Bureau of Air Quality.

9.4 Safe Drinking Water Act (SDWA)

The SDWA does not apply to the proposed action or any of the alternatives since all actions are surface actions and all drinking water on the NTS is groundwater.

10.0 PERSONS, GROUPS, AND AGENCIES CONSULTED

No outside people, groups, or agencies were consulted.

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12.0 DEFINITIONS

Alluvial Fan. A geomorphological feature characterized by a cone or fan shaped deposit of boulders, gravel, and fine sediments that have been eroded from mountain slopes, transported by flood flows and then deposited on the valley floor, and which is subject to flash flooding, high velocity flows, debris flows, erosion, sediment movement and deposition, and channel migration.

Alluvium. Clay, silt, sand, gravel, or similar detrital material deposited by flowing water.

Aquifer. A water bearing stratum or formation capable of transmitting water in quantities sufficient to permit development.

Ashfall and Ashflow. A deposit of volcanic ash.

Biomass. Total mass of living organisms per unit area or unit volume per unit time. (From Dictionary of Geological Terms).

Carbonate Sediment. Sediment composed of one or more members of the calcite, dolomite, and aragonite groups of minerals.

Curie. A unit of radioactivity equal to 3.7×10^{10} disintegrations per second.

Floodplain. Any land susceptible to being inundated by water from any source (i.e., flooding). Flooding means a general and temporary condition of partial or complete inundation of normally dry land areas from: (1) the overflow of inland or tidal waters; (2) the unusual and rapid accumulation or runoff of surface waters from any source; and (3) mudslides.

Flux. The net rate of transfer of fluid across a given surface.

Hydrogeology. A branch of geology concerned with the occurrence and utilization of surface and groundwater and with the functions of water in modifying the earth.

Hydrology. The study of water on the surface of the land, in the soil and underlying rocks, and in the atmosphere.

Low-level Waste. Radioactive waste not classified as high-level waste, transuranic waste, spent nuclear fuel, or byproduct material as defined in Section 11e(2) of the Atomic Energy Act.

Mixed Waste. Waste containing both radioactive and hazardous components, as defined by the Atomic Energy Act and the Resource Conservation and Recovery Act. (From NTS EIS).

Paleozoic Era. An era of geological history from 570 to 225 million years ago.

Quaternary Period. The second period of the Cenozoic era. The Quaternary period started two to three million years ago and runs till present.

Tertiary Period. The first period of the Cenozoic era. It began 65 million years ago and extended until two to three million years ago.

Transuranic Waste. Radioactive waste containing alpha-emitting radionuclides having an atomic number greater than 92 and half-lives greater than 20 years, in concentrations greater than 100 nanocuries (nCi) per gram. (From NTS EIS).

Tuff. A general term for all consolidated pyroclastic rocks.

Unconsolidated. A sediment that is loosely arranged or not stratified, or whose particles are not cemented.

Vadose Zone. The zone of aeration that extends from the ground surface to the water table. The vadose zone contains both the unsaturated zone and the capillary fringe above the water table.

Water Potential. The energy required to remove a unit mass of soil pore water from an unsaturated soil. The lower the water potential the easier it is to remove any soil pore water.

APPENDIX A

Floodplain Assessment

This floodplain assessment was prepared
in accordance with requirements of
10 CFR 1022 B(12).

1. Project Description

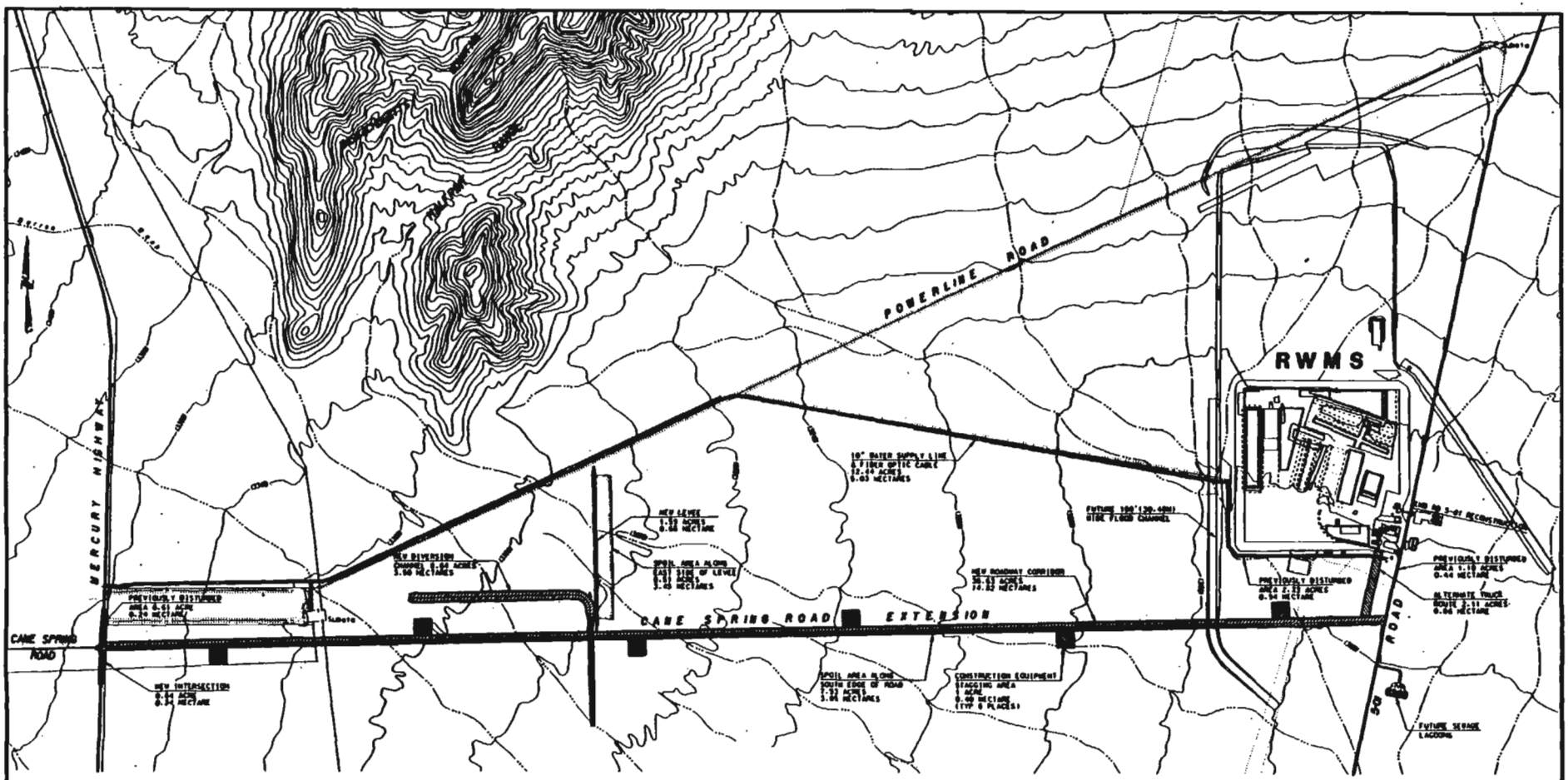
The proposed action will construct an extension of the Cane Spring Road east from Mercury Highway to 5-01 Road (Figure 1), across an undisturbed area of the Barren Wash alluvial fan. The extended road will meet current American Association of State Highway and Transportation Officials (AASHTO) structural specifications for semitrailers and heavy truck traffic. Preconstruction activities would include clearing vegetation during the initial grading and leveling operations along the road alignment. In addition, six (one every 0.81 km (0.5 mi)) 30.5 m x 30.5 m (100.0 ft x 100.0 ft) areas would be cleared for staging construction equipment and for turnaround areas.

The road would consist of two 3.7 m (12.0 ft) wide lanes with 2.4 m (8.0 ft) shoulders and side slopes built up using a balanced cut and fill method from channels excavated along the north side of the road alignment. Side slopes of the road would be 200:1 on the north side and 6:1 on the south side.

The proposed road design requires that a drainage control system consisting of two channel reaches be excavated along the north side of the road. The first channel reach would extend east for approximately 4.4 km (2.71 mi) from Mercury Highway to the existing RWMS flood control channel. This reach would be 9.1 m (30.0 ft) wide, 1.7 m (5.5 ft) deep, with 2:1 side slopes, running parallel to the road 6.1 m (20 ft) from the edge of pavement, and would be designed to carry flow from an approximately 10-year, 6-hour storm along the road alignment to the RWMS channel.

The second channel reach would extend east for approximately 0.7 km (0.4 mi) from near the east side of the RWMS flood control channel to the existing 5-01 Road. This reach would be 3.7 m (12.0 ft) wide, 1.2 m (4.0 ft) deep, with 2:1 side slopes, running parallel to the road 6.1 m (20 ft) from the edge of pavement, and would be designed to carry flow from an approximately 5-year, 6-hour storm to a culvert under the 5-01 road. This .91 m (3 ft) culvert would convey flow under the 5-01 Road, and daylight on the east side of the road in an existing swale.

The Cane Spring Road extension will traverse delineated 100-year (6-hour) flood hazard zones of Barren Wash alluvial fan (Figure 2). The flood hazard depth in all zones is 0.3 m (1 ft), with different zone velocities ranging from 1 to 2 mps (3.0 to 6.0 fps).



SITE PLAN

SCALE: 1" = 600'

CANE SPRING ROAD EXTENSION (ROAD 5-01 RECONFIGURATION)		
LAND USE DESCRIPTION	AREA OF NEW DISTURBED LAND	AREA OF PREVIOUSLY DISTURBED LAND RE-D FOR PROJECT
NEW INTERSECTION	0.84 ACRE 0.34 HECTARE	0.61 ACRE 0.24 HECTARE
NEW ROADWAY	36.63 ACRES 14.82 HECTARES	1.10 ACRES 0.44 HECTARE
NEW CHANNEL	8.64 ACRES 3.50 HECTARES	
NEW LEVEE	1.39 ACRES 0.56 HECTARE	
STAGGING AREAS	6.00 ACRES 2.40 HECTARES	
SPOIL AREAS	16.04 ACRES 6.50 HECTARES	
ALTERNATE TRUCK ROUTE	2.11 ACRES 0.86 HECTARE	
TOTAL	71.05 ACRES 29.07 HECTARE	1.71 ACRES 0.68 HECTARE

GRAPHIC SCALE

0 300 600 1200 1800 FEET

1" = 600'

U.S. DEPARTMENT OF ENERGY

NEVADA TEST SITE ——— AREA 5

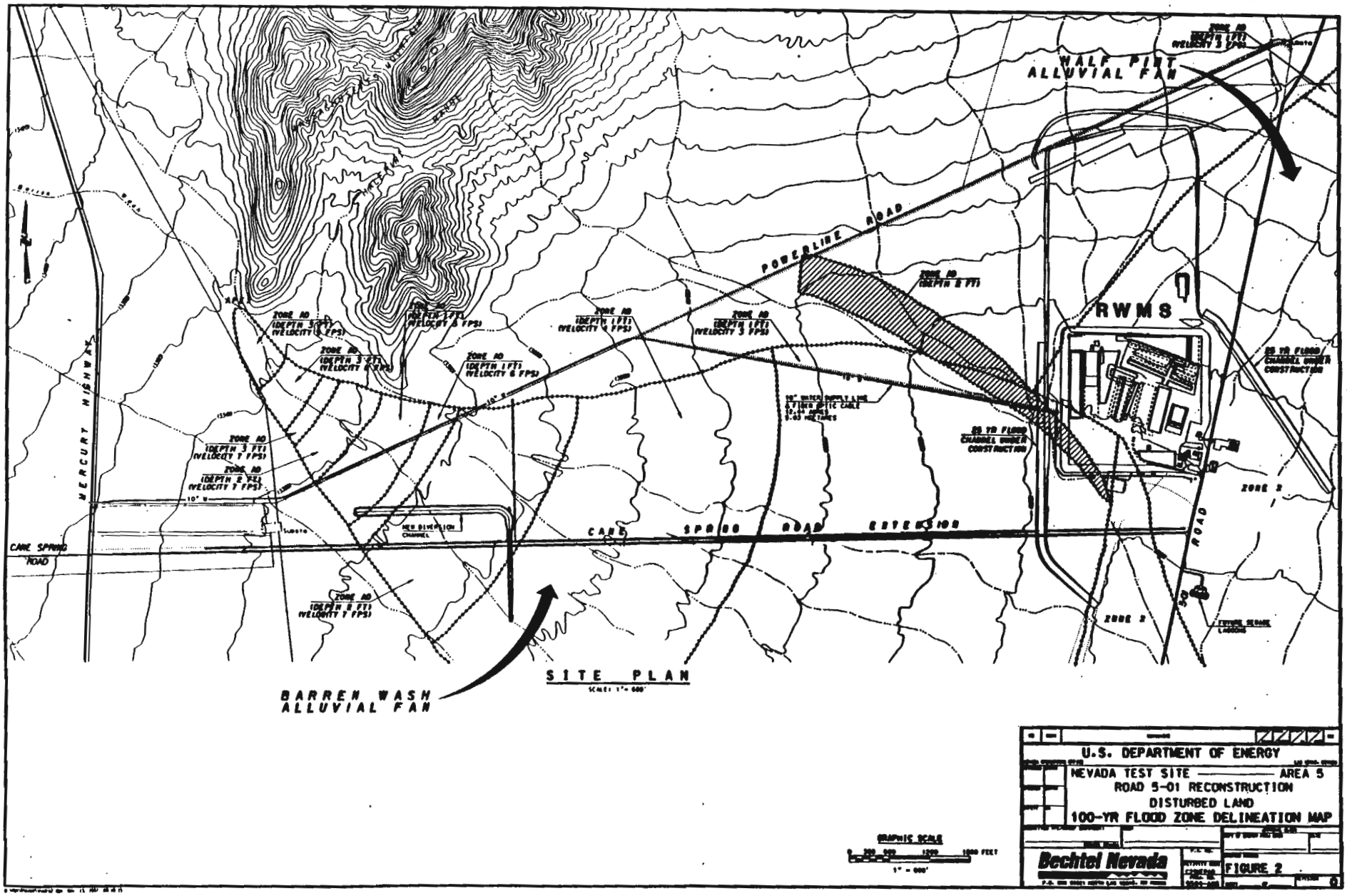
ROAD 5-01 RECONSTRUCTION

DISTURBED LAND

SITE PLAN

Bechtel Nevada

FIGURE 1



U.S. DEPARTMENT OF ENERGY

NEVADA TEST SITE — AREA 5

ROAD 5-01 RECONSTRUCTION

DISTURBED LAND

100-YR FLOOD ZONE DELINEATION MAP

Bechtel Nevada

FIGURE 2

2. Floodplain Effects

Expected changes in erosion, deposition, and overland flow patterns caused by the proposed action are not expected to significantly impact the Barren Wash alluvial fan floodplain. The NTS is a restricted area; there are no residences and private or public property located on or downstream of the Barren Wash alluvial fan. Risk to lives and property from flooding on the alluvial fan is limited to NTS workers and DOE property. Also, cultural resource values of the floodplain, such as natural beauty and open space, are not as restrictive to an action as they would be in a public area.

An expected long-term effect of the proposed road alignment and parallel flood control channel will be lower densities and biomass of the dominant perennial shrubs (*Larrea tridentiata and Ambrosia dumosa*) downstream on the floodplain. Shrub communities in the Mojave Desert have been shown to depend on soil moisture from overland runoff as well as precipitation. Field studies in similar Mojave Desert vegetation have shown lower shrub densities and biomass downslope of runoff diversion ditches (Schlesinger and Jones, 1984) and roads crossing bajadas (alluvial fans) (Johnson et al., 1975). However, expected changes in vegetation, erosion, deposition, and overland flow patterns are not expected to significantly impact wildlife habitat, including the desert tortoise, within Frenchman Flat [C. Wills, oral commun., 1996].

An elevated road grade and side slopes of the road and flood control channel may restrict or redirect the movements of certain species such as reptiles, small mammals, coyotes, and badgers. The project is not expected, however, to directly harm the threatened desert tortoise or to impact their movements. The proposed project area is in an area of poor tortoise habitat [C. Wills, oral commun., 1996]. No tortoises or their sign have been found in any of the biological surveys conducted within this area; therefore, the U.S. Fish and Wildlife Service (FWS) concurred with DOE/NV that tortoises are absent and not expected to occur within this area (FWS, 1996).

Table 1 lists the positive/negative, direct/indirect, and long-term/short-term floodplain effects of the proposed action.

Table 1. Floodplain effects of the proposed action.

IMPACTS / FLOODPLAIN EFFECTS	Positive	Negative	Direct	Indirect	Long-term	Short-term
Safer road design will decrease chance of an accident; therefore, decrease risk of a spill in floodplain.	x		x		x	
Water will be directed towards the RWMS.		x	x		x	
Surface water will not flow into another watershed. Drainage will continue to Frenchman Lake.	x		x		x	
Area of the Barren Wash alluvial fan will decrease as flow is redirected by the road alignment. This will result in the delineated flood hazard zones moving further downstream on the fan.		x	x		x	
Expected changes in vegetation, erosion, deposition, and overland flow patterns are not expected to significantly impact wildlife habitat	x			x	x	
An elevated road grade with steep side slopes may restrict or redirect the movements of certain species such as reptiles, small mammals, coyotes, and badgers		x	x		x	
The proposed project is not expected to directly harm the threatened desert tortoise or to impact their movements as no tortoises have been found in the area.	x		x		x	
The elevated road grade and parallel flood control channels will redirect and concentrate flow.		x	x		x	
Water quality will not significantly change.	x				x	

Table 1. Floodplain effects of the proposed action (continued).

IMPACTS / FLOODPLAIN EFFECTS	Positive	Negative	Direct	Indirect	Long-term	Short-term
Recharge to the aquifers will not be affected. (Recharge occurs along the mountain fronts, not on the alluvial fans in Area 5.)	x				x	
Flood storage on Barren Wash alluvial fan will probably decrease as the area of the fan available for flow is restricted.		x	x		x	
Construction activities will cause air and noise pollution and short-term disturbances to the ecosystem.		x	x			x
Cultural resource values (open space, scientific study, outdoor education, recreation, historic or cultural sites) will not change.	x				x	
Aesthetics of Frenchman Flat will not significantly change.	x				x	
Cultivated resources will not change as none exist.	x				x	

3. Alternatives

a. No Action

Under this alternative, use of the existing 5-01 Road will continue. The existing alignment does not traverse the Barren Wash alluvial fan, and therefore will not affect this floodplain. Natural drainages from other watersheds cross the southern end of the existing road at numerous dip crossings. The possibility of road closure or damage due to flash floods at these dip crossings will continue to exist. However, this alternative will not meet the need of DOE/NV for safe transport of waste to the RWMS, as the existing road does not meet AASHTO specifications.

b. Road 5-01 Reconstruction Alternative

This alternative will provide for the reconstruction of the existing alignment of the 5-01 Road. The existing alignment does not traverse the Barren Wash alluvial fan, and therefore will not affect this floodplain. The possibility of closure or damage due to flash floods may be minimized by the addition of drainage structures where natural drainages cross the southern end of the road.

During reconstruction of the 5-01 Road, a temporary detour will be constructed using the 5-07 Road. Part of this road traverses the delineated 100-year flood hazard zone of the Barren Wash alluvial fan, and therefore will affect that floodplain. Significant upgrades to the 5-07 Road may be required, including the addition of drainage structures.

c. Powerline Road Corridor Alternative

This alternative will utilize the existing gravel-surfaced Powerline Road corridor connecting Mercury Highway and 5-01 Road. This alignment traverses the delineated 100-year flood hazard zones of Barren Wash alluvial fan, and therefore will affect this floodplain.

Powerline Road intersects 5-01 Road just north of the RWMS. The existing road alignment interferes with the northern section of the 25-year, 24-hour flood control channel at the RWMS. Drainage structures may have to be added to the road alignment, and the alignment will have to be altered near the RWMS to avoid interference with the flood protection structures.