



**Environmental
Regulatory Compliance
Plan for Site Characterization**

**Yucca Mountain Site, Nevada Research
and Development Area, Nevada**

Revision 1

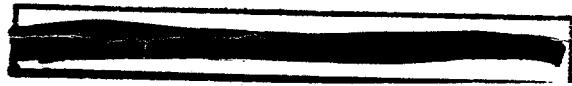
December 1988

**U.S. Department of Energy
Office of Civilian Radioactive Waste Management
Washington, DC 20585**

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ENVIRONMENTAL REGULATORY COMPLIANCE PLAN

FOR

SITE CHARACTERIZATION

REVISION 1

DECEMBER 1988

Yucca Mountain Project
Yucca Mountain Project Office
U.S. Department of Energy
Nevada Operations Office
Las Vegas, NV

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1.0 INTRODUCTION

1.1 HISTORY

The United States plans to begin operating the first repository for the permanent disposal of high-level radioactive waste early in the next century. The Nuclear Waste Policy Act of 1982, as amended by the Nuclear Waste Policy Amendments Act of 1987, (NWPA), specifies the process for siting and constructing, operating, closing, and decommissioning a repository.*

In February 1983, the U.S. Department of Energy (DOE) identified Yucca Mountain as one of nine potentially acceptable sites for a repository. All nine potentially acceptable sites, were evaluated in accordance with the DOE's General Guidelines for the Recommendation of Sites for Nuclear Waste Repositories (10 CFR Part 960). These evaluations were reported in nine draft Environmental Assessments (EAs), prepared pursuant to Section 112 of the Nuclear Waste Policy Act of 1982. The draft EAs were issued for public review and comment in December 1984. Of the nine sites evaluated, five were nominated for further study. Final EAs for the five nominated sites were published in May 1986 (U.S. DOE, 1986a, b, c, d, and e). On the basis of these five evaluations, the DOE recommended three sites, including Yucca Mountain, for site characterization.

On May 28, 1986, the President approved three sites for site characterization: the Yucca Mountain site, Nevada; the Hanford site, Washington; and the Deaf Smith County site, Texas.

On December 21, 1987, Congress passed the Nuclear Waste Policy Amendments Act of 1987. This legislation authorized the DOE to characterize only

*A list of acronyms is included at the end of the document.

the Yucca Mountain site as a candidate site for development of the first nuclear waste repository. During characterization of the Yucca Mountain site, the DOE will construct a deep exploratory shaft for underground testing to determine whether geologic and hydrologic conditions at the site will provide the necessary isolation of the wastes from the environment.

Section 113(b)(3) of NWPA requires the DOE to prepare a Site Characterization Plan (SCP) prior to construction of the Exploratory Shaft. The SCP will be reviewed by the Nuclear Regulatory Commission, the State of Nevada, and the public. The DOE will issue semiannual progress reports on site characterization after issuance of the SCP, as required by Section 113(b) of the NWPA.

1.2 PURPOSE

The DOE is committed to conduct its operations in an environmentally safe and sound manner, and will comply with applicable environmental statutes and regulations. These objectives are described in DOE Order 5400.1 (Environmental Protection Program Requirements).¹ This document - the Environmental Regulatory Compliance Plan (ERCP) - is one method of implementing the policy set forth in DOE Order 5400.1 and the NWPA. The ERCP describes the plan by which the DOE will comply with applicable Federal environmental statutes and regulations. The ERCP also discusses how DOE will address State and local environmental statutes and regulations.

In addition to the ERCP, other environmental activities have been, or will be, undertaken to implement DOE Order 5400.1 and the NWPA, including:

- (1) The Environmental and Socioeconomic Monitoring and Mitigation Plans that address potentially significant adverse impacts that may be

¹Applicable DOE Orders are described in Section 3.5 and are cited in "References," Chapter 6.

caused by site characterization, and describe plans to monitor these potential impacts and minimize their effects to the maximum extent practicable;

- (2) Preparation of an Environmental Impact Statement (EIS) and an EIS Implementation Plan in accordance with the National Environmental Policy Act (NEPA) and Section 114(f) of the NWPA;
- (3) Development of information identified in DOE's General Guidelines for the Recommendation of Sites for the Nuclear Waste Repositories (10 CFR Part 960);

1.3 SCOPE

The ERCP contains the following information:

1. An identification and description of Federal environmental laws and regulations, Executive Orders, and DOE Orders which may be applicable the characterization of the Yucca Mountain site;
2. An identification and description of State and local environmental laws and regulations for which Federal law mandates compliance;
3. A list of other related State and local laws;
4. A description of field activities planned for site characterization that may trigger applicable Federal, State, and local laws, and regulations and references;
5. Federal, State, and local agencies that have responsibilities for assuring compliance with the above;
6. Description of the processes for complying with all applicable Federal environmental laws, regulations, and Executive Orders;

7. Description of the process for addressing the concerns evidenced by related State and local statutes and regulations to the extent practicable, but not inconsistent with DOE's responsibilities under the NWPA or other federal laws;
8. Description of a computer-based permit tracking system;
9. Identification of the organizations within the DOE that are responsible for obtaining permits/approvals in a timely manner; and
10. Description of the procedures by which the DOE will monitor changes to existing laws, regulations, DOE Orders, and Executive Orders, and procedures to monitor new laws, regulations, DOE Orders, and Executive Orders that may affect the conduct of site characterization at the Yucca Mountain site.

The process of land access is not discussed in the ERCP. However, the ERCP will address the environmental compliance requirements associated with the land access process.

1.4 REVISIONS OF ERCP

In the event that there are changes in site characterization plans and changes in applicable Federal, State, or local laws and regulations, the ERCP will be revised to reflect these changes. Moreover, the ERCP will be revised, as appropriate, to reflect comments on site-specific study plans. The procedures for making these revisions are discussed in Section 4.4.

2. SITE CHARACTERIZATION PROGRAM SUMMARY

This chapter describes the activities that are planned at and near Yucca Mountain during site characterization. The Yucca Mountain area is shown in Figure 2-1. The information presented is derived from two sources:

(1) Chapter 4 of the Final Environmental Assessment (EA) for Yucca Mountain (DOE, 1986) and (2) the Statutory Draft of the Site Characterization Plan (SCP) for Yucca Mountain. The detail presented in this chapter is greater than that presented in the EA. Nevertheless, the reader should keep in mind that some of the information presented here, such as the proposed location and number of drillholes, may change as planning for project development continues, and especially as data from site characterization investigations become available.

Site characterization activities will consist of ongoing and additional proposed studies. The existing and proposed components (e.g., drillholes, trenches, and infiltration sites) of the site characterization program are listed with location coordinates in Appendix A of this document. Additionally, Maps 1-4 are located at the back of this report and depict predisturbance conditions (Map 1), existing activities and disturbed areas (Map 2), activities proposed for site characterization (Map 3), and an expanded view of the Exploratory Shaft Facility (ESF) site (Map 4). The majority of site characterization activities described in this chapter can be located on these maps. The SCP includes several references to the possibility that far-field testing eventually might be needed in adjoining States should such testing be indicated by the results of the planned site characterization studies. No such testing, however, is planned at this time.

The Yucca Mountain Project SCP contains a summary of schedule information for site characterization. Specific durations and start/finish dates are being developed as part of ongoing planning efforts. The schedule for activities at the ESF is reported in this chapter only in terms of duration (number of months to complete a particular activity) and is not tied to a specific date.

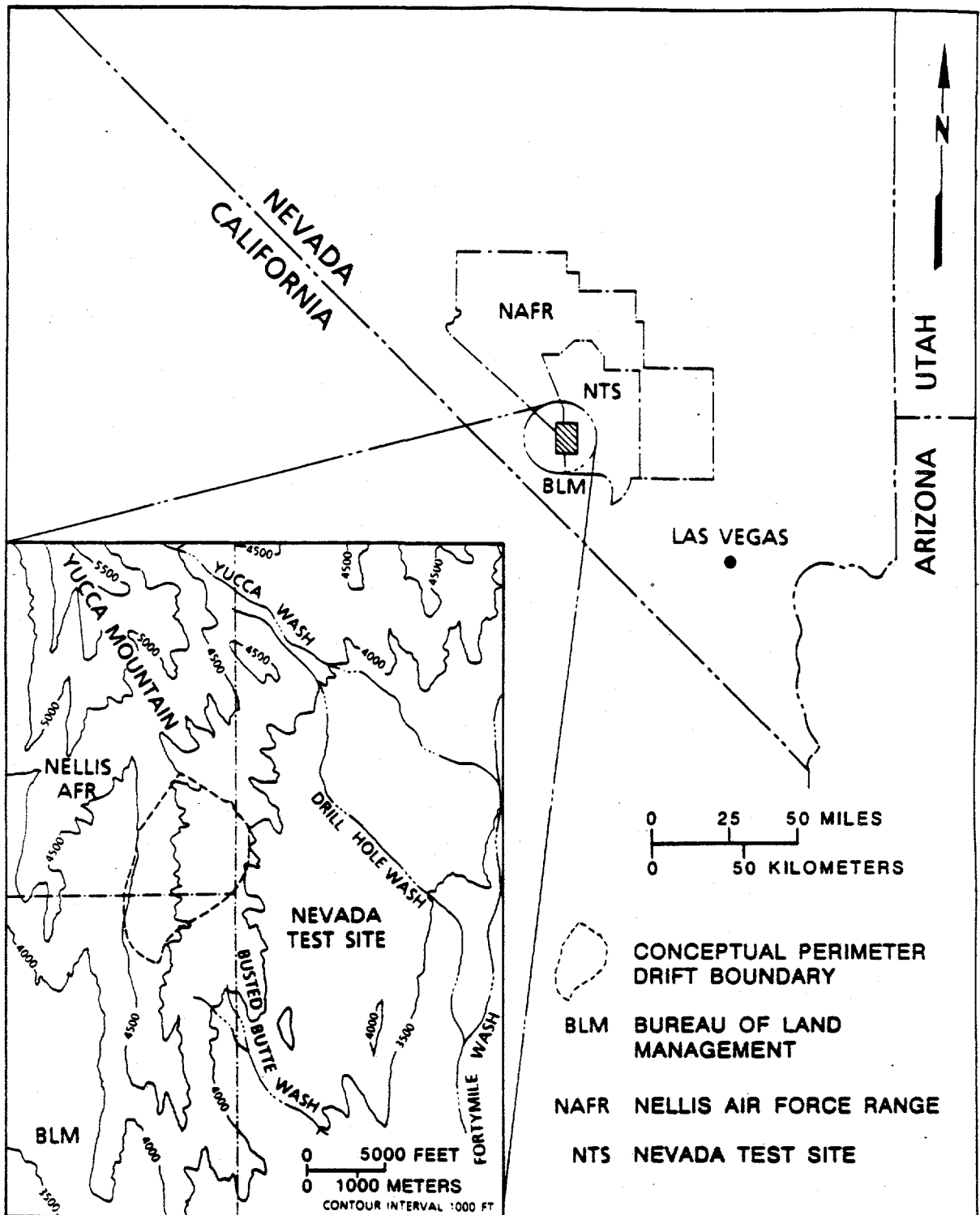


Figure 2-1 Location of the Yucca Mountain Site

Finally, whenever a particular activity, group of activities, or location of an activity is believed to trigger an environmental compliance action on the part of the DOE, the statute or regulation is listed in the text and the reader is referred to the appropriate section in Chapter 3 for details.

[Note: Measurements, such as hole depths and pumping rates, are presented in this chapter in both metric and english units. These measurements are only approximate measurements and, as such, conversions from one system to the other were rounded off and are not exact].

2.1 FIELD ACTIVITIES

Field activities include all surface-based site characterization activities needed to evaluate the suitability of the Yucca Mountain site for the location of a repository. This section includes information on site preparation; access road construction and borrow pit excavation; exploratory drilling and testing; transportation, storage, and disposal of solid waste; geophysical surveys; and geological mapping. Most of the activities will take place within a Right-of-Way reservation granted to the DOE from the Bureau of Land Management (see Section 3.2.7 for details).

In addition to the proposed field activities, several types of data-gathering activities were conducted as part of studies initiated prior to the start of site characterization. These ongoing activities were necessary to get an early start on data gathering when the NNWSI Project (now the Yucca Mountain Project) began to focus on tuff at Yucca Mountain as a potential repository host rock. Monitoring equipment for these ongoing studies has already been installed at and near Yucca Mountain, and this equipment will be used during site characterization. The ongoing studies consist primarily of field observations and monitoring. The activities consist of (1) monitoring the hydrologic processes of the unsaturated zone, (2) monitoring the potentiometric (water table) level, (3) monitoring natural infiltration rates in the surficial units of the unsaturated zone, (4) streamflow monitoring,

(5) debris flow monitoring, (6) monitoring erosion on hillslopes and in selected stream channels, (7) regional hydrologic studies, (8) ground-water recharge analog studies, (9) seismic monitoring, (10) biennial geodetic surveys, (11) soil and dust-trap sampling for studying paleoenvironments, (12) sampling and mapping trenches and pits for tectonic and paleoclimatic studies, (13) geologic and geomorphic mapping, (14) meteorological and precipitation monitoring, (15) surface outcrop sampling for geologic, geomechanical, and geochemical tests, and (16) geophysical surveys.

Based on current plans, it is estimated that site characterization activities may disturb approximately 180 ha (440 acres). The extent of this disturbance will vary from minor disturbances associated with off-road use and deployment of monitoring instruments, to major disturbance, such as cut-and-fill construction associated with the ESF. Approximately 18 ha (45 acres) of the estimated total disturbance would be associated with construction of the ESF, which is discussed in Section 2.2. Actions required as part of, or in support of, surface-based investigations account for the rest of the proposed disturbance. [The major difference in the amount of land projected to be disturbed during site characterization here (180 ha), and that estimated in the EA (285 ha), is that the number and approximate locations of proposed field activities are better known now than at the time the EA was published].

The field studies described in this section include some standard operating practices (good engineering and environmental practice) and reclamation guidelines that will be implemented to reduce the possibility of adverse environmental impacts from the studies. These practices and guidelines include the following:

1. Stockpiling topsoil that is removed during site preparation for the ESF and at selected field sites. Where appropriate, topsoil stockpiles will be protected with a mulch or vegetative cover. Depending on the results of reclamation studies, the topsoil will be available for reclamation of these sites.

2. Engineering the slope angles on the sides of the muck-storage pile, and at other sites where rock debris and mud will be piled, to control slope erosion and encourage stability.
3. Trenches, shafts, and boreholes will be marked, fenced, or otherwise protected so as not to constitute a hazard to the public or to wildlife.
4. Reducing dust by spraying disturbed areas with water or other dust-binding fluids.

The standard operating practices will minimize the potential impacts of site characterization activities. Additionally, plans for site reclamation and habitat restoration for the affected area are now being developed.

2.1.1 Site Preparation

Site preparation will be required for many of the surface-based site characterization activities. Site preparation is generally defined here as construction-type activities that involve the disruption, removal, and/or relocation of vegetation and surficial materials. This includes cut-and-fill, grading, and excavation operations. Site characterization activities requiring site preparation include construction of the ESF area (discussed in Section 2.2), drill-pad construction, excavation of trenches and pits, and preparation of bedrock pavement study areas. Construction of access roads will also be discussed because they are needed to support site characterization activities. Because site preparation will disturb more than 8 ha (20 acres) per year, an air quality Registration Certificate and an Operating Permit is required from the Nevada Division of Environmental Protection (see Section 3.3.1 for details).

Many surface-based investigations will not require site preparation and will result in minimal or no disturbance. These investigations include meteorological monitoring, radiological monitoring, geodesy, seismic monitoring, shallow-penetrating geophysical surveys, evapotranspiration studies,

geologic and surficial deposits mapping, erosion monitoring, precipitation and streamflow monitoring, and unsaturated-zone infiltration monitoring. The types of field activities that are necessary to support these investigations involve:

1. Installation of passive monitoring equipment on the surface or on towers.
2. Installation of survey monuments, small edifices, etc.
3. Use of portable geophysical seismic sources and recorders.
4. Deployment of ground motion detectors or other geophysical instruments.
5. Infrequent off-road vehicular travel.
6. Use of an all-terrain truck-mounted drill rig to drill shallow [<60 m (220 ft)] boreholes.

The amount of disturbance associated with these activities (even though considered minor) has been estimated and is included in the total estimated amount of disturbance.

The following subsections describe the general categories of field activities that will involve some level of site preparation. Section 2.1.2 discusses access road construction. The applications of the major activities are presented in Sections 2.1.3, 2.1.5, and 2.1.6.

Drilling. The Yucca Mountain Project has developed a proposed comprehensive drilling program that includes conditionally planned drilling methods and boreholes, which may require some modifications presented herein. Since the drilling of some boreholes is dependent on the results of other investigations, a range for the planned number of holes is presented rather than an absolute number. Conditionally planned drilling activities are discussed in more detail in Section 2.1.3.

In terms of surface impacts, the drilling of boreholes can be separated into two broad groups based on drill depth and core requirements. Shallow boreholes, typically less than 60 m (220 ft) in depth, can be drilled using an all-terrain, rubber-wheeled truck-mounted drill rig; the drill sites will not require any surface preparation. Shallow holes include unsaturated-zone neutron access holes associated with the natural and artificial infiltration investigations, and the seismic shotholes associated with the deep (regional) seismic refraction and reflection surveys. Deeper boreholes, and holes that involve conventional and wireline coring techniques with drilling fluids for circulation, require construction of a drill pad.

Present plans include drilling 53 to 59 deep boreholes that require construction of drill pads. This range of holes includes the possible need to drill four additional saturated-zone holes (tentatively designated the "southern tracer complex") that are dependent on results of investigations conducted at the existing UE-25 c-hole complex; an additional vertical calcite-silica corehole (designated as UE-25 PH#1b) that is dependent on the results of five shallower slant coreholes, and the possibility that one of the two unsaturated-zone prototype boreholes may not serve a dual purpose (thereby requiring an additional hole). This estimate does not include the possibility that additional boreholes may be required later on, depending on the results of planned investigations, as part of the systematic drilling and in situ stress investigation plans. Additional drilling for these programs is not expected at this time, and is not included in the integrated drilling program. Four existing unsaturated zone boreholes will be reentered and deepened. They are not included in this total because they are existing holes.

Site preparation required for drill-pad construction involves providing an area that is level and cleared of vegetation. The extent of surface disturbance is dependent on the site location and type of drilling, or drill rig used. Disturbance will vary from (1) simply clearing vegetation and grading the surface area level that is needed for drilling and support equipment, to (2) cut-and-fill construction on hill slopes to provide a level surface. Pre-disturbance archaeological and biological surveys will be conducted as explained in Section 3.2.11 (the National Historic Preservation

Act) and in Section 3.2.5 (the Endangered Species Act). Also, an air quality permit for surface disturbance will be obtained as explained in Section 3.3.1 (the Clean Air Act). If drilling fluids are used, a mud pit will be excavated as part of the drill pad, and lined with bentonite (or similar low permeability earthen-type material) (see Section 3.4.3 for the potential regulatory requirements that are associated with this activity). A parking and equipment storage area will also be needed as part of the drill pad. The approximate area of surface disturbance associated with drill-pad site preparation is estimated at 1 ha (2.5 acres). If fill dirt is needed to provide a leveled site, it will be excavated from an area adjacent to the drill site, thereby becoming part of the drill pad. A total of approximately 48 ha (120 acres) of disturbance is anticipated for construction of drill pads. This figure considers that several boreholes will be drilled from the same drill pad. This would include the three UE-25 UZ#9-complex holes and UE-25 VSP#1 hole, USW UZ-2 and UZ-3, USW UZ-11 and UZ-12, and the two unsaturated-zone prototype boreholes. Also, the area affected by site preparation for the two multipurpose boreholes is within the pad areas of the exploratory shafts, and is therefore considered part of the disturbed area associated with ESF construction.

Little if any surface preparation will be required for shallow holes drilled with the truck-mounted drill rig. Approximately 266 neutron access holes are proposed. These holes are needed to allow monitoring of infiltration and percolation rates in the surficial materials of the unsaturated zone with a neutron moisture meter. The objective is to monitor infiltration of the existing surficial conditions (i.e., undisturbed vegetation and soils) under natural and artificial precipitation rates. However, minor disturbances will occur as a result of accessing the site of the hole. Approximately 2 ha (5 acres) will be disturbed in drilling these holes. The amount of disturbance is small compared to the large number of holes because (1) several holes will be located in a small area (e.g., 10 holes per large plot rainfall simulation site, which covers an area of approximately 37 m² (440 ft²)) and (2) the holes will be located no more than 60 m (220 ft) from the nearest existing or proposed road (a compressor, with a 60-m (220-ft) hose, is needed for drilling and will be parked along the nearest road).

In addition to the neutron access holes, seismic shotholes associated with the proposed deep (or regional) seismic refraction survey (Section 2.1.5), will be drilled. These holes will not require site preparation and will range in depth from 15 to 60 m (50 to 100 ft). They will be loaded with explosive charges to serve as the seismic source for the surveys. Prior to detonation, the holes are backfilled with gravel and/or drill cuttings in a manner that reduces the possibility of cratering. Based on the spacing specifications, summarized in Section 2.1.5, 21 to 52 such holes could be drilled. These holes will be located along existing roads as much as possible. Disturbance resulting from this drilling is included in that estimated for seismic surveys.

Trenching. Excavation of trenches with bulldozers or backhoes will be needed for tectonic studies of faults and fault zones and for paleohydrology studies (Section 2.1.6). The size and depth of trenches will vary depending on the feature being investigated. Excavated material will be stockpiled adjacent to the trench and will be backfilled into the trench following the completion of investigations. In addition to the planned trenches, smaller soil pits may be needed to support surficial deposits mapping activities. The amount of disturbance associated with trenching has been estimated to be approximately 6 ha (15 acres).

Infiltration Studies. A minimum amount of site preparation will be required as part of the artificial infiltration ponding studies. Approximately 50 of the unsaturated zone neutron access holes, used originally for monitoring natural infiltration, will serve the dual purpose of monitoring moisture influx under saturated conditions. This artificial infiltration investigation is referred to in Section 2.1.2 as the ponding studies. Site preparation will involve constructing a low berm of impervious material around one or two neutron access holes, enclosing approximately 10 m² (100 ft²). A dye tracer will be mixed with the ponded water to allow percolation pathways to be mapped (regulatory requirements, if any, will be determined through consultations with the State). Again, the objective is to determine flow paths of the surficial materials under natural, or nondisturbed, conditions. Therefore, disturbance associated with site preparation (berm construction) will be minimized. The rock mass beneath some highly fractured

locations will be excavated to a depth of as much as 7.5 m (25 ft) following ponding, and flow patterns mapped. Up to six such excavations are possible. This disturbance is included in that estimated for trenching.

Bedrock Pavements. The term "pavement" refers to a bedrock surface that has little or no regolith covering. Pavements are uneven natural surfaces and are commonly located on slopes. Surface fracture network studies involve the mapping and measurement of fracture patterns in bedrock. Planned pavement studies will be undertaken only where bedrock is relatively close to the surface. In some instances, clearing of thin layers of surficial material may be required to expose a sufficient amount of bedrock (up to 800 m² of cleared area is needed per pavement, depending on the geologic aspects of each pavement location). Where necessary, bedrock will be cleared by spraying the area with compressed air and water. Displaced surface material will collect adjacent to the cleared area. At least two additional bedrock pavement areas will be selected for surface fracture network investigations. Because only areas where bedrock is already fairly well-exposed will be selected for study, total disturbance associated with site preparation for these investigations is expected to amount to less than an acre.

2.1.2 Access Road Construction and Borrow Pit Excavation

Two types of access roads exist at or near the site, exclusive of the paved access road and other roads (e.g., haul roads) associated with the ESF: bladed, unimproved dirt or graveled roads, and one-lane dirt tracks or trails. Bladed roads generally are required where the amount of vehicular traffic is significant or where heavy vehicles and equipment must have access, such as the majority of the drill sites. The decision to add road base and/or gravel to the road surface is dependent on the amount of traffic and length of time the road will be used. Primary access roads that will receive daily use will typically be graveled. Shorter roads that connect field sites to the primary access roads will normally not be graveled.

The unimproved road surfaces will average about 7 m (23 ft) in width. However, since drainage ditches, berms, and cut-and-fill slopes are typically

associated with construction of these roads, the average width of right-of-way disturbance has been estimated to be approximately 15 m (50 ft). Total disturbance associated with construction of unimproved roads has been estimated at approximately 46 ha (115 acres). These roads will be constructed and maintained in such a manner that runoff from precipitation will be prevented, to the extent practicable, from ponding or running down the road surface. Cross culverts and water bars will be installed as necessary to control runoff. Road dips, or culverts, will be installed where roads cross natural drainages to minimize potential impacts to natural runoff patterns.

One-lane dirt tracks or trails will be required to access infrequently visited, or short-term, field sites such as trenches, streamflow monitoring stations, bedrock pavement sites, etc. These trails will be bladed or simply consist of vehicle tracks. The need to blade a track to provide access to a field site will be dependent on the terrain. An average disturbance width of 4.5 m (15 ft) is associated with these roads. Total disturbance associated with these roads has been estimated at approximately 4 ha (10 acres).

With the exception of the borrow area associated with construction of the ESF, excavation of borrow areas for site characterization field activities at, or in the vicinity of, Yucca Mountain is not anticipated at this time. Any road base, gravel, or fill material that may be required for site preparation will be transported to the site from aggregate areas located on the Nevada Test Site (NTS). Such aggregate areas on the NTS are operated by contractors for NTS activities and are independent of Yucca Mountain Project activities. If borrow areas are needed, a Free-Use Permit may be required of the DOE if the government is to supply these materials to the contractor (see Section 3.2.9 for details).

2.1.3 Exploratory Drilling and Testing

Equipment that may be used at each deep drill site includes a diesel-powered drill rig, pumps for circulating drilling fluid, drilling and coring tools, and an air compressor. Tentative plans call for solid waste generated

at drill sites to be hauled to and disposed of at a landfill on the NTS. Water to be used for drilling, dust suppression and compaction, and human consumption will be trucked daily to each site. When drilling fluids are used for circulation during drilling operations, fluids and cuttings, such as air-foam circulation, polymer drilling muds, and bentonite, will be discharged into mud pits. Where possible and necessary, drillholes will be drilled without fluids to minimize the potential of introducing additional liquids to the unsaturated zone. Hazardous wastes, if any, will be stored temporarily at each drill site, then transported to a RCRA-permitted facility (see Section 3.3.3).

Each deep drillhole will be logged to evaluate the hole conditions during drilling operations. Data logs will be acquired using special, recoverable instruments that are lowered into the hole on a wireline cable. In some cases, radioactive sources emitting alpha or gamma radiation are fixed in the instrument. These radioactive sources include cesium-137, americium-241, and beryllium. In other cases, conservative chemical tracers and organic dyes may be used. Regulatory requirements associated with these substances are discussed in Section 3.3.4a.

The exploratory drilling and testing program will include (1) unsaturated zone drilling and testing, (2) water table monitoring and saturated zone testing, (3) water infiltration and recharge studies, (4) in situ stress testing, (5) geological boreholes and geophysical studies, and (6) paleo-investigations. The locations of most of these proposed boreholes and studies are shown on Map 3. At many of these sites, such as the infiltration monitoring sites, numerous holes may be drilled as is explained in the following subsections. This accounts for the difference in the number of sites shown on Map 3 and the total number of drillholes discussed in Section 2.1.1.

Unsaturated zone drilling and testing. Drilling in the unsaturated zone will consist of the following vertical borehole drilling programs: the unsaturated zone drilling program, the multipurpose borehole activity, and the systematic drilling program. In addition to the vertical drilling programs, a horizontal borehole is planned that will consist of drilling

laterally into the Topopah Spring welded unit of the unsaturated zone. The location of the hole has been tentatively identified as approximately 600 m (2,000 ft) north-northwest of the repository Conceptual Perimeter Drift Boundary (CPDB) where the Solitario Canyon scarp is exposed.

Unconventional dry-drilling methods are required to meet the goals and objectives of drilling in the unsaturated zone. A drilling method is needed that will reach depths of up to 550 m (1,800 ft), using only air as the circulation medium, and will obtain core that is representative of the formation's in situ moisture condition. At least two candidate schemes are under consideration for this planned dry drilling to water table depths: (1) dual-tube reverse circulation (DTRC) rotary or down-the-hole hammer technology, and (2) a telescoping ODEX concept similar to that used to drill the existing shallow UZ holes, with the provision for stepdown tool sizes to attain required depths. Feasibility testing of the DTRC rotary method is currently planned for two holes with different diameters, a 17.8-cm (7-inch) hole and a 30.5-cm (12-inch) hole. The location of these holes is presently planned at the location of the UZ#9 complex and vertical seismic profile (VSP) hole. If this location is indeed used, present plans include using one of the feasibility holes as the VSP hole. If this location is not used for feasibility testing (for reasons which include the close proximity of the location to the CPDB), it may be possible to select the location of a proposed hole which is part of another drilling program (such as USW WT-24, located north of the CPDB). One of the two feasibility holes could then be used for testing originally planned for that location.

The unsaturated zone drilling program involves dry drilling and coring of 19 vertical boreholes, within and in the immediate vicinity of the CPDB. Seven of these boreholes are existing and have been at least partially drilled. This includes a series of holes originally designed to penetrate the unsaturated zone above the conceptual repository horizon, and several deeper holes that penetrate the repository horizon. Site characterization plans call for reentering and deepening of UE-25 UZ#4, UE-25 UZ#5, USW UZ-7, USW UZ-8, AND USW UZ-13 to the water table.

The balance of the unsaturated zone drilling program consists of drilling 10 additional boreholes to depths just above the water table. Borehole USW UZ-10 will be located near existing holes USW UZ-13 and USW G-3. USW UZ-2 and -3 will be located together near the existing holes USW UZ-6 and -6s on Yucca Crest. The UE-25 UZ#9-complex (9, 9a, and 9b) will be drilled in a closely-spaced pattern on the eastern flank of Yucca Mountain, just outside the CPDB. A fourth hole will be drilled at the same location as the UZ#9-complex, with the purpose of providing a VSP investigation hole. This VSP hole is included in the site vertical borehole investigations, even though it is not necessarily an unsaturated zone investigation hole. USW UZ-14 will be drilled north of the CPDB, near existing hole USW UZ-1. Holes USW UZ-11 and -12 will be located together at the base of the Solitario Canyon fault scarp.

The objective of this activity is to provide detailed information on flux, permeability, and hydraulic gradient in the unsaturated zone. Drilling and coring needs to be performed dry so that contamination of samples and disturbance to the in situ hydrologic conditions are avoided, or minimized to the extent practicable. Existing hole USW UZ-1 has been fully instrumented to monitor the hydrologic properties and moisture conditions of the unsaturated zone. The existing UZ holes that will not be deepened will also be instrumented to monitor the hydrologic process of the unsaturated zone. Following the completion of drilling, logging, and pressure testing, the proposed and deepened existing holes will be instrumented in a similar manner for long-term monitoring of the hydrologic process of the unsaturated zone. This monitoring will involve the use of a proposed automated Integration Data Acquisition System (IDAS) that will record and transmit data. The IDAS will require installation of instrument shelters at each drill site. It will also require periodic visits for various reasons, including operation of a diesel generator that will supply power in the absence of power lines to each site.

Two vertical boreholes will be drilled near the location of each exploratory shaft. These boreholes are designated as multipurpose boreholes and will be drilled to detect and characterize possible perched water, characterize in situ hydrologic conditions, and obtain samples for analysis

before constructing the shafts. These holes will be drilled in the same manner as the unsaturated zone boreholes.

The systematic drilling program consists of drilling 12 boreholes within the CPDB or in its immediate vicinity to collect samples and data on lithostratigraphy, basic physical properties, fracture characteristics, mineralogy, in situ moisture conditions, and other characteristics of the unsaturated zone. The systematic drilling program is also an important source of samples for geomechanical, geochemical, and geophysical studies. Each borehole will be drilled to approximately 60 m (200 ft) below the water table. These holes will be drilled dry using the same drilling method as will be used for drilling the UZ holes. The location of these 12 boreholes will be determined using several criteria, including location of other holes, configuration and areal coverage of the CPDB, and accommodation of basic geostatistical principles.

Water table monitoring and saturated zone testing. A network consisting of 25 existing geologic, hydrologic, and water table boreholes is being monitored to provide data on the potentiometric surface of the tuffaceous aquifer beneath the Yucca Mountain site and to measure water-level variations over time. In addition to providing water-level data, the holes will be used to collect water samples from the upper part of the saturated zone for hydrochemical analysis. Because these holes were drilled with drilling fluids, which may potentially impact the analysis of samples taken from ground water in and surrounding the holes, it will be necessary to first purge the holes of any potentially affected water in order to obtain a representative sample. This will require the removal of any tubing and the installation of a downhole pump for pumping. The pump will have a lift capacity of approximately 60 liters (15 gallons) per minute. Each hole will be pumped for up to a week, or until water composition stabilizes. As pumping proceeds, repeated analysis of water samples will be performed to ascertain whether stable conditions have been achieved.

Water pumped from these holes, as well as water pumped from other holes associated with the different saturated zone investigations, will be discharged into surface drainages only if it is first determined that such

discharge will not impact other hydrologic investigations, such as natural infiltration studies or site performance, and if such discharges are allowed under the Clean Water Act (see Section 3.3.2). If it is deemed necessary, discharged water will be piped or trucked away from a particular site. If feasible, water that is to be discharged as a result of saturated zone investigations will be pumped into trucks and used for other Project purposes, such as dust suppression on roads. Water appropriation permits for these pump tests, as well as all other pump tests, are not expected to be required (see Section 3.4.2 for details).

Eight additional water table boreholes are planned for the exploration and sampling of the water table. Also, an additional saturated zone borehole (USW H-7) is planned just outside the CPDB to address multiple objectives. Water sampling and analysis similar to that described above will also be conducted at these holes. Six of the eight proposed water table holes will be added to the site potentiometric monitoring network. These consist of USW WT-8 and -9, located west of Yucca Mountain along the Solitario Canyon fault; USW WT-23 and UE-25 WT#24, located north of the CPDB; and UE-25 WT#19 and 20, located south and east of Yucca Mountain. The other two water table holes, USW WT-21 and 22, will be located in Crater Flat and will be monitored in connection with the regional site potentiometric monitoring program. The drilling methods of these holes will be a combination of the dry methodology used to drill the UZ holes and conventional rotary drilling using air foam as the circulation medium. Water table boreholes WT-8 and -9 and USW H-7 will be drilled dry (at least through the unsaturated zone) because core samples obtained from these holes will contribute data to the systematic drilling program. The remaining water table holes will be drilled using conventional methods.

Borehole USW H-7 will be drilled approximately 900 m (3,000 ft) east of, and on the opposite side of, the Solitario Canyon fault from existing hole USW H-6. Pump tests will be conducted in these holes to investigate the hydrologic properties of the Solitario Canyon fault zone. For flow testing, a pump with a lift capacity of approximately 1,900 liters (500 gallons) per minute will be installed successively in each of these holes. Thus, each borehole will serve as a pumping and observation well. Pumping will continue

for approximately 30 days. It is anticipated that a temporary pipeline will need to be installed to divert discharge away from the sites and away from other hydrologic study areas (see Section 3.4.2 concerning regulatory requirements associated with pump tests).

A series of single-well and multiple-well pumping tests will be conducted in the existing UE-25 c-hole complex (c#1, c#2, and c#3). These tests will involve the use of both conservative and reactive tracers. Candidate tracers will first be tested in the lab to determine which tracers and what concentrations will best meet the objectives of the tests. Candidate tracers for the conservative tracer tests include sodium chloride, sodium thiocyanate, fluorescent microspheres (various diameters <2 microns), fluorocarbons, and polystyrene spheres (<1 micron in diameter). Candidate reactive tracers include lithium bromide, boron, and some type of organic tracer to investigate the molecular sieve sorption mechanism. Section 3.3.4a describes the regulatory requirements associated with these planned injections.

About 20 convergent tracer pump tests are planned using various pumping wells, pumping intervals, observation intervals, and tracer injection schemes. This will involve pumping from an isolated interval in one well at the approximate rate of 200 to 750 liters (50 to 200 gallons) per minute until drawdown stabilizes. The tracer will then be released into a second well. Pumping will continue for three to five days until the tracer is recovered. A 30-day pump test is also planned for one of the wells. The test will involve pumping from an isolated interval at the rate of between 400 and 1,500 liters (100 and 400 gallons) per minute. Following these tests, three to five single-well drift-pumpback tests will be performed at the various wells. These tests will involve releasing a tracer into the formation and then pumping the well at an approximate rate of 200 to 600 liters (50 to 150 gallons) per minute to recover the released tracer. These tests will be followed by a multiple-well recirculating tracer test that will involve pumping water from an isolated interval in one well into an isolated interval of a second well at the rate of between 200 and 750 liters (50 to 200 gallons) per minute. Tracer will be injected into the recirculating stream and then the pumping stream will be monitored for three to seven days

to detect the presence of the tracer. After the tracer is detected, pumped water will not be reinjected, with pumping to continue until the tracer is recovered. Both conservative and reactive tracer tests will follow the same testing procedures (see Section 3.3.4a for details on regulatory requirements associated with well injections).

Depending on the results of the above tracer tests, either single-well drift-pumpback tracer tests will be conducted at other existing borehole locations throughout the site, or a second complex of pump test boreholes will be drilled at a location southeast of the CPDB in order to conduct multiple-well tracer tests. This second set of pump test boreholes, if drilled, will consist of four holes, tentatively designated as the southern tracer complex. These holes will be drilled and completed in a manner similar to the "c" holes.

Water infiltration and recharge studies. A series of shallow holes will be drilled dry to a depth of about 15 m (50 ft) in different hydrogeologic settings at the site to monitor natural infiltration associated with precipitation events (these holes are designated as Unsaturated Zone Neutron Holes in Appendix A and Map 3). In addition to the 74 holes that already exist at the site for these studies, an additional 24 shallow holes are planned during site characterization. Each infiltration-monitoring hole will be drilled without a drill pad, using a portable all-terrain drill rig. All the planned infiltration-monitoring holes and 25 or 26 of the existing holes will also be used for artificial infiltration ponding studies.

At approximately 50 locations, a low berm enclosing an area of about 10 m² (100 ft²) will be constructed of impervious material. During infiltration testing, a static water level sufficient to cover the surface by 2.5 to 5.0 cm (1 to 2 in) will be maintained in each pond. The duration of testing will vary depending on the length of time required for the site to reach a steady-state percolation rate. The amount of water used will vary from location to location, but will probably not exceed 75,700 liters (20,000 gallons) at any location.

Infiltration will also be monitored under artificial precipitation rates. Fourteen large-plot rainfall simulation tests and 23 small-plot rainfall simulation tests are planned for this artificial infiltration study. At each of the rainfall simulation test sites, a control plot will be established to monitor natural infiltration during testing. To the extent possible, artificial infiltration sites will be in close proximity to natural infiltration study sites to maximize the use of natural infiltration sites and minimize disturbance. The water used for these tests will be delivered to each site by truck.

At each of the small-plot rainfall simulation sites, four monitoring holes will be drilled to a depth of about 1.5 m (5 ft). A water distribution system similar to irrigation systems will be installed, and discrete rainfall events will be simulated. Present plans call for four tests at each of the 23 sites; each test will involve distribution of approximately 454 liters (120 gallons) of water over an area of 1 m² (9 ft²).

At each of the large-plot rainfall simulation sites, 10 monitoring holes will be drilled to a depth of 9 to 15 m (30 to 50 ft). Present plans call for five tests at each of the 14 sites. Each test will require the distribution of approximately 11,360 liters (3,000 gallons) of water over an area of 37 m² (400 ft²). Monitoring of infiltration rates will be accomplished with a portable neutron moisture probe.

As part of the regional ground-water recharge investigations, three holes, each 180 to 240 m (600 to 800 ft) deep, will be drilled in Fortymile Wash to monitor aquifer recharge during precipitation events (see discussion of regulatory requirements associated with Floodplains in Section 3.2.13). The holes will be drilled dry in the same manner as the UZ holes. Spot core will be recovered during drilling. The total depth of each hole will be close to, but not intersect, the water table. After each flooding event in the wash, the holes will be monitored periodically using wireline geophysical tools. The regulatory requirements associated with working in a floodplain are addressed in Section 3.2.13. In addition, a small berm may be constructed around the collar of each hole. Infiltration from the bermed area will be used to investigate near-surface response, particularly if major

flooding does not occur during site characterization. Finally, 10 shallow holes will be drilled and instrumented with neutron-moisture tubes at key locations across Fortymile Wash to monitor infiltration.

Water samples will be collected from all available sources of ground water and surface water at and near the site, including Amargosa Valley and the Amargosa Desert. Some sampling programs will be conducted in commercial drillholes and wells in the region. Discharge from the hydrologic system will be studied by monitoring evapotranspiration and spring discharge rates. Evapotranspiration monitoring will require surface sampling and shallow drilling to variable depths, generally less than 30 m (100 ft), for the purpose of installing piezometers. These piezometers will be installed in the Amargosa Desert, upgradient from Franklin Lake Playa.

In situ stress testing. In situ stress will be measured by the hydrofracturing method at two as yet undetermined locations. One location will be in the vicinity of Yucca Mountain at an existing borehole location. The second location will be east of the site on the NTS. An additional borehole will be required for this site. Hydrofracturing requires isolating a select interval of borehole and injecting water into that interval until the surrounding walls fail and resultant stress measurements are obtained. This activity is expected to improve the understanding of previous stress measurements performed at Yucca Mountain. Depending on the results of tests at these two locations, additional existing boreholes, which would no longer be used for other studies, would be selected for testing. As many as 20 boreholes could be selected for in situ stress testing. The regulatory requirements associated with hydrofracturing are described in Section 3.3.4a.

Geological boreholes and geophysical studies. All holes drilled during site characterization will be geophysically logged (radioactive sources are often used in geophysical logging, as contained sources in sealed instruments). This logging will usually occur during the course of drilling operations. Analysis of available cuttings and core samples will be used for interpretation of the well logs. Temperature logs will be used to further develop the heatflow model of the site.

Two coreholes, approximately 1,520 m (5,000 ft) deep, are planned in Yucca Wash and in Drill Hole Wash (G-5 and -6) to study subsurface formations (see discussion of regulatory requirements associated with floodplains in Section 3.2.13).. An additional deep corehole is planned south of Yucca Mountain on the NTS (G-7). Locations of these proposed holes are presented in Appendix A and shown on Map 3. These holes will require construction of drill pads and access roads. They will be fully cored. Mud or air foam will be used as the circulating medium. The uppermost 305 to 610 m (1,000 to 2,000 ft) of each hole may be reamed to a diameter of 16 to 31 cm (6.25 to 12 in), if necessary, to set steel casing for hole stability and circulation control. If drilling mud is used as a circulation medium, the amount of water necessary for each hole may vary because of differing subsurface conditions and hole depth at each drill site. Existing drillhole G-4, for example, was drilled with mud to a depth of 915 m (3,000 ft) using approximately 2.0×10^6 liters (530,000 gallons) of water. Although the amount of water that may potentially be used for the three holes described will vary with depth, fracture system, and hole conditions, it can be expected that a few million gallons may be used. This water will be trucked to the site at least twice daily.

Four holes, designated as volcanic boreholes, are planned to investigate magnetic anomalies in southern Crater Flat and in the Amargosa Desert. They will be drilled using conventional rotary drilling methods, using mud or air foam as a circulation medium, to a depth of roughly 305 m (1,000 ft). These holes will be drilled over magnetic anomalies that may be igneous intrusions or buried volcanic rocks. Each hole will be drilled until igneous rock is reached or until sufficient depth is reached to explain the anomalies. Spot core will be acquired at geologic boundaries or where igneous or magnetic material is encountered. Where spot core is required, conventional or wireline coring equipment will be used with drilling mud as a circulating medium.

Paleo-investigations. Several paleo lake systems in the Great Basin will be studied using a combination of techniques, including digging small trenches with a backhoe, and obtaining core by drive-tube sampling or other portable drilling methods to depths of up to 30 m (100 ft). The study areas

have not yet been determined. Twenty-seven potential sites have been identified in the southern Great Basin for obtaining lacustrine sediments. Field reconnaissance is required to determine specific sample locations and sampling methods. Vehicle access to each sampling location may be required to transport the drilling and sampling equipment. The purpose of the study is to characterize the recent (500,000-year) variations in the paleo lake size, hydraulics, temperature, and chemical composition by the analysis of paleo lake sediments. Core samples will be taken from various locations throughout the southern Great Basin for assay and dating of the organic material, fossils, and minerals recovered from the sediments. The regulatory requirements associated with these studies will be determined once the sites have been selected. (See Section 3.2.14 for details).

Five shallow slant coreholes will be drilled in the vicinity of Trench 14 on the NTS to investigate the subsurface character of the Bow Ridge fault and the nature of calcite-silica deposits in the fault zone. A drill pad and a short access road would be constructed on the western slope of Exile Hill. Based on the results, a deeper vertical corehole will be drilled to an approximate depth of 60 to 150 m (200 to 500 ft) to intersect the fault zone in the subsurface. Air foam and drilling mud will be used as circulation media.

2.1.4 Transportation, Storage, and Disposal of Solid Waste

As noted in Section 2.1.1, drilling fluids, when used, will be disposed of in a mud-and-cuttings pit. Future reclamation programs may include filling the pits with stockpiled soils after the removal of drilling fluids and sludge, as appropriate. If removal is required, the material will be scooped up and sealed in steel drums or trucked to an appropriate fill site. Solid waste and trash will probably be hauled to a landfill on the NTS. Sanitary wastes will be collected at portable facilities and removed to an appropriate disposal site. Hazardous waste, as defined by RCRA (see Section 3.3.3), will be stored for shipment to a RCRA-permitted treatment and/or disposal facility.

2.1.5 Geophysical Surveys

The geophysical surveys being considered for the Yucca Mountain area include seismic reflection and refraction, gravity, magnetic, and electrical surveys. Each of these surveys will require land surveying and geologic reconnaissance either on foot, from off-road vehicles, or from helicopters.

Seismic monitoring is currently being conducted through the Southern Great Basin Seismic Network, which consists of 54 monitoring stations in a large array centered on Yucca Mountain. These stations consist of one or more seismometers with a solar-powered data-logging and telemetry system. The seismometers are operated continuously, and data are recorded automatically. The stations were installed in 1978 and 1979 by the U.S. Geological Survey with permission from the National Park Service, Bureau of Land Management (BLM), and U.S. Forest Service. No new roads were constructed at that time for access to any of the sites. Presently, each site is visited every three to six months for inspection and maintenance.

The regional monitoring network is occasionally augmented by temporary deployment of portable instruments for monitoring ground motion at the surface and in existing drillholes. Motion from underground nuclear explosions is analyzed to develop the relationship between earthquakes and weapons testing, in order to predict potential ground motion during repository operations.

Seven to fifteen shallow seismic-reflection survey profiles may be performed using portable small-scale vibrator sources. The decision to conduct these surveys will be made following the evaluation of two preliminary profiles. These surveys will not be limited to existing roads, although off-road travel will be kept to a minimum. Shallow reflection surveys will be conducted in short, 1- to 5-km (0.6- to 3.1-mi) traverses. Survey lines are planned for Crater Flat, Rock Valley on the NTS, and in the immediate vicinity of Yucca Mountain. Potential locations for those in the vicinity of Yucca Mountain are shown in Map 3. All lines will use 9.1-m (30-ft) vibrator source points, with 12 geophones per group. The penetration

of this method can be a few thousand feet depending on seismic propagation conditions.

Shallow seismic-refraction surveys may be performed at the locations of Quaternary faults (in conjunction with trenching) and at various other locations in the vicinity of Yucca Mountain. The seismic-refraction technique uses portable seismographs and repetitive hammer (sledgehammer) sources. Site preparation is not required, and instruments and recorders can be hand-carried from existing roads. This survey will be used to investigate seismic velocity contrasts in subsurface volcanic rocks and to delineate shallow subsurface structures.

A regional deep seismic-reflection study may be performed across Yucca Mountain and Crater Flat. The survey would be conducted along existing roads, where possible, using conventional field equipment consisting of geophone cables, recording trucks, and truck-mounted vibrator sources. The "vibrators" may have off-road capability, but will only be used as seismic sources near existing roads and highways. The design of the survey will seek to maximize the linearity of source and geophone cable locations. This potential survey method will be evaluated for use at Yucca Mountain through feasibility testing of a similar 15 km (9 mi) test line located either south of Amargosa Valley or southwest of Beatty. The test line will also follow existing roads.

A deep, regional seismic-refraction survey will be performed along existing highways and roads and in rugged terrain by the use of helicopters, using discrete event recorders and explosive sources in accordance with standard practices for geophysical exploration. The survey will consist of four profiles: a 160-km (100-mi) long east-west profile centered on Yucca Mountain; and three cross-profiles, potentially including an 80-km (50-mi) profile extending southward from northern Crater Flat, a 110-km (68-mi) profile extending southwestward from the northern end of Crater Flat, and a 70-km (43-mi) profile centered on Stovepipe Wells. The receivers will be discrete, portable, battery-powered event recorders that do not require any excavation and can be readily deployed from a helicopter if necessary. Shot-holes will be prepared at predetermined locations approximately every 9.6 km

(6 mi) along each refraction line. Each shothole will be drilled about 25 cm (10 in) in diameter and 46 m (150 ft) deep and filled with about 910 kg (2,000 lb) of ammonium nitrate explosive. The uppermost 15 m (50 ft) of each hole will be packed with gravel trucked to the site. Two or more such shot-holes will be prepared together for larger shots up to approximately 1,810 kg (4,000 lb). The tendency for surface cratering will vary with the geologic conditions at each shot point; however, each shot will be conservatively designed to prevent cratering. Redundant systems will be used to reduce the possibility of misfire. The exact locations of these surveys have not yet been determined, but tentative plans include an east-west profile centered on Yucca Mountain with three cross profiles.

Several regional magnetotelluric (MT) surveys will be conducted. These surveys consist of measurements of conductivity structure of the earth made at stations located along a line. The MT method is passive, requiring two perpendicular dipole electrode arrays and a magnetometer on the surface. The dipoles are typically 100 to 1,000 m (328 to 3,280 ft) long. The magnetometer sensor is a loop of wire 10 to 100 m (33 to 328 ft) in length, buried a few inches beneath the surface to decrease interference from wind. Off-road vehicle access is not a requirement for an MT survey. Proposed MT lines would follow Nevada Route 29 south from the town of Amargosa Valley and would also transect the Amargosa Desert in a north-south direction. The station spacing for MT surveys in Crater Flat and the Amargosa Desert would be 5 to 8 km (3 to 5 mi). Specific station locations have not been identified and will be determined through field reconnaissance.

Detailed geophysical surveys will be conducted on the land surface in the vicinity of Yucca Mountain, where aeromagnetic and other regional surveys indicate the possible existence of anomalous structures. Geophysical measurements, such as total natural magnetic intensity or the magnitude of gravitational acceleration, will be conducted at station locations distributed over, and adjacent to, possible anomalies. Ground magnetic data will be acquired using portable equipment. Ground magnetic surveys will be semicontinuous with 10 to 20 ft spacing. Off-road vehicle use is not required for these surveys. Other types of surveys (including seismic, electrical, and electromagnetic, either airborne or ground-based) are not

presently planned, but may be required to evaluate mineral resource potential at the site or to determine the engineering properties of soil and bedrock at the site of the proposed repository surface facilities.

Vertical seismic profiling (VSP) is a seismic exploration method similar to seismic reflection whereby geophones are placed in boreholes or underground excavations to improve the quality of the acquired seismic image of the subsurface. The methods of interpretation that are possible with seismic sources located on the surface and with receivers underground allow enhanced vertical and lateral resolution of seismic structures. If feasibility testing shows that this technique is applicable in the unsaturated zone, VSP will be used at Yucca Mountain to image the subsurface at the proposed repository location. Seismic sources will be deployed on the surface of Yucca Mountain and adjacent to existing roads and dirt tracks. Sources will be vibrator trucks.

2.1.6 Geological Mapping

Geological mapping is continuing in the vicinity of Yucca Mountain as part of the geologic, tectonic, and volcanic studies. These studies include collection of samples for laboratory analysis and require some off-road vehicle travel. The specific studies involved are (1) surficial deposits mapping; (2) geomorphic mapping; (3) surface-outcrop sampling; (4) surface-stratigraphic studies; (5) trenching studies; (6) surface fracture network studies; (7) streamflow, debris flow, and erosion studies; and (8) geodetic surveys.

Surficial-deposits mapping. Sampling, testing, and mapping methods will be used to help develop an unconsolidated surficial-materials map of Yucca Mountain. This activity will attempt to delineate surficial units with common shallow infiltration and runoff properties. The mapping activity will define the distribution, spatial relationships, and thickness of the various deposits. The definition will be aimed at identifying the geomorphic settings of the various deposits. It may be necessary to excavate small soils pits, up to 1.5 m (5 ft) deep, with mechanized digging equipment.

Surficial deposits will be dated and the rates of development calculated. A regional network of dust traps has been set up in a variety of climatic and geomorphic settings. Dust-collection data are required as input for the computer modeling of carbonate translocation, the analysis of which will assist in dating soils. Dust traps are passive devices consisting of a simple mechanical trap mounted on a fence post. Off-road vehicular access is not required for trap installation, maintenance, or operation. Dust trap samples will be collected yearly. Soil studies are performed as part of the climate modeling effort that evaluates the effects that a changing climate may have on the hydrologic characteristics of the site. Sampling of small amounts of pack rat hidden deposits in various climatic and geomorphic settings will also be conducted as part of paleoecology investigations.

Geomorphic mapping. Geomorphic mapping is the delineation of surface features on the landscape. Surface mapping of geomorphic features will be conducted in a broad area encompassing Yucca Mountain, Fortymile Wash, and Crater Flat. This activity requires casual access without excavation, drilling, road construction, or off-road vehicular travel.

Detailed geomorphic mapping will be conducted along Fortymile Wash and its tributaries to study downcutting and erosion. This activity will require vehicular travel on existing roads.

Surface-outcrop sampling. Samples are occasionally acquired from surface outcrops for laboratory analysis of thermal and mechanical properties. Samples are required by low-strain-rate testing and other tests needed to predict the behavior of the repository host rock in response to the heat load generated by emplaced waste. Samples are also occasionally acquired from surface outcrops for laboratory analysis of geochemical interactions among the tuff material, ground water, radionuclides, and microorganisms.

Surface-stratigraphic studies. Surface-stratigraphic studies consist of detailed mapping of areas of exposed bedrock on ridges, outcrops, and in scoured stream channels. There will be no excavation or road construction

associated with these studies, and off-road vehicular travel will be minimized.

Trenching studies. Several trenches and test pits at and near Yucca Mountain have been excavated for geologic, tectonic, and paleoclimatic studies. The location of the existing trenches, which are within the area, are shown on Map 2. Many of these trenches are sampled and mapped on an ongoing basis. It may be necessary during site characterization to enlarge and deepen some of these existing trenches (e.g., Trench 14 on the west side of Exile Hill) to collect additional data and to prevent trench degradation.

Excavation of several new trenches is planned during site characterization to support tectonic and paleohydrologic investigations. The need for 27 new trenches has been identified to date; 26 for tectonic investigations and 1 near existing Trench 14 for paleoclimatic investigations. Approximate locations are known only for the paleoclimatic trench (designated in Appendix A as 14B) and the Bare Mountain fault trenches (BM1 and BM2). Field reconnaissance will be required to provide approximate locations for the others. As a result, only trenches with known approximate location coordinates are shown on Map 3. However, the fault zones or general area of the planned trenches are known. Twelve trenches are planned for the potential site of the conceptual Repository Surface Facilities in Midway Valley (just east of Fran Ridge), two for the Rock Valley fault zone, two for the Stagecoach Road fault zone, and eight trenches are planned for faults in the vicinity of Yucca Mountain.

Surface fracture network studies. Fractures and joints will be mapped at selected exposures of bedrock in the immediate vicinity of Yucca Mountain. Natural bedrock exposures will be used when possible, augmented by exposing additional area by hydraulically or pneumatically stripping a thin layer of overburden, as described in Section 2.1.1.

Streamflow, debris flow, and erosion studies. Gauges have been installed at and near Yucca Mountain for purposes of studying precipitation, streamflow, debris flow, and erosion processes. Additional precipitation and

streamflow gauging stations are proposed for the Yucca Mountain area (Appendix A and Map 2).

Streamflow monitoring will be conducted to understand the characteristics of surface-water runoff during precipitation events. During and after surface runoff, debris flows will be observed in stream channels if they occur. The purpose of this study is to better understand the mechanisms of water and debris flows, and the climatic factors and their cause. Monitoring will also be conducted to characterize the present rates of erosion. Additionally, scour chains will be installed to monitor the amount of erosion that occurs in washes at times of heavy runoff. These experiments will be conducted by observations of events and equipment by scientists in the field.

Geodetic surveys. Geodetic benchmarks have been permanently installed on and around Yucca Mountain to monitor surface adjustments due to present-day tectonic activities in the vicinity of the site. A 70-km (43-mi) level line extends from Crater Flat on the west of Yucca Mountain to Rock Valley on the east, and a quadrilateral network has been installed across several faults in the immediate vicinity of the site. Biennial resurveys are conducted.

2.2 EXPLORATORY SHAFT FACILITY

The ESF will consist of surface facilities and two shafts where a variety of subsurface tests will be conducted. These tests are essential to evaluate the suitability of the Yucca Mountain site for the location of a repository. The subsurface testing program is not expected to cause any significant adverse environmental impacts. This section includes information on design; site preparation; access road construction and improvement; utility services; construction of surface and support structures; construction of shafts; construction of underground rooms; and transportation, storage, and disposal of mined materials.

The standard operating practices (good engineering and environmental practice) that will be used during site preparation, construction, and

operation of the ESF in minimizing the potential for significant adverse environmental impacts are the same as those described in Section 2.1. In addition, the DOE will do the following:

1. Install a leachate monitoring system at the muck-storage pile and the mine waste-water pond or lagoon.
2. Locate borrow areas where impacts to the environment will be minimized.
3. Sufficiently separate the surface facilities to reduce the potential damage in the event of fires.

In addition to the standard operating practices identified in Section 2.1, these additional practices may also serve to minimize the potential impacts that site characterization activities may cause. Detailed plans for site reclamation and habitat restoration for the affected area are in the process of being developed.

2.2.1 Design Description

The ESF will consist of two vertical shafts, underground excavations constructed from the shafts, underground test facilities, and numerous facilities at the surface to support excavation of the shafts. Figure 2-2 shows the proposed location of the ESF. In addition, Map 4 presents an expanded view of the ESF location with associated roads and facilities.

The two exploratory shafts are designated ES-1 (the main test shaft) and ES-2, with ES-2 being excavated with relatively little or no associated testing (other than limited geologic mapping) to expedite access to the subsurface. ES-2 will also be used for ventilation, materials handling, and emergency egress. ES-1 will have an inside finished diameter of 3.7 m (12 ft), and a depth of 337 m (1,105 ft); it will contain several rooms, constructed horizontally from the shaft for testing and storage of equipment. ES-2 will also have an inside finished diameter of 3.7 m (12 ft), but a depth

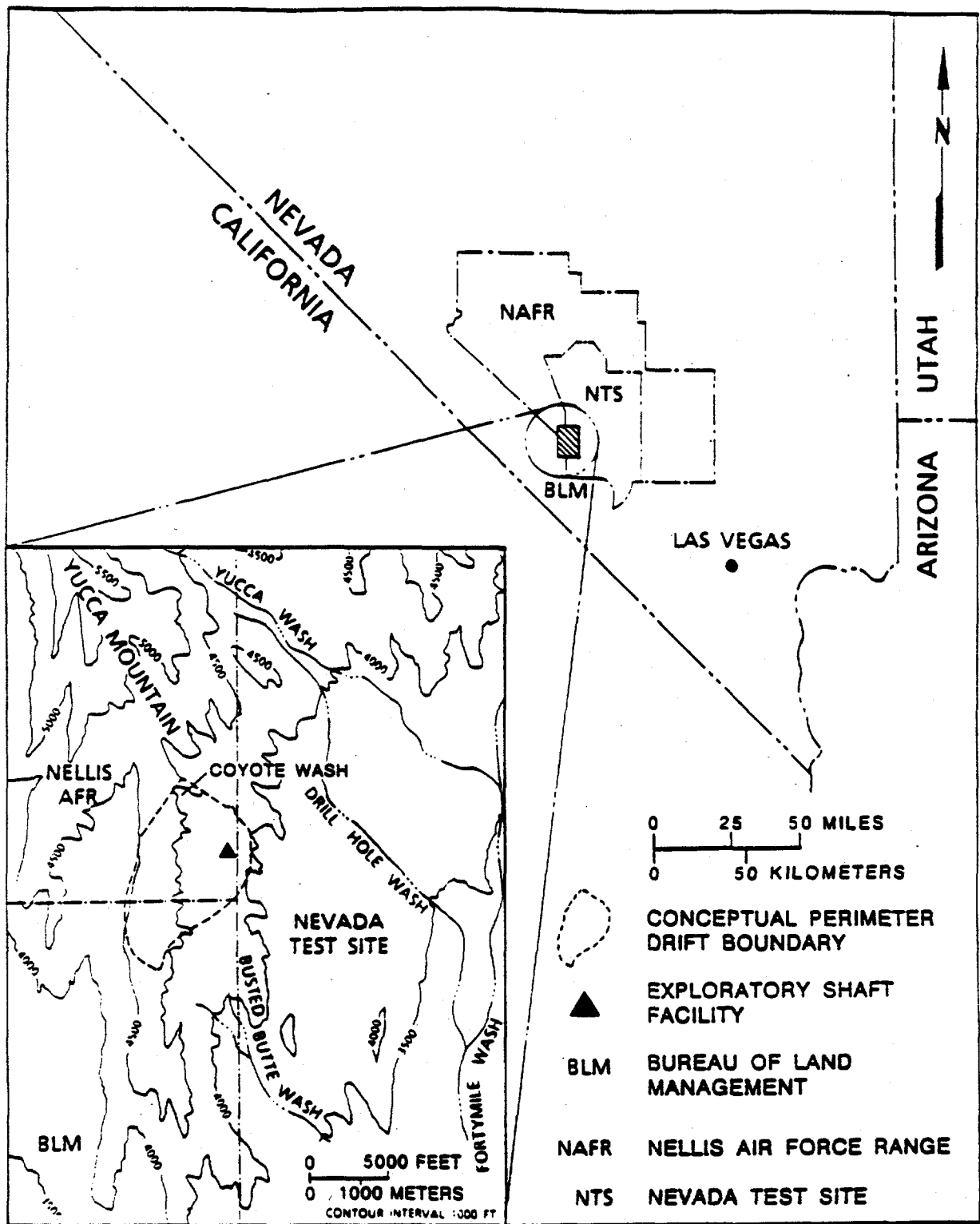


Figure 2-2 Location of the Exploratory Shaft Facility on the Yucca Mountain Site

of 351 m (1,150 ft). The two shafts will be connected at the 320-m (1,055-ft) level. The main test level of the ESF will provide access to approximately 1,219 m (4,000 ft) of drifts, test alcoves, and operations areas. The rock debris and mud created during excavation of the subsurface facilities will be hoisted to the surface and disposed of on a muck-storage pile at the site (Figure 2-3). Liquids will be disposed of in the mine waste-water pond or lagoon (Figure 2-3). See Sections 3.3.3 and 3.4.3 for the regulatory requirements that are associated with the muck-storage pile and the mine waste-water pond.

The surface facilities will include a hoist house, warehouses, repair shops, trailers, parking areas, water- and electrical-distribution systems (including an electrical substation), a sewage system, a communication system, areas for storing explosives, a borrow area, a muck-storage pile, a mine waste-water pond or lagoon, a concrete-batch plant, and a topsoil storage area. Roads, pipelines, and electrical transmission and communication lines will be extended to the ESF from existing roads and facilities on the NTS.

Transport of materials to Yucca Mountain during site characterization is expected to peak at an average of one truck shipment per day during construction of the ESF. The materials that will be transported to the site include gasoline, diesel fuel, explosives, cement, steel, copper wire, and wooden power poles. See Section 3.2.8 for information concerning the transport of hazardous materials to the site.

2.2.2 Site Preparation

The ESF will be located in Coyote Wash on the east side of Yucca Mountain at an elevation of about 1,260 m (4,130 ft); the actual shafts will be located above the wash on the side of a ridge. Figure 2-3 shows the site layout, and Figure 2-4 provides a three-dimensional illustration of the entire ESF. Because no facilities or access roads currently exist at the ESF site to support heavy construction, access roads must first be constructed,

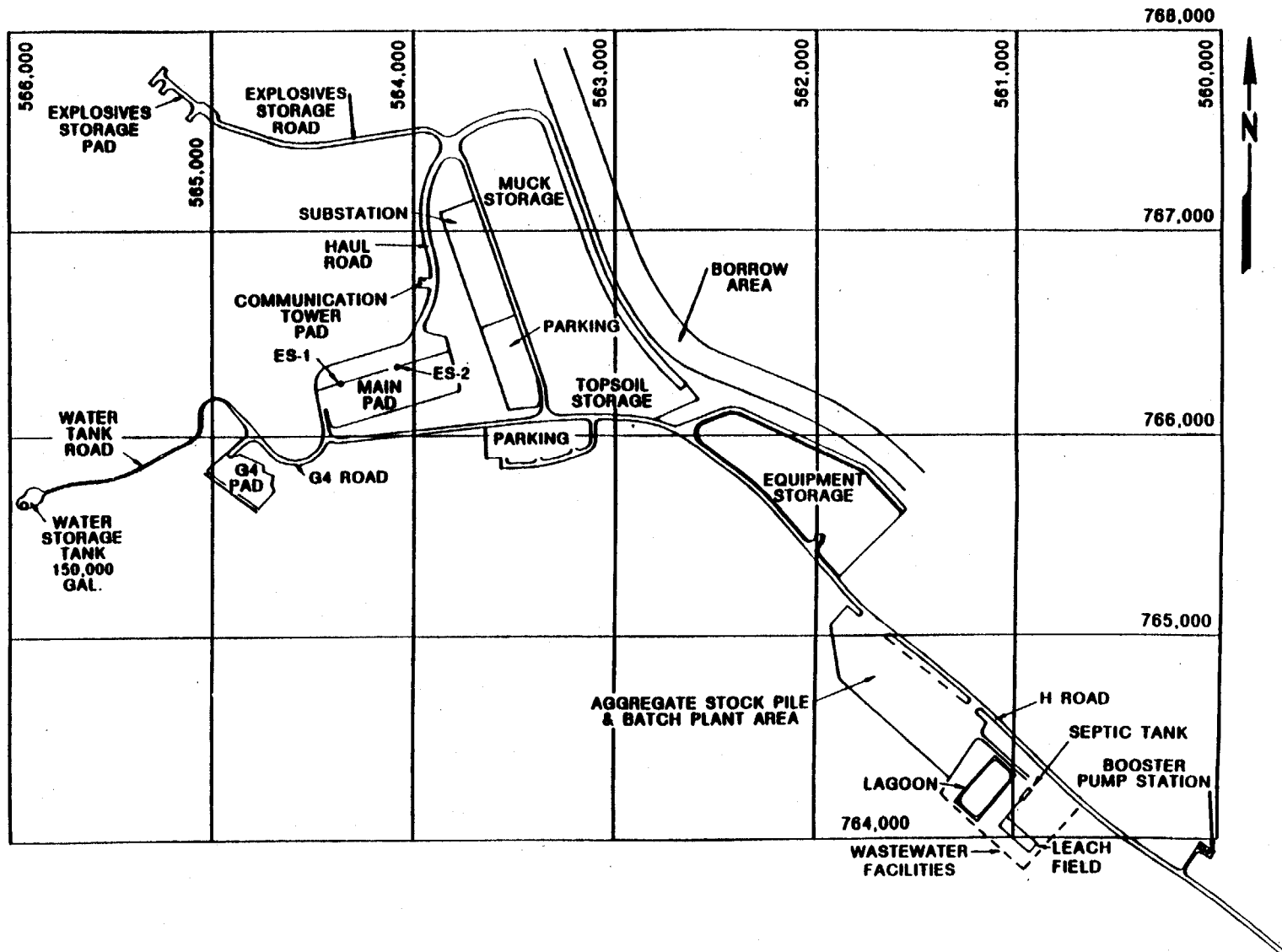


Figure 2-3. ESF overall site plan.

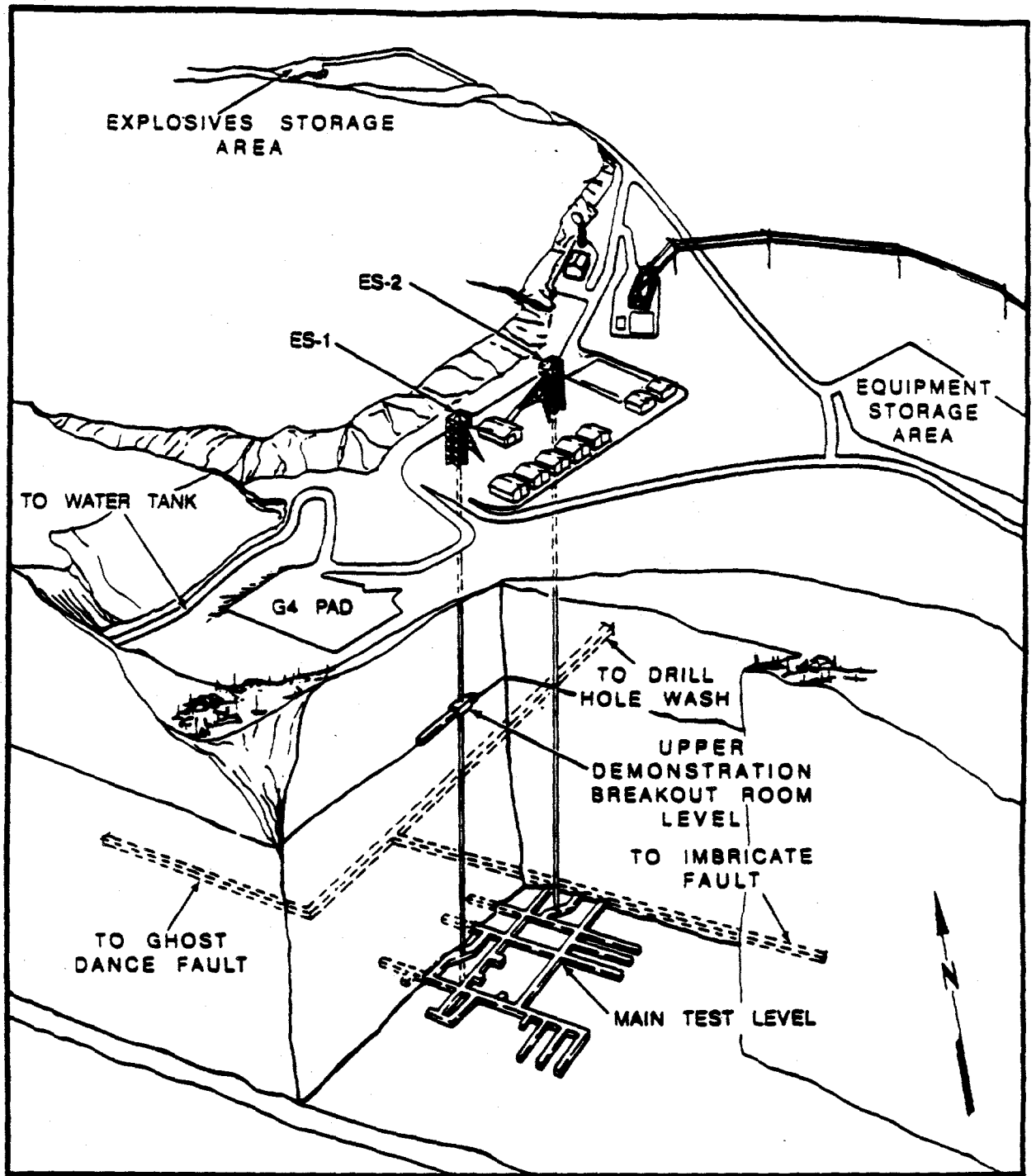


Figure 2-4. Conceptual illustration of the exploratory shaft facility.

and the surface of the site must be prepared (road construction is described in Section 2.2.3; numerous regulatory requirements are associated with site preparation as described in Sections 3.2.5, 3.2.7, 3.2.11, 3.2.13, 3.3.1, and 3.4.2).

Approximately 18 ha (45 acres) will be disturbed at the site for road construction and the surface facilities for the ESF. The site must first be cleared of vegetation, graded, and then stabilized with about 15 cm (6 in) of gravel. See Section 3.3.1 for a discussion of the regulatory requirements associated with these surface disturbances.

Several leveled pads will be required to accommodate the various facilities needed at the site. Pads will be required for the exploratory shafts and their associated buildings, the water tank, equipment storage areas, the explosive storage area, the mine waste-water pond or lagoon, the sewage collection system, and the muck-storage area. An existing pad will be used for the concrete batch plant.

The pad for ES-1 and ES-2 will be situated on a cut-and-fill rock shelf approximately 60 m (200 ft) north of and above the confluence of two small dry washes that are tributaries of Coyote Wash. The location of Coyote Wash is shown on Figure 2-2. Site preparation will require cut and fill to provide level pads for the two exploratory shafts, the surface structures, and the parking and storage areas. Additional fill material, if needed, will be obtained from borrow areas (Figure 2-3). Topsoil removed during site preparation will be stockpiled for future use in decommissioning the site, if necessary (Figure 2-3).

Surface preparation for the other pads will require clearing vegetation and grading the site into a level pad that is large enough to accommodate the particular facility.

Figure 2-5 shows the duration of site preparation activities and surface construction at the ESF.

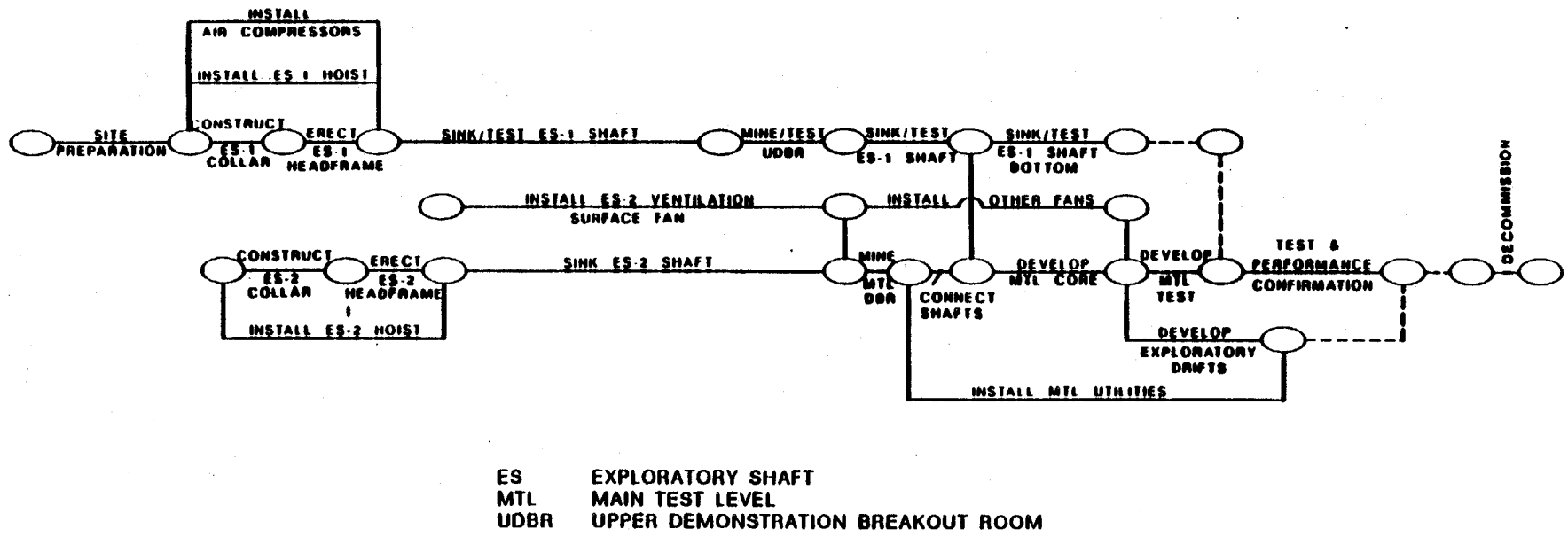


Figure 2-5 Relationship of Planned Site Preparation Activities at the ESF

2.2.3 Access Road Construction and Improvement

An access road leading westward from Jackass Flats to the boundary of the NTS can currently accommodate heavy equipment. The road is approximately 7 m (24 ft) wide, has 2.5-m (8-ft) shoulders, and is surfaced with a double oil-and-chip layer. This road will be extended 400 m (1,300 ft) to the ESF. It will be constructed on fill material and to the same standards as the existing road. Construction of the road will disturb up to a 50-m (160-ft) wide path in some locations due to modification of the dry washes along the route to protect the road during flash floods. Additional roads to the pad of the exploratory shafts, the explosives storage area, and the water storage tank will also be constructed. In addition, a road dedicated to hauling rock debris to and from the exploratory shafts and muck-storage area will be constructed (Figure 2-3).

2.2.4 Utility Services

The utility and communication systems will provide electrical power, water, sewage, and communications that are necessary to support the surface and subsurface operations at the ESF. The communications systems will provide surface communications facilities, fire protection, and life safety support system monitoring.

The above-ground electrical supply and power for the underground distribution system will be provided by a surface substation to be constructed at the ESF. The substation will be supplied from a 400-m (1,300-ft) extension of an existing 69-kV overhead power line that now extends from the Canyon Substation in Jackass Flats to near the NTS boundary (Figure 2-6 and Map 4). The substation will be equipped with transformers to supply power to the hoists, air compressors, ventilation fans, surface buildings, and the underground facilities.

A power line will be added to the existing power poles to provide power to the water-supply booster-pump station from the site substation. Night

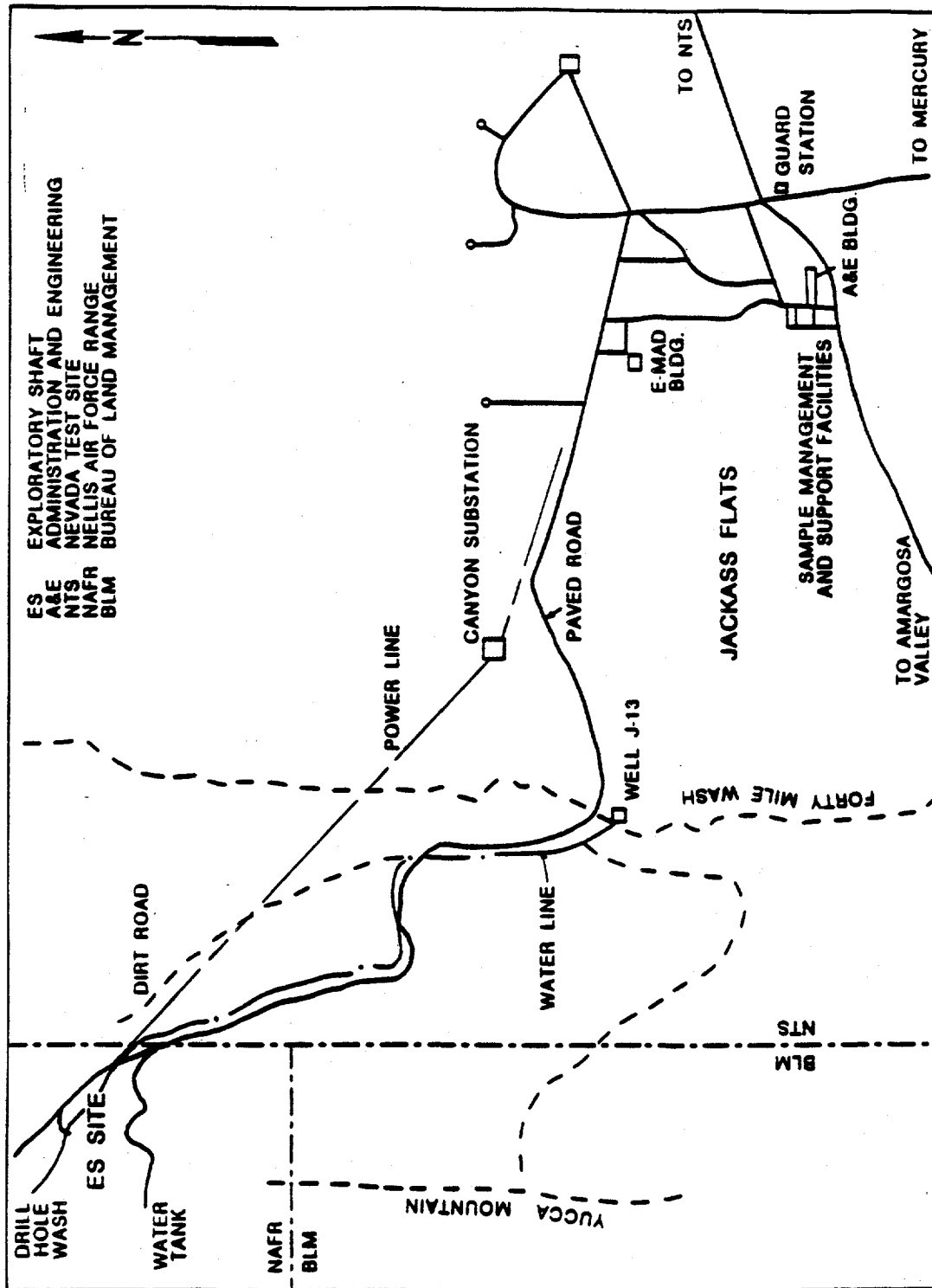


Figure 2-6. Location of NTS facilities required to support the exploratory shaft facility.

lighting will be provided by pole-mounted area floodlights. Standby electrical supply will be provided by diesel generators. The diesel generators will cover interruptions to electrical systems critical to life support and data collection. Further backup to critical systems will be provided with uninterruptable power supplies. Although the DOE will use industrial transformers in its electrical distribution system, bid specifications will preclude the use of transformers containing PCBs. Construction of the electrical distribution system will therefore not trigger compliance under the Toxic Substances Control Act (see Appendix B).

The water supply will be distributed from well J-13 on the NTS through an existing 10-km (6.1-mi) long, 15-cm (6-in) diameter polyvinyl-chloride pipe buried about 0.6 m (2 ft) below the surface (Figure 2-6 and Map 4). Well J-13 is located approximately 6 km (4 mi) from the pad of the exploratory shafts. The pipeline, which has already been constructed in the bed of an old access road to the NTS boundary, is adjacent to the new road. One pumping station is at well J-13, and a booster pumping station will be installed about halfway (based on elevation) to the site. Water will be pumped to a 600-m³ (150,000-gal) water tank to be located west of the site at an elevation of approximately 1,320 m (4,330 ft). The tank will supply water for all needs at the ESF, including fire protection. The water supply system will be designed to accommodate reasonable changes in the surface and underground facilities. Drinking water will be separately provided to the underground workers. Water controls will be installed to ensure that failure of the distribution system will not be critical.

Sanitary waste will be collected and disposed of in a sewage system located to the east beyond the proposed repository boundary. The sewage system will be conservatively designed to accommodate sewage from approximately 200 persons during a 24-hour period. An underground sewer line will connect all trailers and buildings to the sanitary waste system. The DOE will submit design plans for the system to the Nevada Division of Environmental Protection for approval (see Section 3.4.1 for details).

The communications system includes telephone service, monitoring systems, integrated data system interfaces, and equipment for transmitting

data to the existing Administration and Engineering (A&E) building at Jackass Flats (Figure 2-6).

2.2.5 Construction of Surface and Support Structures at the ESF

Numerous surface facilities, in addition to those described in previous sections, will be assembled or constructed at the site of the ESF; some facilities will be on the shaft pad, and some will be away from the pad.

Temporary buildings will be assembled or moved to the ESF as they are needed during the construction and operations phases. The site pad will accommodate a limited number of buildings, and as one construction phase is completed, buildings may be converted for different uses or removed from the site. Prefabricated metal buildings will be assembled to provide space for a shop with repair facilities, a warehouse, and a hoist house. Trailers will be located on the ESF pad and used for change rooms, offices and sample preparation space, and a first aid station. Most functions not directly in support of shaft construction will be conducted from the A&E building (Figure 2-6), which will have a visitors' center and office space.

Three magazines will be required for the storage of explosive materials; one for explosives, one for detonators, and one for primer makeup. The magazines will be located away from the exploratory shaft site as shown on Figure 2-3. Transport of explosives to the ESF, as well as the transport of other hazardous materials such as flammable liquids and solids, combustible or corrosive materials, and compressed gases, is regulated by the U.S. Department of Transportation under authority of the Hazardous Materials Transportation Act. Although no permits or approvals need to be obtained by the DOE for transport of these materials, the DOE must comply with regulations in 49 CFR Parts 171-178 regarding the packaging, handling, labeling, placarding, and routing of these materials, and the notification procedures in the event of an accidental spill (see Section 3.2.8 for additional information).

A mine plant and associated facilities will be constructed at the surface to support the subsurface construction. Major equipment in the mine plant will include ventilation fans and surface duct work in the shaft collar; air compressors and supply lines to the shaft collar; and water-supply piping controls and waste-water piping from the shaft collar to the mine waste-water pond or lagoon. Major support facilities will include a concrete batch plant, a muck-storage area, a mine waste-water storage pond or lagoon, and lay-down areas for supplies and equipment.

Ventilation, exhaust, and distribution facilities will be designed to supply and remove conditioned air to and from underground working areas to maintain adequate health and safety of personnel. Systems will be installed to monitor radon, methane, oxygen, carbon monoxide, temperature, humidity, and air speed in the underground facility.

A concrete-batch plant will be assembled at the ESF to store and mix materials for concrete and grout during construction of the ESF. Concrete will be used for building foundations and the shaft collars and liners. Approximately 0.4 ha (1 acre) will be required for the batch plant, which will be located beyond the proposed repository boundary (Figure 2-3). Crushed rock, sand, and cement will be stored at the batch plant. An air quality Registration Certificate and an Operating Permit will be required from the Nevada Division of Environmental Protection for construction and operation of the batch plant (see Section 3.3.1 for more details).

The mine waste-water pond or lagoon, located east of the exploratory shafts (Figure 2-3) and beyond the repository boundary, will be bermed. Liquids that will be used during construction of the shafts include air-water mist, bentonitic mud with water control agents, polymer foam, and other waste liquids that will all be pumped from the underground facility to this pond. The design life of the pond will be a minimum of 25 years, and will have the capacity to hold approximately 1.4×10^6 L (375,000 gal) of liquid waste. The DOE intends to consult with the Nevada Division of Environmental Protection in regard to the regulatory requirements associated with this pond (see Sections 3.3.2 and 3.4.3 for additional information).

The muck-storage area will be located east of the exploratory shaft pad (Figure 2-3). The rock debris removed during construction of the shafts, the testing rooms, and the exploratory drifts will be transported to the surface and hauled by truck to the muck-storage area. The site of the muck-storage area was selected because it does not constrain the size of the muck-storage pile in the event that additional mining is necessary. The muck-storage area will accommodate approximately 122,300 m³ (160,000 yd³) of rock debris, which is the amount (swollen volume) of rock debris currently planned to be disposed of in the muck-storage area. Recompaction of the rock debris in the muck-storage area is a possibility and would, to some extent, reduce the size of the disturbed area. Dust generated from the dumping operation will be minimized by appropriate dust suppression techniques.

2.2.6 Construction of Shafts

ES-1 will have a finished inside diameter of 3.7 m (12 ft) and a total depth of 337 m (1,105 ft). A breakout room at 183 m (600 ft) and the main test facility at 320 m (1,055 ft) below the surface will be constructed as drifts from ES-1. ES-2 will also have a finished inside diameter of 3.7 m (12 ft), but a depth of 352 m (1,150 ft); it will be used for ventilation, materials handling, emergency egress, geologic mapping, and possible testing of perched water or anomalous geologic structures if found.

Construction of ES-1. After the headframe, sinking deck, and associated equipment are in place (Figure 2-7), the shaft-sinking operation will be generally routine to the upper demonstration breakout room, except for testing conducted in the shaft. A typical sequence of operations includes drilling a number of small-diameter blast holes into the rock (the number, depth, and location of the holes will be determined by rock conditions and previous blasting results). The blast holes will then be loaded with explosives and detonated in such a way that the blast is controlled (i.e., the vertical advance is enhanced, damage to the rock zone is limited, and acceptable-sized rock fragments are produced). Once the blast holes are prepared, the sinking deck and associated equipment will be raised to protect them from damage. The miners will then exit the shaft, and the explosives

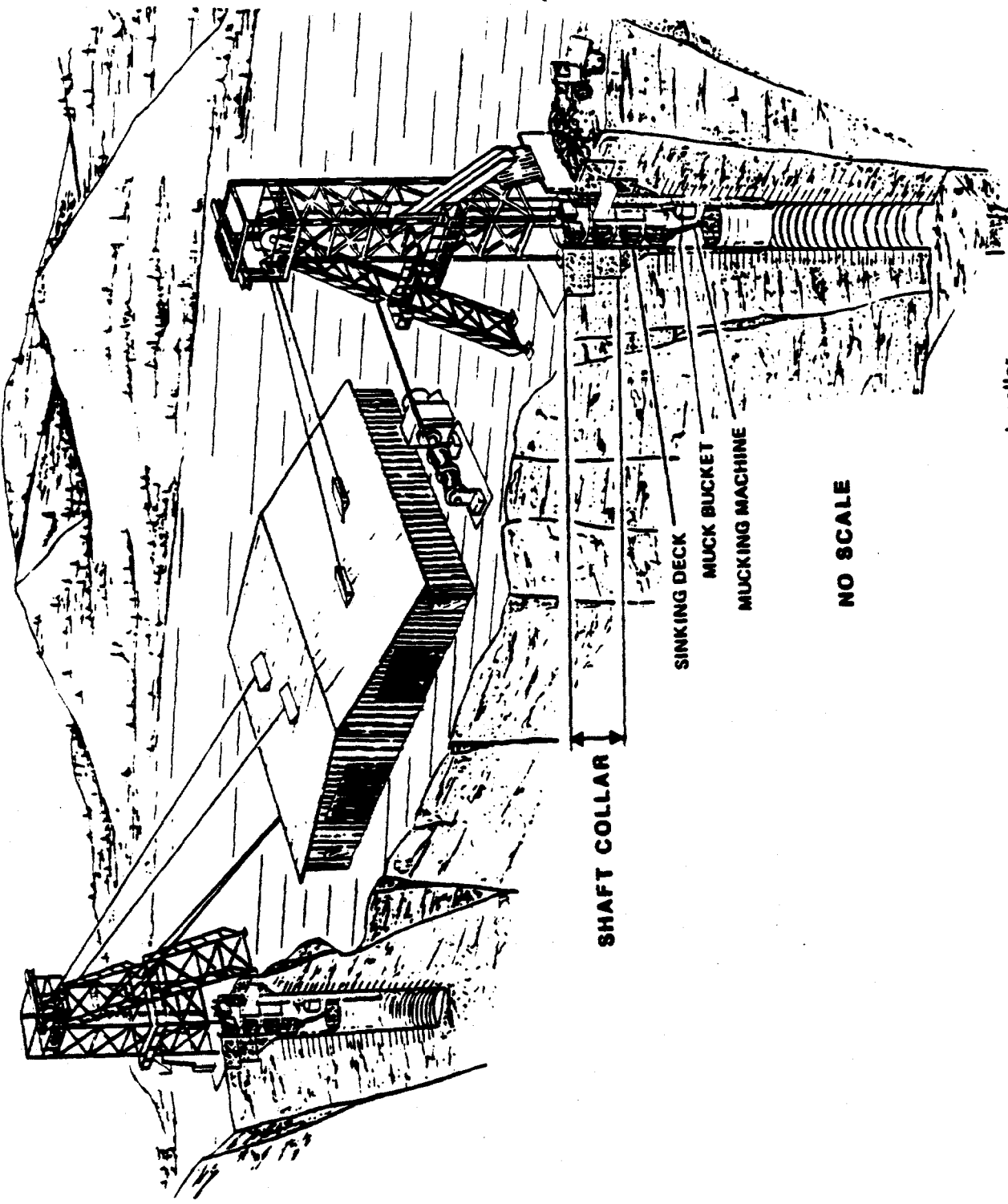


Figure 2-7. Typical hoist, headframe, and collar.

will be detonated. Following each blast, air will be exhausted to remove smoke, dust, and fumes before the miners enter the shaft to muck out the rubble.

The shaft miners will usually spray the rubble with water for additional dust control before mucking. Water usage will be minimized in ES-1, however, to limit any potential impact on geologic and hydrologic tests conducted in the shaft. All water used for dust suppression will be tagged with a suitable tracer to distinguish it from natural water. Humidity in the supply and exhaust ventilation will be monitored and recorded.

After the removal of smoke, dust, and fumes, the miners will reenter the shaft and start to remove the muck with a mucking machine hung below the sinking deck and a muck bucket suspended from the main hoist as shown on Figure 2-7. After the shaft has been advanced 2 m (6.5 ft) or more, all the rubble has been mucked out, and any loose rock cleaned off the walls, the miners will stow their equipment. Scientists will then enter the shaft to conduct shaft-wall mapping, sampling, and other tests in the freshly exposed interval of wall rock.

When the scientists have completed their work, they will exit the shaft, and the miners will prepare the next blast round. After several blast rounds, a concrete shaft-liner will be poured in 6-m (20-ft) segments to protect workers in the shaft. When specified by the scientists, blockouts will be installed to protect necessary instruments and equipment before the liner is poured. The unreinforced concrete liner is expected to be at least 0.3 m (1 ft) thick through the welded tuff units. While the freshly placed concrete is setting, the miners will move up the shaft approximately 18 m (60 ft) and install a 6-m (20-ft) section of shaft equipment, including manway ladders and landings, conveyance guides, utility piping, and instrument conduits (Figure 2-7). When this work is completed, the miners will move back down the shaft and muck out the rubble remaining from the previous blasting round. The scientists will then conduct their tests, and this sequence of activities will be repeated down to the proposed total depth

(with interim construction and mining activities at the specified levels for breakout rooms and testing).

Construction of ES-2. ES-2 will be sunk continuously using a method similar to that used for ES-1. A connecting drift along the main test level of ES-1 will be constructed after ES-2 is completed. Geologic mapping will occur at regular intervals. Significant structural, hydrologic, and stratigraphic features may also be mapped.

2.2.7 Construction of Underground Rooms

ES-1 will have a breakout room for testing and a main-testing level. The upper demonstration breakout room and a landing will be excavated at a depth of about 183 m (600 ft) below the surface. The room will be approximately 79.3 m long, 7.6 m wide, and 5.5 m high (260 ft long, 25 ft wide, and 18 ft high). It will be mined by the drill-blast-muck technique already described. The rock debris and muck from the room will be hauled by vehicle to the main shaft, loaded into the muck bucket, and hoisted to the surface for disposal on the muck-storage pile. Fluids will be disposed of in the mine waste-water pond.

Landings and approximately 1,219 m (4,000 ft) of drifts will be constructed at the main-testing level at a depth of 320 m (1,055 ft). After a landing is constructed, a muck-holding pocket about 12 m (40 ft) deep and a muck chute that will discharge directly into a scoop in the shaft will be constructed. Upon completion of the station, the connecting drift from ES-2 will be completed.

2.2.8 Transport, Storage, and Disposal of Mined Materials

The rock debris removed during construction of ES-1, ES-2, and the ESF drifts will be hoisted to the surface and deposited next to ES-1. The rock will then be hauled by truck to the muck-storage pile on the east side of the ESF (Figure 2-3). The pit will be lined and bermed to minimize percolation

of fluids into the ground. Dust from the dumping operations will be minimized by appropriate wet-suppression techniques. Waste-water and other fluids will be disposed of in a bermed mine waste-water pond. The regulatory requirements that may be associated with the much-storage pile and the mine waste-water pond are discussed in Sections 3.3.3 and 3.4.3.

3.0 ENVIRONMENTAL REQUIREMENTS

As stated by the Secretary of Energy in draft DOE Order 5400.1, it is the policy of the U. S. Department of Energy (DOE) to conduct its operations in an environmentally safe and sound manner. To this end, the Office of Civilian Radioactive Waste Management is committed to ensuring the incorporation of national goals of environmental protection in the formulation and implementation of the repository program.

The DOE will meet all applicable environmental requirements set forth by Federal laws and regulations, Executive Orders, and DOE Orders. In regard to related State and local environmental laws for which Federal sovereign immunity has not been waived by the Congress (such as state laws that do not derive their authority from a Federal law), it is the DOE's intention to, at a minimum, address substantive elements of the state requirements. The foregoing should not, however, be construed as limiting or restricting the DOE's courses of action should any State or local requirements be inconsistent with fulfilling the DOE's responsibilities under NWSA, the Atomic Energy Act, and other Federal statutes.

As described in Section 8.3 of the SCP (U.S. DOE, 1988a), regional field studies may be needed after completion of studies in the immediate vicinity of the Yucca Mountain site. Because the regional activities and their locations are as yet not determined to be necessary, regulatory requirements that may be applicable to these activities are not discussed in this ERCP. The DOE will make appropriate permit applications to do such testing if it is determined, as a result of the other site characterization activities, that the testing is necessary. Updated versions of the ERCP will specify such permits and application procedures.

This chapter describes the Federal and State environmental regulations that may be applicable to site characterization at the Yucca Mountain site and require either a permit, consultation or agency approval. No applicable local or county environmental regulatory requirements have thus far been identified. The rationale for determining that other environmental regulations are inapplicable to site characterization as well as a list of

Federal and State environmental regulations that may be applicable to site characterization but do not require a permit, consultation, or agency approval are contained in Appendix B. It is emphasized, however, that future consultation with Federal and State agencies may require modification to Chapter 3.

If the plans for site characterization are modified during field studies, compliance with additional (or fewer) regulations may be required. Moreover, as new regulations of some Acts are implemented during the next several years modifications to planned additional compliance actions may become necessary.

Compliance with environmental statutes and regulations is viewed by the DOE as a process that will continue through the site characterization phase. Many permits, for example, require the permittee to comply with stipulated conditions during the period for which the permits are issued. Moreover, new regulations may become applicable during site characterization or an unexpected discovery at the site, such as the nest of a migratory bird, may require the DOE to comply with a specific law (in this example, the Migratory Bird Treaty Act). The compliance program consists of the following activities:

- o Compilation of this ERCP.
- o Consultations with Federal, State, and local agencies to identify the laws and regulations that these agencies consider to be applicable to site characterization at Yucca Mountain. Among the agencies that may be consulted are:

- U.S. Air Force
- U.S. Bureau of Land Management
- U.S. Fish and Wildlife Service
- U.S. Environmental Protection Agency
- U.S. Bureau of Indian Affairs
(and local Indian Tribes)
- U.S. Department of Transportation

U.S. Soil Conservation Service
U.S. Army Corps of Engineers
Nevada Division of Environmental Protection
Nevada Division of Water Resources
Nevada Department of Wildlife
Officials of Nye County, Nevada
Nevada Division of Health
Nevada State Historic Preservation Officer (and the Advisory
Council on Historic Preservation)
Nevada State Engineer

- o Compilation of information for applicable permits and submission of applications to appropriate Federal and State agencies. Conduction and documentation of formal consultations that are required by law. (The Health, Physics, and Environmental Division of DOE's Nevada Operations Office will have the responsibility for submitting all permit applications to the agencies).
- o Verification that all conditions specified in the permits are complied with during the period for which the permits are issued. Section 4.5 discusses a program of environmental compliance auditing to be implemented by the DOE. This program is still being developed by the DOE.
- o Conduction of periodic consultations (annually or semi-annually) with Federal, State, and local agencies to keep abreast of new or changing regulations that may be applicable to site characterization, and to inform the agencies of any changes to the site characterization program that may require compliance with existing or new regulations.

3.1 SOURCES OF INFORMATION

Determining the environmental requirements that relate to site characterization of Yucca Mountain is a three-part process. The first part is to develop an understanding of what site characterization will entail. The

second part is to gain an understanding of why specific environmental requirements have been developed, the type of activities that they regulate, and the methods by which the requirements are implemented. Finally, the third part requires an analysis of each site characterization activity in terms of whether it falls within the scope of the various environmental requirements under consideration.

The process outlined in the paragraph above has been conducted for many Federal and commercial projects and has resulted in a large body of generic information concerning environmental regulatory compliance. The DOE's own guidance manual for environmental compliance (U.S. DOE, 1981a) was a source of information, particularly the flow charts that outline the steps needed to comply with the various statutes. The DOE's guidance manual, however, does not include State environmental statutes and regulations (other than those Federal laws whose implementation and enforcement have been delegated to the State). Therefore, the Nevada Administrative Code, the Nevada Revised Statutes, and a report by the Nevada Bureau of Mines and Geology (1986) were used to evaluate the applicability of Nevada's environmental laws to site characterization of Yucca Mountain. Finally, detailed compliance actions for several laws are described in separate DOE Compliance Guides that are referenced in this chapter.

3.2 FEDERAL STATUTES AND EXECUTIVE ORDERS¹

This section identifies the Federal statutes, Executive Orders and their implementing regulations that, based on the plans for site characterization described in Chapter 2, will require compliance action by the DOE. For each statute and Executive Order, information is provided on (1) its purpose and its applicability to site characterization, (2) the requirements for obtaining the permit, (3) and the process by which the DOE will obtain the permit.

¹All Federal and Federally-delegated laws, as well as Executive Orders, DOE Orders, and implementing regulations discussed in this ERCP are cited in Chapter 6.

3.2.1 ANTIQUITIES ACT (16 USC 431, 432 and 433; 25 CFR 261;
36 CFR 296; 43 CFR 3 and 7)

3.2.1.1 Purpose and applicability

This Act and its regulations seek to protect historic and prehistoric ruins, monuments, and objects of antiquity (including paleontological resources) on lands owned or controlled by the U.S. Government.

The Act applies to all site characterization activities on land owned or controlled by the Federal government, and to all persons who enter on those lands.

3.2.1.2 Requirements

Any person who appropriates, excavates, injures, or destroys any historic or prehistoric ruin or monument or any object of antiquity situated on lands owned or controlled by the U.S. government must have the permission of the Secretary of that Department of the government having jurisdiction over the land. Failure to obtain such permission can result in fines of not more than \$500 or imprisonment for a period of not more than 90 days, or both (16 USC 433).

3.2.1.3 Process

Any person working on land owned or controlled by the U.S. Government, upon finding any historic or prehistoric ruin or monument, or any object of antiquity, must seek approval from the appropriate Federal agency that has jurisdiction over the land before appropriating, excavating, injuring, or destroying the object.

By virtue of having complied with the National Historic Preservation Act and the accompanying Programmatic Agreement (described in Section 3.2.11 of this report), the DOE will have identified the most reasonably anticipated objects subject to the controls under the Antiquities Act. If unanticipated ruins or protected objects are found, DOE will determine whether project activities are likely to affect them. If so, either the activity will be relocated, or permission will be obtained from the Federal agency that has jurisdiction over the land to excavate or otherwise affect the objects. Personnel will comply with the procedural terms of the Programmatic Agreement if protected objects are found. (See discussion of Programmatic Agreement under Section 3.2.11.)

The steps by which the DOE will comply with this and other laws related to the protection of archaeology and historic resources are shown in Figure 3-6 under the National Historic Preservation Act (Section 3.2.11).

3.2.2 AMERICAN INDIAN RELIGIOUS FREEDOM ACT (AIRFA) of 1978 (P.L. 95-341; 42 USC 1996; 36 CFR Part 296; 43 CFR Part 7)

3.2.2.1 Purpose and applicability

The purpose of the Act is to require Federal agencies to consider Indian religious values in undertaking land use projects.

AIRFA is applicable to all site characterization activities that could directly or indirectly affect sacred or religious sites of Native Americans.

3.2.2.2 Requirements

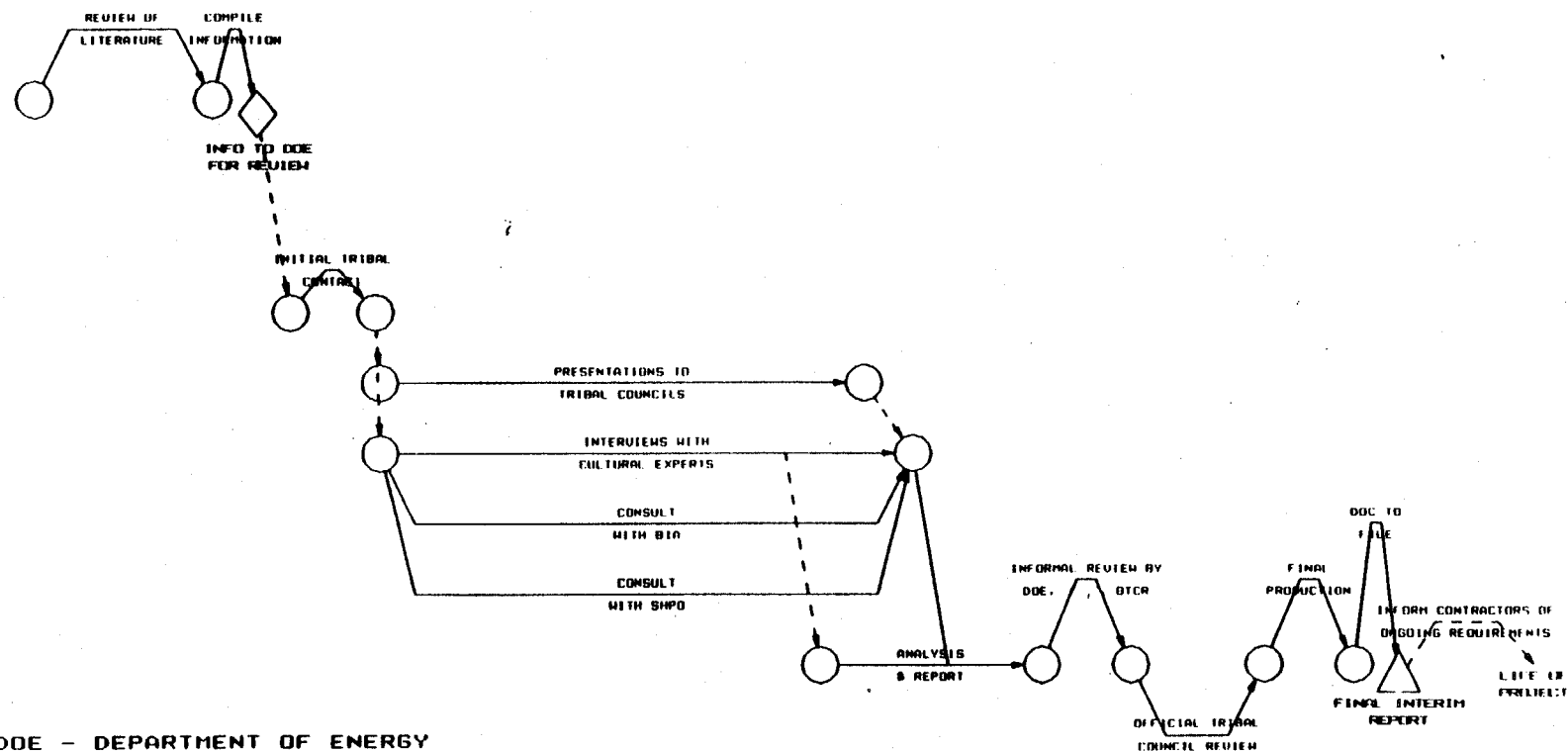
DOE is obligated to consider Indian religions values and avoid unnecessary interference with Indian religious practices.

3.2.2.3 Process

As shown in Figure 3-1, DOE first determines if a proposed project site is related to religious rites or is a sacred site of any Native American group. If the site is a subject of religious practice, DOE consults with Native American leaders to determine whether the DOE action would infringe on the free exercise of that religion. If such infringement is possible, DOE will prepare alternatives in consultation with Native American leaders and will evaluate which alternative will minimize impacts on Native American religious practices while still meeting the goals of DOE for the project.

The DOE has developed a Programmatic Agreement with the Advisory Council on Historic Preservation which describes (1) the steps to be taken by the DOE to ensure compliance with AIRFA and (2) to ensure that historic properties of cultural or religious value are identified and avoided. Under the stipulations in the Programmatic Agreement the DOE will consult with the Bureau of Indian Affairs and local tribes with current or historic ties to the land (such as the Western Shoshone) and other parties that have expressed interest, to ensure identification and notification of all potentially involved Native American groups. An ethnobotanist will investigate the site to locate plant resources that are of importance to Native Americans. The consultations will begin as soon as possible before site characterization commences, to assure that significant properties of traditional cultural or religious value to such groups are identified and avoided to the extent feasible.

FIGURE 3-1. AMERICAN INDIAN RELIGIOUS FREEDOM ACT



DOE - DEPARTMENT OF ENERGY

BIA - BUREAU OF INDIAN AFFAIRS

SHPO - NEVADA STATE HISTORICAL PRESERVATION OFFICE

* SYMBOLS ARE FOR INTERNAL DOE USE

If such properties are identified, and effects on them from site characterization cannot be avoided, the DOE will consult further with the Native American group(s) involved, the Nevada State Historic Preservation Officer and the Council on Historic Preservation to seek ways to mitigate the project's effects on such properties. The DOE will consider recommended mitigation measures. Consultation will be undertaken with reference to the Council's March, 1985, draft, "Guidelines for Consideration of Traditional Cultural Values in Historic Preservation Review."

Contact with Native American tribes regarding cultural or religious sites is also required by the Archaeological Resources Protection Act and its implementing regulations if archaeological investigations may disturb these locations (see Section 3.2.3 of this document).

3.2.3 ARCHAEOLOGICAL RESOURCES PROTECTION ACT (ARPA) of 1979 (16 USC Sections 470aa-47011; 36 CFR 296; 43 CFR 7)

3.2.3.1 Purpose and applicability

The purpose of this Act is to secure the protection of archaeological resources and sites which are on public lands and Indian lands, and to foster the exchange of information between involved individuals and entities. The DOE is obligated to do whatever is practicable to implement the purpose of this Act.

Prohibitions against vandalism are addressed in the ARPA and in the Programmatic Agreement developed between the DOE and the Advisory Council on Historic Preservation, particularly in the section dealing with worker education (see Section 3.2.11. Also, see discussion in Section 3.2.2 regarding planned consultations with Native Americans). The Act applies to all site characterization activities that affect Federal land.

3.2.3.2 Requirements

Compliance with the provisions of the National Historic Preservation Act (Section 3.2.11) will provide some safeguard that an adequate investigation has been conducted to identify historic resources potentially subject to the ARPA. Further safeguards would involve contacting local authorities, professional archaeologists, and private individuals having archaeological data. The Programmatic Agreement (PA described in Section 3.2.11) that was developed by the DOE in consultation and coordination with the Nevada State Historic Preservation Office and the Advisory Council on Historic Preservation (ACHP) is an alternative (prescribed in 36 CFR 800.13) to compliance with the individual procedural steps outlined in the ACHP regulations (see Section 3.2.11.2).

If there are archaeological resources discovered that will be disturbed during characterization, and it is necessary to excavate or remove them, approval must be secured from the Secretary of the DOE (for DOE land), or the Secretary of the U.S. Department of the Interior (for BLM land). Approval will be granted only if (1) the personnel proposed to remove the items are qualified to carry out the permitted activity; (2) the activities are undertaken for the purpose of furthering archaeological knowledge and are in the public interest; (3) the resources excavated will remain the property of the United States, with preservation of data by a suitable university, museum, or other specific or educational institution; and (4) the activity is not inconsistent with any management plan applicable to the public lands concerned (16 USC 470cc). If the approval is denied, the project may not proceed if the archaeological resources will be disturbed.

3.2.3.3 Process

DOE will comply with the terms of the Programmatic Agreement (see Section 3.2.11) in order to make every practicable effort in identifying archaeological resources and providing for their protection before excavations begin (see Figure 3-6).

In practice, the Desert Research Institute (DRI) has been and will continue to be employed by DOE's Nevada Operations Office to conduct pre-construction archaeological surveys for DOE operations in Nevada. DRI personnel conducting these surveys will have ARPA permits prior to disturbing any archaeological resources.

3.2.4 COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT (CERCLA) OF 1980, AS AMENDED BY THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) OF 1986 (42 USC 9601 et seq; 40 CFR 300, 302, 355, 370, and 372; Executive Orders 12286, 12288, and 12580)

3.2.4.1 Purpose and applicability

CERCLA (as amended by SARA) provides for the clean-up and emergency response for hazardous substances released into the environment and for the clean-up of hazardous waste sites which present a substantial danger to the public health and welfare. CERCLA also requires the notification of the National Response Center and appropriate agencies and officials when a release of a reportable quantity of a hazardous substance occurs. Title III, or the Emergency Planning and Community Right-to-Know Act of 1986, was added to SARA as a free-standing law to address emergency planning and community right-to-know reporting for "extremely hazardous substances" and reporting in OSHA defined "hazardous chemicals."

Site characterization activities at Yucca Mountain will involve the use of small quantities of hazardous substances. In the event of a release of a reportable quantity of a hazardous substance, certain provisions of the act will apply. A "Spill Contingency Plan" will be developed and all field personnel will be trained in the proper handling of hazardous substances and response procedures to be followed in the event of a spill. DOE will take actions, as appropriate, to clean up any spills or releases.

3.2.4.2 Requirements

There are no specific permits obtainable under the Act. In the event of a release of a reportable quantity of a hazardous substance, however, the DOE will notify the National Response Center who will then notify appropriate agencies and officials to initiate clean-up action, if necessary.

Title III of SARA created the Emergency Planning and Community Right to Know Act of 1986. This Act established requirements for emergency planning, spill reporting, and inventory reporting on hazardous and toxic chemicals. State and local emergency planning committees are to be established and are to prepare plans to respond to potential chemical emergencies. Owners and operators of facilities must immediately notify the local and State committees of releases beyond facility boundaries of reportable quantities (initially set at one pound) of substances reportable under CERCLA Section 103(a). Owners and operators that are required to prepare reports for hazardous chemicals under the Occupational Safety and Health Administration (OSHA) Hazard Communication Standard are also required to report information concerning their inventories to State and local authorities. If substances that are subject to Title III requirements are to be used during site characterization, DOE will follow and require its contractors to follow all appropriate reporting, training, and emergency response planning requirements.

3.2.4.3 Process

All hazardous substances used or generated during site characterization will be handled, transported, and disposed of according to Federal and State regulations (see Section 3.3.3). In the unlikely event of a release of hazardous substances, DOE will comply with notification requirements and initiate appropriate remedial action.

3.2.5. ENDANGERED SPECIES ACT OF 1973 (P.L. 93-205, as amended; 16 USC 1531-1543; 50 CFR Sections 17.11, 17.12, and 17.94-96; 50 CFR Parts 13, 222, 226, 227, 402, 424, and 450-453)

3.2.5.1 Purpose and applicability

The purpose of the Endangered Species Act is to ensure that each Federal agency that authorizes, funds, or carries out an action does not jeopardize the continued existence of endangered or threatened species or result in the destruction or adverse modification of their critical habitat.

Any Federal activity or Federally-supported activity requires compliance with the Endangered Species Act. Furthermore, any Federal activity that could potentially disrupt protected fish, wildlife, or vegetation, or habitat of these protected species, must avoid or mitigate all potentially adverse impacts.

3.2.5.2 Requirements

The DOE requested information from the U.S. Fish and Wildlife Service (FWS) on the presence of any listed species in the project area in a letter dated January 15, 1988. The FWS, in a letter dated February 23, 1988,

indicated that no listed or proposed threatened or endangered species exist in the project area. If such species are ever discovered in the project area, the DOE must evaluate, in consultation with the FWS, the impact of the project on these species, and develop plans to avoid or mitigate impacts to these protected species.

3.2.5.3 Process

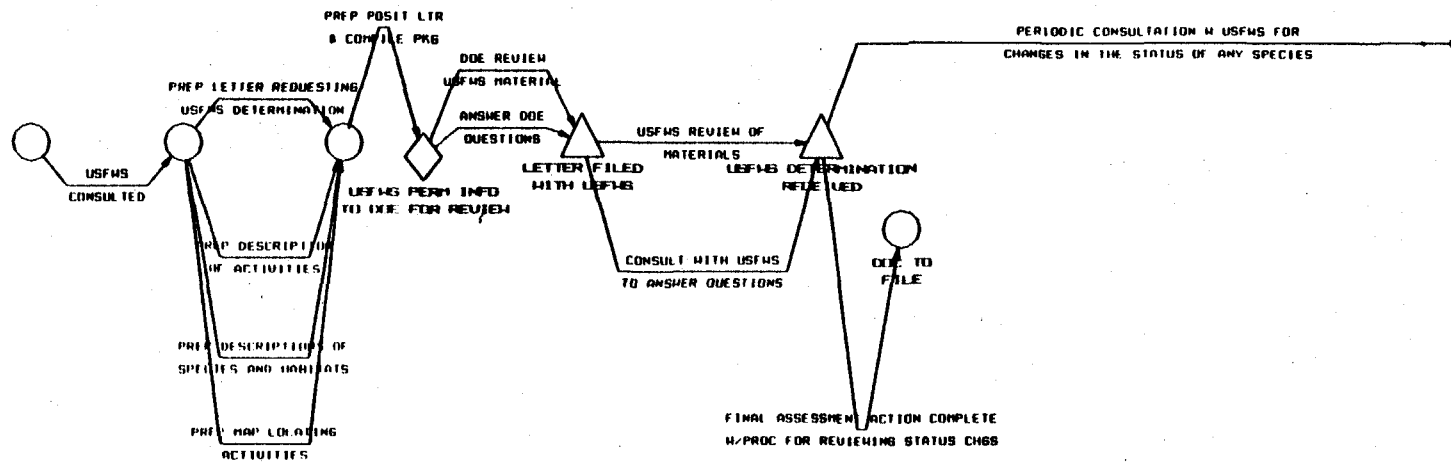
The steps by which the DOE will comply with the Endangered Species Act are shown in Figure 3-2, and described in detail by Salk and others (1982).

Correspondence with the FWS indicates that no threatened or endangered species occur at the Yucca Mountain site. Periodic consultations with the FWS, however, will be conducted by the DOE to ensure that compliance with the Endangered Species Act is maintained throughout the course of site characterization. Furthermore, it is the DOE's policy to conduct ecological surveys prior to any surface-disturbing activities associated with site characterization of Yucca Mountain.

The FWS maintain lists of species in three categories that are not protected under the Act, but are of concern and considered potential candidates for listing. Category 1 includes those for which there is enough biological information to support proposed listing as threatened or endangered; Category 2 includes species for which more information is required before a ruling can be made; and Category 3 includes species which, for one of several reasons, are no longer being considered for listing.

Currently, there are two species of concern at Yucca Mountain; the desert tortoise and the Fishhook cactus. In September 1984, FWS received a petition to list the desert tortoise, currently a Category-2 species, as a threatened or endangered species. In December 1985 (50 Federal Register 49868-49870), FWS ruled that the desert tortoise warranted listing throughout its geographic range, but that listing the species at this time was precluded by other pending proposals of higher priority. The FWS intends to

FIGURE 3-2. THE ENDANGERED SPECIES ACT



gather and evaluate additional information on the status of the tortoise and to decide whether to list the species throughout its range or to list only those populations currently facing the highest degree of threat. This finding does not change the current official status of the tortoise: it remains a Category-2 species. The likelihood is increased, however, that the species will eventually be listed as threatened and endangered. Should the FWS reclassify the desert tortoise as a threatened or endangered species, the ERCP will be updated to reflect this change in the species' status. If a desert tortoise is found during site characterization, mitigative measures will be undertaken to prevent any adverse impact from occurring.

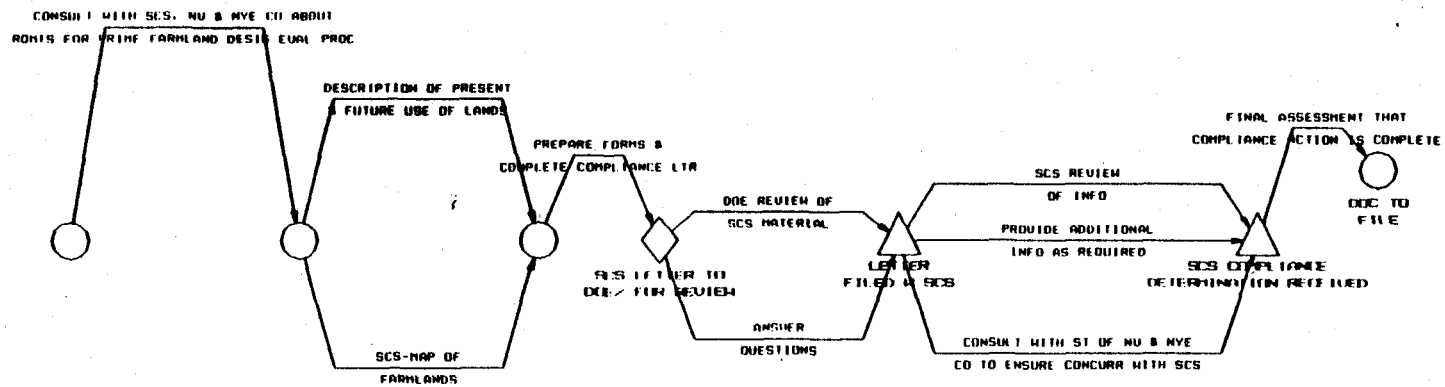
The Mojave fishhook cactus was recently dropped from Category-2 to Category-3 and thus will probably not be considered for listing. Considering the probable long duration of the Yucca Mountain Project, however, concern for this cactus may be renewed, and its candidacy as a threatened and endangered species could be forwarded at some time in the future.

3.2.6 FARMLAND PROTECTION POLICY ACT (FPPA) OF 1981 (P.L. 97-98; 7 USC 4201-4209; 7 CFR 658)

3.2.6.1 Purpose and applicability

The Farmland Protection Policy Act seeks to minimize the extent to which Federal programs contribute to the unnecessary and irreversible conversion of farmlands to nonagricultural uses.

FIGURE 3-3. PRIME FARMLAND ACT



SCS - SOILS CONSERVATION SERVICE
 NU - NEVADA
 CO - COUNTY

* SYMBOLS ARE FOR INTERNAL DOE USE

3.2.6.2 Requirements

Compliance with FPPA requires that the DOE determine whether there is any potential for site characterization to affect land designated either prime or unique, or farmlands of State or local importance.

Correspondence with the SCS indicates that no prime or unique farmland will be disturbed during site characterization. Consultation with the Nevada Department of Conservation and Natural Resources will also be conducted to determine if farmlands of State or local importance will be affected.

3.2.6.3 Process

The steps by which the DOE is complying, and will comply, with the FPPA are shown in Figure 3-3.

3.2.7 FEDERAL LAND POLICY AND MANAGEMENT ACT (FLPMA) OF 1976 (P.L. 94-579; 43 USC 1701-1784; 43 CFR 2800).

3.2.7.1 Purpose and applicability

FLPMA establishes U.S. policy with regard to government-owned lands administered by the Bureau of Land Management (BLM). Among other provisions, FLPMA makes it the policy of the U.S. Government that such lands be managed in a manner that will (1) protect the quality of scientific, scenic, historical, ecological, environmental, and archaeological values; (2) preserve and protect certain public lands in their natural condition; (3) provide food and habitat for fish and domestic animals; and (4) provide for outdoor recreation and human occupancy and use.

Federal activities requiring access to, and activity on, such public lands require compliance with FLPMA. Because the Yucca Mountain site is partly on BLM-administered public land and BLM-administered Air Force land, and because activities will occur on BLM lands, DOE compliance with BLM requirements for access and use of this land is mandatory.

3.2.7.2 Requirements

The DOE obtained access to BLM lands for site characterization through a Right-of-Way issued to the DOE by the BLM in January 1988 under the authority of FLPMA. The DOE is currently in negotiation with the U.S. Air Force regarding access to and use of Air Force lands at the site under Title V, Section 507 of FLPMA (Rights-of-Way for Federal Agencies).

In issuing the Right-of-Way, the BLM has stipulated specific environmental compliance actions that are required by the DOE. These actions include:

- o DOE is required to fulfill all requirements of the National Environmental Policy Act (see Section 3.2.10 of the ERCP) and all requirements for mitigation, stabilization, and rehabilitation as described in the Plan of Development and further listed in Sections 4.1.1.4 and 4.1.2.6 of the Yucca Mountain Environmental Assessment (U.S. DOE, 1986a). This responsibility will continue until the requirements are met, regardless of expiration of the Right-of-Way reservation.
- o Any required site specific environmental analyses necessary for DOE activities will be conducted by DOE and will be coordinated with BLM.
- o No hazardous materials will be disposed of on public lands.
- o Archaeological and threatened and endangered species surveys will be conducted by DOE prior to start of surface disturbing activities.

If antiquities including, but not limited to, archaeological items, paleontologic objects, or other objects of historical or scientific interest are discovered on the subject sites, the District Manager, BLM, in consultation with the State Historical Preservation Officer and the DOE, will determine the appropriate action to be taken. Until such action has been decided, DOE will ensure these items, objects, or conditions are left intact. Cultural resource reports will be made available to the BLM prior to surface disturbance at the site.

- o All desert tortoise found in areas where their continued presence constitutes a hazard to themselves, will be removed to a safe area (at least 150 yards from the surface disturbance). Construction personnel will be informed that collection of tortoises is prohibited and punishable by a minimum of \$100.00 fine.
- o Trenches, shafts, and bores shall be marked, fenced, or otherwise protected so as not to constitute a hazard to the public or to wildlife.
- o Core holes and wells containing potentially usable water should be left in a manner which facilitates their development as water sources. Prior to termination of the agreement or abandonment of the holes/wells, DOE will consult with BLM to determine if the holes will be sealed and capped, plugged back, or turned over to the BLM as is.

3.2.7.3 Process

The DOE will ensure compliance with the environmental requirements listed in Section 3.2.7.2 by "field compliance inspections" which are a component of the Environmental Regulatory Compliance Audit Program described briefly in Section 4.5.

3.2.8 HAZARDOUS MATERIALS TRANSPORTATION ACT (49 USC 1801-1812; 49 CFR 171-178)

3.2.8.1 Purpose and applicability

The Hazardous Materials Transportation Act (HMTA) provides regulatory and enforcement authority to the Secretary of Transportation to protect the Nation from the risks of transporting hazardous materials. These materials include explosives, flammable liquids and solids, combustible and corrosive materials, and compressed gases, to name a few.

Transport of all hazardous materials to Yucca Mountain for the purpose of site characterization must meet the requirements of the HMTA.

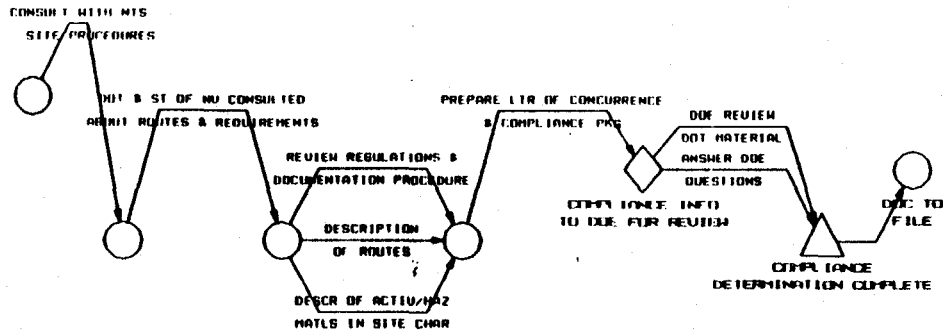
3.2.8.2 Requirements

Shippers, carriers, and handlers of hazardous materials are required to comply with the U.S. Department of Transportation (DOT) regulations in 49 CFR 171-178. The regulations include requirements for packaging, handling, labeling, placarding, and operational procedures for shipments of hazardous materials, including notification procedures in the event of a spill. Under the Resource Conservation and Recovery Act (Part 263) generators as well as transporters of hazardous waste are responsible for complying with DOT hazardous material transportation regulations (see Section 3.3.3).

3.2.8.3 Process

The steps by which the DOE will comply with the Hazardous Materials Transportation Act are shown in Figure 3-4.

FIGURE 3-4. HAZARDOUS MATERIAL TRANSPORTATION ACT



NTS - NEVADA TEST SITE

DOT - DEPARTMENT OF TRANSPORTATION

DOE - DEPARTMENT OF ENERGY

* SYMBOLS ARE FOR INTERNAL DOE USE

The DOE will ensure that its shippers/handlers of hazardous materials will comply with all applicable regulations of the DOT. Prior to any shipments of hazardous materials to Yucca Mountain, the DOE plans to consult with the DOT (as well as the Nevada DOT) to ensure that all DOT requirements will be satisfied during the course of site characterization.

3.2.9 MATERIALS ACT OF 1947 (30 USC 601-604; 43 CFR 3600 et seq.)

3.2.9.1. Purpose and applicability

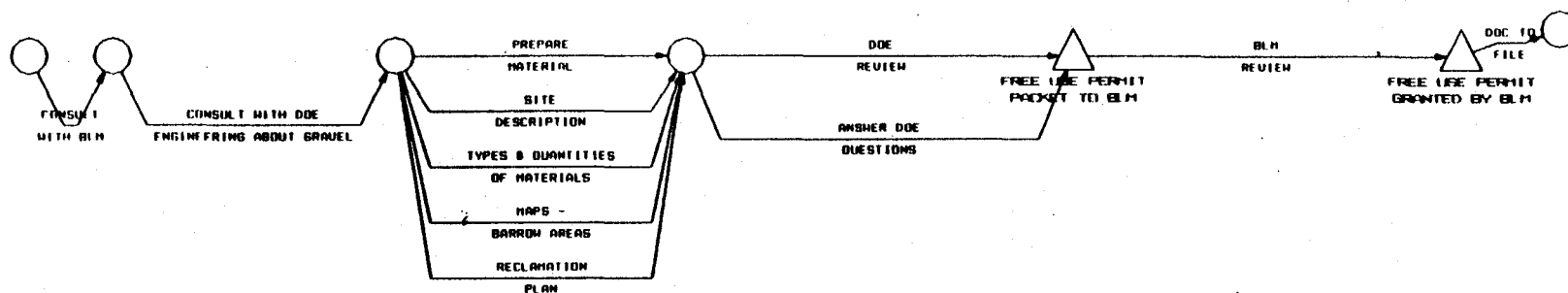
The Materials Act of 1947 authorizes the land-management agencies, such as the Bureau of Land Management (BLM) and the U.S. Forest Service, to make available to Federal and State agencies common varieties of sand, stone, and gravel from public lands. Use of these materials is authorized by the issuance of a Free-Use Permit to the Federal agency.

The Materials Act is applicable to site characterization of Yucca Mountain because borrow areas may be needed during site characterization. (A Free Use Permit is applicable only if the U.S. Government will be supplying the sand and gravel to its contractors. If the contractors will be supplying these materials from a borrow area on BLM land, the materials must be purchased from the BLM and therefore the Materials Act would not be applicable.)

3.2.9.2. Requirements

The DOE must file an application with the Las Vegas and/or Battle Mountain District Offices of the BLM for a Free-Use Permit. The application must contain, among other things, a description of the location of the proposed borrow area(s), the purpose for which the material will be used, and the amount of material that will be extracted.

FIGURE 3-5. THE MATERIALS ACT



BLM - BUREAU OF LAND MANAGEMENT

DOE - DEPARTMENT OF ENERGY

* SYMBOLS ARE FOR INTERNAL DOE USE

3.2.9.3. Process

The steps by which the DOE will comply with the Materials Act are shown in Figure 3-5.

If a Free Use Permit is needed, the DOE will complete application Form 5510-1 for a Free-Use Permit and submit it to the Las Vegas and/or Battle Mountain District offices of the BLM. Stipulations to the permit generally include requirements for restoring the surface after use.

3.2.10 NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) OF 1969 (42 USC 4321-4361; 40 CFR 1500-1508; Executive Order 11514, as amended by Executive Order 11991; 10 CFR 1021)

3.2.10.1 Purpose and applicability

The purposes of NEPA include the establishment of a national policy that encourages harmony between man and his environment, promotion of efforts that will prevent or eliminate damage to the environment, and enrichment of the understanding of ecological systems and natural resources.

The National Environmental Policy Act applies to those aspects of site characterization not specifically excluded by the NWPA. Section 112(e) of NWPA states that the recommendation of candidate sites for site characterization is "a preliminary decisionmaking activity" and specifies that "no such activity shall require preparation of an Environmental Impact Statement (EIS) under Section 102(2)(C) of NEPA...or require any environmental review under subparagraph (E) or (F)." Section 113(d) of the NWPA excludes actual site characterization activities from these same requirements.

3.2.10.2 Requirements

Environmental documentation of the effects of site characterization activities is required by NWPA Section 112(b) in the form of NWPA-defined Environmental Assessments (EAs). These were issued in draft form in December 1984 and in final form in May 1986. Moreover, the NWPA requires, in Section 114(f), that DOE prepare an Environmental Impact Statement (EIS) to accompany the recommendation by the Secretary of Energy to the President to approve a site for a repository. Preparation of this EIS requires the collection of environmental data during site characterization.

In conducting activities during site characterization, DOE must adhere to Sections 101(b), 102(2)(A), 102(2)(B), 102(2)(G), 102(2)(H), and 103 of NEPA. Sections 101(b), 102(2)(A), and 102(2)(H) are broad statements that pertain to overall protection of the environment by agencies implementing Federal programs. Section 101(b) stresses the Federal Government's responsibility to use the environment "without degradation, risk to health or safety, or other undesirable and unintended consequences."

Section 102(2)(A) of NEPA states that Federal agencies must also "utilize a systematic, interdisciplinary approach that will insure the integrated use of the natural and social sciences and the environmental design arts in planning and in decisionmaking which may have an impact on man's environment." Under Section 102(2)(H), Federal agencies must also "initiate and utilize ecological information in the planning and development of resource-oriented projects." NEPA also requires that Federal agencies have procedural mechanisms in place to comply with NEPA. Section 102(2)(B) requires agencies to identify and develop methods and procedures that will ensure that environmental values are given appropriate consideration along with economic and technical concerns. Section 103 requires agencies to review their statutory authorities, regulations, policies, and procedures to determine inconsistencies that would prohibit full compliance with NEPA. NEPA also ensures that interested parties are part of the NEPA process. Section 102(2)(G) requires agencies to make available to interested parties "advice and information useful in restoring, maintaining, and enhancing the quality of the environment."

3.2.10.3 Process

Title II of NEPA established the Council on Environmental Quality (CEQ) which has promulgated regulations for NEPA implementation (40 CFR Parts 1500-1508) which DOE adopted in 10 CFR Part 1021. DOE has developed NEPA compliance guidelines that are contained in 52 FR 47662, DOE NEPA Guidelines; and DOE Order 5440.1c, National Environmental Policy Act Procedures.

For site characterization activities, the DOE's Office of Civilian Radioactive Waste Management (OCRWM) has instituted an environmental program that is consistent with the general environmental protection goals and the systematic interdisciplinary approach required by NEPA. OCRWM's integrated environmental program, as summarized in the Environmental Program Overview (EPO), includes the development of an Environmental Monitoring and Mitigation Plan (EMMP), a Socioeconomic Monitoring and Mitigation Plan (SMMP), and an Environmental Regulatory Compliance Plan (ERCP; this document). The EMMP and SMMP outline DOE's approach to monitoring for, and mitigating significant adverse environmental and socioeconomic impacts that might occur during site characterization. The ERCP identifies environmental regulatory requirements that are triggered by specific site characterization activities, and outlines approaches to environmental regulatory compliance; the ERCP constitutes a major element of DOE's environmental program.

The SMMP and EMMP will continue to be revised by the DOE in response to discussions with representatives of Nevada. DOE is preparing Environmental Field Activity Plans (EFAPs) that cover the major environmental disciplines. These plans have several purposes, including the inclusion of technical data necessary to meet the environmental objectives of monitoring and mitigating any potentially significant adverse impacts that may occur during site characterization (see Section 3.2.7).

3.2.11 NATIONAL HISTORIC PRESERVATION ACT OF 1966, as amended (16 USC 470 et seq.; 36 CFR Parts 60, 61, 63, 65, 67, 68, and 800; Executive Order 11593) HISTORIC SITES, BUILDINGS, AND ANTIQUITIES ACT, as amended (16 USC 461-467), ARCHAEOLOGICAL AND HISTORIC PRESERVATION ACT (16 USC 469-469c)

3.2.11.1 Purpose and applicability

The goal of all the laws listed above, in terms of Federal activities, is to ensure consideration of the values of historic properties in carrying out Federal activities, and to make efforts to identify and mitigate impacts to significant historic properties. The National Historic Preservation Act (NHPA) is the principal authority to which the DOE will respond in regard to the protection of historic properties. NHPA requires all Federal agencies to take into account the effects of their undertakings (such as site characterization) on historic properties and to allow the Advisory Council on Historic Preservation an opportunity to comment. Historic properties are defined as any properties included in, or eligible for inclusion in, the National Register of Historic Places.

3.2.11.2 Requirements

Section 106 of the NHPA is the chief provision that requires action on the part of a Federal agency. Under 36 CFR 800, which implements Section 106, a Federal agency must undertake the following three-phase process, in consultation with the State Historic Preservation Officer (SHPO), as described below.

Phase 1--The agency must survey the area of potential impact and identify and evaluate any historic/prehistoric sites (includes sites, objects, or artifacts that are included in or eligible for inclusion in the National Register of Historic Places). Phase 2--If resources are identified,

the agency must make a determination of either "no effect," "no adverse effect," or "adverse effect" and document this determination for the Executive Director of the ACHP. Phase 3--If a finding is made of "no effect," or "no adverse effect," and the SHPO and the ACHP do not object to this finding, the agency may proceed with the project. If the determination is "adverse effect," the agency must consult with the SHPO and the ACHP to consider alternatives or mitigating measures.

This process may be modified upon agreement between the agency and the ACHP to design an approach which is tailored to meet the needs of a specific program. This is done by development of a PA, as authorized in 36 CFR 800.13.

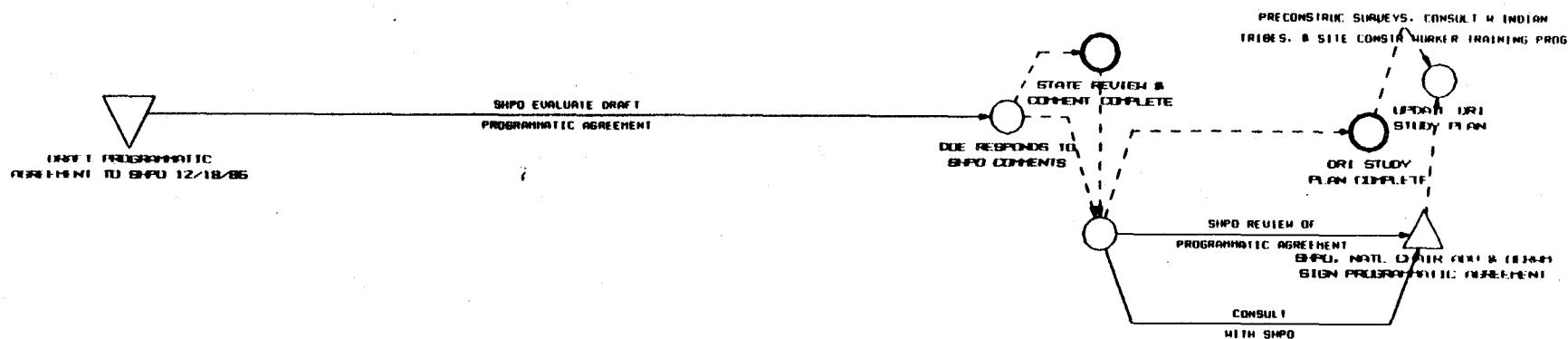
3.2.11.3 Process

Figure 3-6 shows the steps needed to comply with the NHPA and other laws related to historic preservation and archaeology.

The DOE has worked closely with the Advisory Council on Historic Preservation, the National Conference of State Historic Preservation Officers, and the Nevada State Historic Preservation Officer to develop a PA for site characterization at Yucca Mountain. Comments from all participants have been incorporated into the PA by DOE. The SHPO has been invited to comment, and to be a consulting party. Although the SHPO has chosen not to be a signatory, the SHPO has worked closely with DOE to ensure that their substantive concerns are met. The Council's regulations require only that the Department and the ACHP sign the agreement for it to be valid. DOE will continue to consult with the SHPO.

By complying with the stipulations in the Programmatic Agreement (including monitoring, research, data recovery, surveys in areas not previously studied, consultation with other agencies, the development of a

FIGURE 3-6. NATIONAL HISTORICAL PRESERVATION ACT & RELATED ACTS



DRI - DESERT RESEARCH INSTITUTE

SHPO - NEVADA STATE HISTORICAL PRESERVATION OFFICE

DOE - DEPARTMENT OF ENERGY

* SYMBOLS ARE FOR INTERNAL DOE USE

program of worker education, and resolution of disputes) the DOE will comply with its responsibilities under Section 106 of the NHPA.

Pre-construction archaeological surveys are routinely done by the Desert Research Institute for all DOE projects in Nevada. Since 1977, the DOE has been conducting systematic cultural resource surveys on the Nevada Test Site, and many properties that are potentially eligible for the National Register have already been identified. Cultural resource reviews have been prepared for Yucca Mountain, Ranier Mesa, and Pahute Mesa, and intensive archaeological surveys have identified and evaluated more than 200 cultural sites on more than 17 square miles of Yucca Mountain. Test excavations have been conducted at 29 sites at and near Yucca Mountain and long-term research objectives have been identified.

3.2.12 THE NOISE CONTROL ACT OF 1972, AS AMENDED BY THE QUIET COMMUNITIES ACT OF 1978 (42 USC 4901-4918, Executive Order 12088)

3.2.12.1 Purpose and applicability

The purpose of the Act is to promote an environment that is free of harmful and damaging noise.

The Act applies to noise-generating site characterization activities.

3.2.12.2 Requirements

Federal agencies must carry out their programs in a manner that promotes an environment free of noise that could jeopardize public health or welfare. Federal agencies must also comply with State and local requirements for the

control and abatement of environmental noise. To date, no State and local noise abatement requirements have been identified.

3.2.12.3 Process

There are no specific Federal, State, or local compliance standards for environmental noise control or abatement that are applicable to the Yucca Mountain area. DOE will monitor noise-generating activities during site characterization and mitigate, to the extent practicable, those activities deemed potentially harmful.

3.2.13 EXECUTIVE ORDER 11988; FLOODPLAIN MANAGEMENT (1977; as amended by EO 12148) (10 CFR Part 1022)

3.2.13.1 Purpose and applicability

Executive Order 11988 requires that each Federal agency take action to reduce the risk of flood damage, minimize the impact of floods on human safety, health, and welfare, and restore and preserve the natural and beneficial values served by floodplains.

Compliance with Executive Order 11988 is required for all Federal and Federally-supported activities and projects. Specific compliance actions are required if activities are planned within a defined 100-year floodplain.

3.2.13.2. Requirements

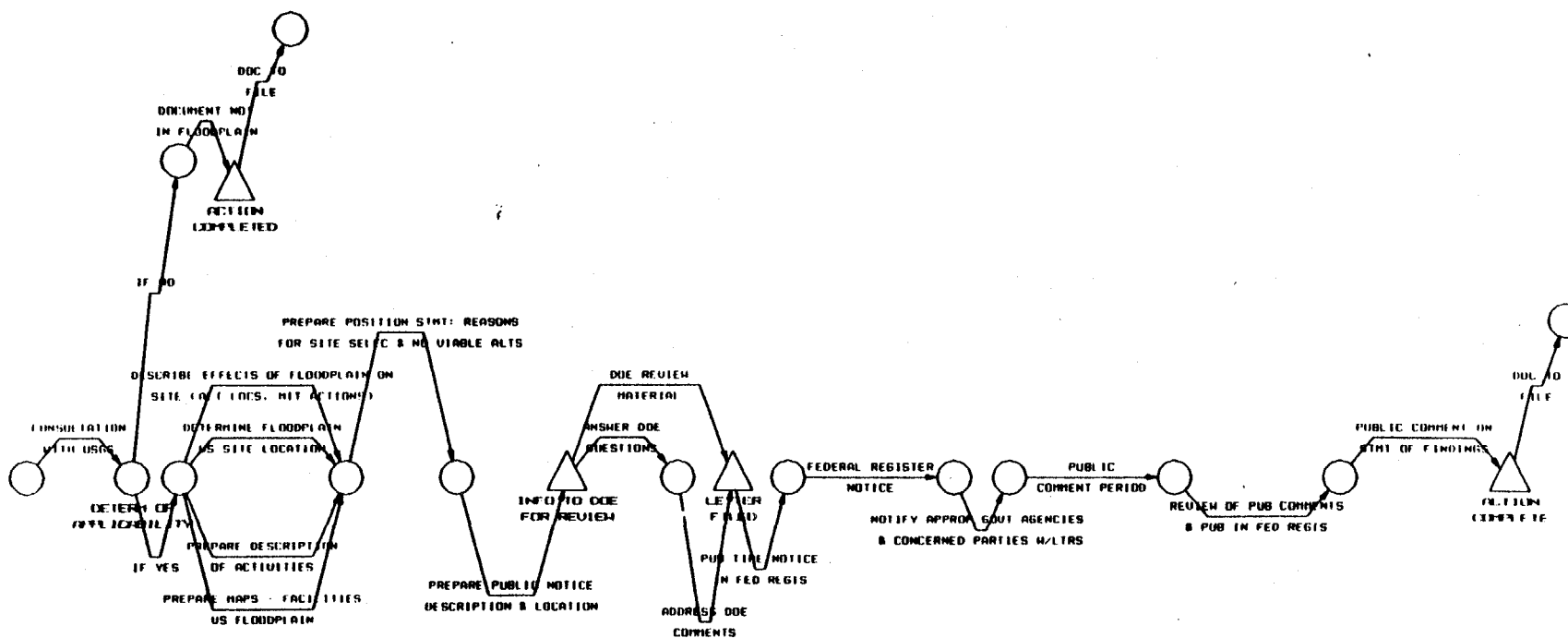
The DOE determines whether any site characterization activities will occur within a 100-year floodplain. If not, the project proceeds. If activities are planned within a floodplain, the DOE must consider alternatives and mitigating measures to the action. If, after considering design changes, activity in the floodplain is still required, the DOE must prepare a public notice of the proposed action; solicit and evaluate substantive comments; and re-evaluate the practicality of alternatives. If alternatives are not practicable, the DOE must attempt to modify its actions through design changes to minimize potential harm to the floodplains. If no suitable alternative exists, the DOE's Assistant Secretary for Environment must publish a Statement of Findings in the Federal Register.

3.2.13.3. Process

The steps by which the DOE will comply with Executive Order 11988 are shown in Figure 3-7.

The DOE determines first whether the Yucca Mountain site contains floodplains as defined in the Executive Order. The DOE's implementation of EO 11988, presumably extends to normally-dry washes such as those at Yucca Mountain; thus, the EO may apply to site characterization of Yucca Mountain. The DOE will then gather all available maps of the area that show flooding potential. If proposed activities fall within the 100-year floodplain, the DOE will publish a notice of proposed action and evaluate alternatives to the proposed locations in a "Floodplain Assessment." The public notice will describe the proposed action and where the action will take place. Fifteen days will be allowed for public comment. At the same time, the DOE will notify appropriate Federal, State, and local agencies and interested groups. A floodplain assessment of the proposed action and the alternatives considered will be prepared, along with mitigating measures to avoid potential harm to the floodplains. A 3-page Statement of Finding (maximum) will then be published in the Federal Register and distributed to appropriate

FIGURE 3-7. FLOODPLAIN MANAGEMENT (EO 11988)



USGS - U. S. GEOLOGICAL SURVEY

DOE - DEPARTMENT OF ENERGY

FED REGIS - FEDERAL REGISTER

* SYMBOLS ARE FOR INTERNAL DOE USE

ALT - ALTERNATE.

LOC - LOCATIONS.

MIT - MITIGATION

STMT - STATEMENT.

agencies and parties. A 15-day public review of the Statement of Finding is the final step in the compliance process.

The applicability of the floodplain regulations to activities that are remote from the exploratory shaft facility, such as drill and trench sites located in small, dry washes, will be determined by the DOE through consultations with BLM.

3.2.14 EXECUTIVE ORDER 11990; PROTECTION OF WETLANDS (1977) (10 CFR Part 1022)

3.2.14.1 Purpose and applicability

The intent of Executive Order 11990 is to avoid, to the extent practicable, the long- and short-term adverse impacts of destroying or modifying wetlands, and to avoid direct or indirect support of new construction in wetlands if there is a practicable alternative.

Compliance with Executive Order 11990 is required for all Federal and Federally-supported activities and projects.

3.2.14.2 Requirements

The DOE will determine if site characterization will adversely affect wetlands. If not, the project proceeds. If activities are planned within wetlands, the same requirements as those outlined in 3.2.13.2 (Floodplains) must be followed except that no Statement of Findings is required for a wetland.

3.2.14.3 Process

The steps by which the DOE will comply with Executive Order 11990 are shown in Figure 3-8.

Wetlands are defined in Section 7(c) of Executive Order 11990 as areas that are inundated by surface or groundwater with a frequency sufficient to support vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Based on this definition, the location and extent of wetlands that may be affected by site characterization activities will be determined. After a determination of which wetlands are to be affected, the general procedure described in Section 3.2.14.2 (Wetlands) will be followed.

3.3 FEDERAL ENVIRONMENTAL REGULATORY AUTHORITIES DELEGATED TO THE STATE OF NEVADA

This section identifies and describes the Federal statutes whose implementation and enforcement have been delegated to the State of Nevada by the Federal Government.

3.3.1 CLEAN AIR ACT as amended (P.L. 95-95; 42 USC 7401-7642; 40 CFR 50-53, 58, 60-61, 81.300-81.400, 124; EO 11738; EO 12088; NRS 445.401 et seq; Nevada Administrative Code 445.430-445.995)

3.3.1.1 Purpose and applicability

The Clean Air Act establishes Federal policy to protect and enhance the quality of the Nation's air resources so as to protect public health and welfare. The Act ensures, through a State-issued permit program, that adequate steps are taken to control the release of air contaminants from industrial processes and land-disturbing activities.

The U.S. EPA approved Nevada's plan to implement and enforce the Clean Air Act in 1980 [Nevada's State Implementation Plan (SIP); 1980 is the date of most recent approval of the SIP, but it does not delegate authority to Nevada to regulate radioactive air-emissions, which was and still is retained by the U.S. EPA]. The Nevada Division of Environmental Protection within the Nevada Department of Conservation and Natural Resources is the agency responsible for implementing and enforcing the Clean Air Act in Nevada. Section 118 of the Clean Air Act requires Federal agencies to comply with all Federal, State, interstate, and local requirements, administrative authority, and process and sanctions respecting the control and abatement of air pollution in the same manner, and to the same extent, as any non-governmental entity.

Site characterization activities such as construction and operation of the exploratory shaft, operation of concrete-batch plants, and land disturbances from field testing and site preparation will generate particulate and gaseous emissions of air pollutants. Most particulates will be generated by drilling, blasting, rock removal and storage, operation of the concrete-batch plant, surface grading and leveling, wind erosion, vehicle travel, and from diesel and gasoline engines.

Because Yucca Mountain is in an "unclassified" area where the existing air quality is probably better than State and Federal ambient air-quality standards (an attainment area), emissions associated with site characterization are subject to examination under the Clean Air Act's regulations on Prevention of Significant Deterioration (PSD). Initial analyses reported in the Environmental Assessment of Yucca Mountain (U.S. DOE, 1986a) indicate that air emissions would be considerably less than the 250-ton per year threshold for each pollutant that would classify the source as major; thus, PSD permitting will probably not be required and it is not discussed further in this section.

A Registration Certificate and an Operating Permit for disturbing the surface will be required because site characterization will disturb more than 20 acres of land per year (this is the minimum acreage of surface disturbance per year that triggers permit requirements). Furthermore, a new concrete-batch plant, if one must be built, will also require Registration Certificates and Operating Permits because the plant will exceed a process weight rate of 50 lbs per hour. The requirements for obtaining Registration Certificates and Operating Permits are described in the next section.

3.3.1.2 Requirements

The requirements described below for obtaining Registration Certificates and Operating Permits are summarized directly from Nevada's regulations governing air quality (Nevada Administrative Code (NAC) 445.430 through 445.945) and from Sigal (1982).

The Air Quality Officer (AQO) in the Nevada Division of Environmental Protection (under authority of the NAC) requires that each new source of air contaminants have both a Registration Certificate and an Operating Permit. The Registration Certificate is a document issued and signed by the AQO certifying that (1) adequate empirical data for the source of air contaminants have been received and that issuance of the certificate constitutes approval of location for the source, or (2) if the source is a point source, an environmental evaluation (if required by the AQO) has been submitted in accordance with Nevada's air-pollution regulations and that issuance of the certificate constitutes approval of location and construction.

An Operating Permit, issuable only if the operator has a valid Registration Certificate for the source and can demonstrate compliance with the NAC and the permit conditions, is signed and issued by the AQO for operation of the new source of air contaminants.

For several of the sources at Yucca Mountain, such as surface disturbances, the Registration Certificate and Operating Permit will be applied for at the same time.

Registration Certificates:

Registration Certificates are required for all new sources (property and/or equipment) that may emit air contaminants. Exemptions to these requirements that are pertinent to site characterization at Yucca Mountain include air-conditioning equipment or fuel-burning equipment that has a heat-input rating of less than 4,000,000 Btu per hour; motor vehicles and internal combustion engines; incinerators with rated burning capacity of less than 25 lbs per hour; storage containers for gasoline, petroleum distillates, or other volatile organic compounds having a capacity of less than 40,000 gallons; equipment used solely for the processing of food for human consumption; disturbing less than 20 acres per year of topsoil; and process weight rates of less than 50 lbs per hour.

A separate Registration Certificate is required for each new single source of contaminants prior to the commencement of the activity generating

the contaminants. For surface disturbances at the site such as field activities, road building, drill-pad construction, and surface preparation for the exploratory shaft facility, the AQO can issue one Registration Certificate covering all surface-disturbing activities. The AQO may require an environmental evaluation of the adverse impacts of the proposed emissions (Nevada Administrative Code 445.710); therefore, the Environmental Assessment of Yucca Mountain (U.S.DOE, 1986) will also be sent to the AQO. A Registration Certificate expires if construction of the new source is not started within 1 year of its issuance or if construction is delayed 1 year after it began. A \$10 fee is charged for each certificate. The information required for a Registration Certificate includes a flow diagram of the process (if it is an industrial process), a plot plan of the facility, U.S. Geological Survey maps showing the location(s) of facilities and (or) areas of land disturbance, and, if desired by the applicant, the results of computer models that demonstrate compliance with ambient air-quality standards.

At the current time it is likely that a concrete-batch plant on the Nevada Test Site will be used at its current location to supply concrete for preparation of the surface facilities at the exploratory shaft site. This plant is already permitted by the NDEP. However, if that plant is moved, a Change-of-Location form must be submitted to the AQO. Concrete to be used for lining the two exploratory shafts will be supplied by a new concrete-batch plant that will be constructed at the site of the exploratory shaft facility; this plant will need both a Registration Certificate and an Operating Permit. Information to be included with the application for a Registration Certificate should be sufficient for the AQO to make an evaluation of air-quality impacts resulting from the plant.

The Registration Certificate for a point source will be denied if (1) the point source will prevent the maintenance of State and National ambient air-quality standards; (2) is contrary to the State's air-pollution control strategy; (3) will cause a violation of 40 CFR 60-61 (New Source Performance Standards and National Emission Standards for Hazardous Air Pollutants); or

(4) if the best available control technology is not defined and adopted as an emission limitation for the source.

Operating Permits:

An Operating Permit is required within 180 days after start up for each new source that emits or may emit air contaminants. It is a document issued and signed by the AQO that approves the operation of a new or existing single source of air contaminants; it may or may not include stipulations. A valid Registration Certificate for the source must be in-hand before an Operating Permit is issued.

An Operating Permit must be granted if the AQO finds (from an appropriate test at the new source) that the source will not result in any violation of the State air-quality standards or regulations or 40 CFR 60-61 (New Source Performance Standards and National Emission Standards for Hazardous Air Pollutants). A denial of an application for an Operating Permit must be accompanied by a statement of the reasons for the denial. Operating Permits must be posted conspicuously at or near the source. A \$50 fee is charged for each Operating Permit, and the permits must be renewed (if still needed) 5 years after the date of issuance for a fee of \$50 each. Requests for renewal must be made in writing to the AQO at least 30 days prior to the expiration date of the current Operating Permit.

After obtaining an Operating Permit(s), the operator (in this case the DOE) is responsible for maintaining emissions of air pollutants within the limits specified in the permit. If limits are exceeded or if scheduled maintenance or equipment malfunctions occur, the operator is required to inform the AQO within 24 hours and prepare a written report to be sent to the State within 15 days of the event (Nevada Administrative Code 445.667). An operating permit can be revoked if the source is not operating within the limits of its permit or if the AQO determines that there has been a violation of State or Federal ambient air quality standards.

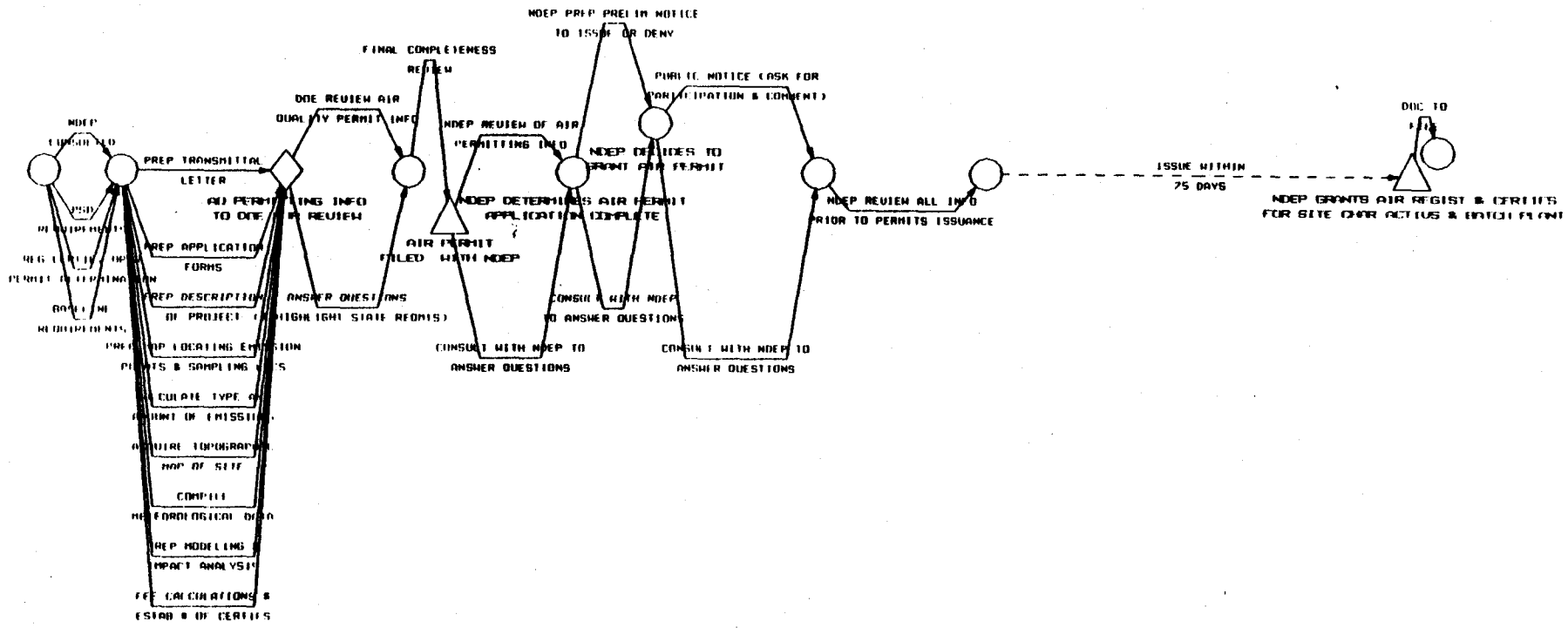
3.3.1.3 Process

The steps required by the DOE to comply with the Clean Air Act are shown on Figures 3-9 and 3-10.

The DOE prepares two application forms and submits them to the AQO for Registration Certificates covering (1) surface disturbances, and (2) the new batch plant (an application for an Operating Permit covering surface disturbances will be applied for at the same time). Within 5 working days after receiving the applications, the AQO will determine if any additional information is required. Within 15 days after receiving adequate information, the AQO will make a preliminary determination to either issue or deny the Registration Certificates. The application, and the AQO's review and preliminary decisions, must be made public in Carson City and at a site close to Yucca Mountain for a period of 30 days for public comment. All comments must be made in writing to the AQO within 30 days after the public announcement. A public hearing may be convened on the basis of the comments or at the discretion of the AQO. Within 75 days after receiving adequate information (and, if required, the public hearing), the AQO will issue or deny the Registration Certificates.

Assuming that a Registration Certificate and an Operating Permit are issued for surface disturbances, an Operating Permit for the concrete-batch plant will be applied for within 6 months after receiving its Registration Certificate. Assuming that air-quality violations do not occur after issuance of the Registration Certificates, Operating Permits must be granted if the AQO finds (from an appropriate test at the new source) that the sources will not result in any violation of the State air-quality regulations or 40 CFR 60-61 (New Source Performance Standards and National Emission Standards for Hazardous Air Pollutants). A denial of an application for an Operating Permit must be accompanied by a statement of the reasons for the denial. Operating Permits must be renewed 5 years after their date of issuance.

FIGURE 3-9. CLEAN AIR ACT - REGISTRATION CERTIFICATES

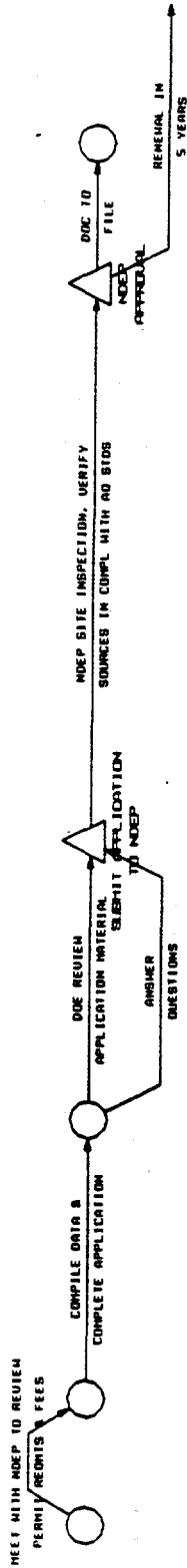


NDEP - NEVADA DEPARTMENT OF ENVIRONMENTAL PROTECTION
 PSD - PREVENTION OF SIGNIFICANT DETERIORATION
 REG - REGISTRATION
 PREP - PREPARE
 DOE - DEPARTMENT OF ENERGY

* SYMBOLS ARE FOR INTERNAL DOE USE

3-44

FIGURE 3-10. CLEAN AIR ACT - OPERATING PERMIT



NDEP - NEVADA DEPARTMENT OF ENVIRONMENTAL PROTECTION

DOE - DEPARTMENT OF ENERGY

AD - AIR QUALITY

STDS - STANDARDS

* SYMBOLS ARE FOR INTERNAL DOE USE

3.3.2 FEDERAL WATER POLLUTION CONTROL ACT, as amended by the CLEAN WATER ACT OF 1977 AND THE WATER QUALITY ACT OF 1987 as amended (33 USC 1251-1376; 33 CFR 209, 320, 323-330; 40 CFR 110, 112, 116, 117, 121, 122-125, 129, 133, 136, 230, 401, and 403; EO 11735; EO 12088; Nevada Administrative Code 445.70-445.241)

3.3.2.1 Purpose and applicability

The various Acts cited in this section are referred to collectively throughout the remainder of this report as "the Clean Water Act." The Clean Water Act establishes Federal policy to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. Among other things, the Act provides for the U.S. EPA or Federally-authorized States to implement permit programs for regulating the discharge of pollutants to the navigable waters from any point source [Title IV of the Act--Permits and Licenses; Section 402, the National Pollutant Discharge Elimination System (NPDES), is enforced by the State of Nevada]; Federal effluent limitations for direct dischargers, and pre-treatment standards for dischargers into publicly-owned treatment works (Title III of the Act; enforced by the U.S. EPA); a program to regulate oil and hazardous substances (Section 311 of the Act); and a permit system for the use of dredge and fill material (Section 404 of the Act; administered by the U.S. Army Corps of Engineers).

Because site characterization does not involve the use of fill and dredge material in navigable waters, a Section 404 permit from the U.S. Army Corps of Engineers is not required (this will be verified through correspondence with the Corps). Except for the NPDES program discussed below, all other parts of the Clean Water Act are considered to be inapplicable to site characterization of Yucca Mountain.

On September 9, 1975 the U.S. EPA approved Nevada's NPDES permit program and authorized Nevada to implement and enforce this program. The Nevada Division of Environmental Protection within the Nevada Department of Conservation and Natural Resources is the agency that is responsible for issuing or

denying NPDES permits. Section 313 directs Federal agencies to comply with all Federal, State, interstate, and local requirements, administrative authority, and process and sanctions respecting the control and abatement of water pollution in the same manner, and to the same extent, as any non-government entity.

In the Clean Water Act the term navigable waters is defined to mean "Waters of the United States," which are defined by EPA regulations to include essentially all surface waters. Excluded, however, are waste treatment systems, including ponds or lagoons designed to meet the requirements of the Clean Water Act (other than cooling ponds) so long as these systems were not originally created in waters of the United States nor resulted from the impoundments of waters of the United States (40 CFR 122.2). Based on this exclusion, a sewage lagoon constructed at Yucca Mountain, or a septic-tank system constructed in unsaturated alluvium, would not require an NPDES permit under the Clean Water Act.

An NPDES permit may be required for discharges from the mine waste-water pond, disposing of sewage at Yucca Mountain, or from other minor discharges including pump tests that would discharge relatively small volumes of water at the surface. Under authority of Nevada Administrative Code 445.142, the State could conclude that an NPDES permit is not required for site characterization and would inform the DOE of this determination in writing; this determination would constitute final action by the State on the DOE's application (Nevada Administrative Code 445.142; Section 4). The sections below describe what would be required of the DOE in the event that an NPDES permit was required (Section 3.3.2.2), and the process by which the DOE would acquire the permit and comply with its terms (Section 3.3.2.3).

3.3.2.2 Requirements

The requirements described below are summarized directly from Nevada's regulations on NPDES permits (Nevada Administrative Code 445.140 through 445.178) and from Hunsaker (1982).

The DOE must submit a completed application form, along with a fee, to the Water Quality Officer (WQO) in the Nevada Division of Environmental Protection. The application must be received by the WQO not less than 180 days in advance of the date on which discharges are expected to begin. The WQO may require additional information if the application is incomplete; processing the application will be delayed until this information is available to the WQO. Information required for the application includes the type and volume of waste water discharged to the surface (sanitary wastes, process wastes, etc.), where the wastes will be discharged (well, lagoon, etc.), the number of separate discharge points, and whether the discharges could contain certain substances.

The application can be for one or more discharge points, but for each additional point of discharge the DOE must include \$25. Discharge points (in addition to sewage) that could be added to the NPDES permit application form include discharges from the mine waste-water pond, the rock-storage pile, and miscellaneous pump tests. Before issuing a public notice (and under the assumption that an NPDES permit is required) the WQO will make a preliminary determination to either issue or deny the permit. If the tentative decision is to issue the permit, a draft permit is prepared that (1) identifies the proposed effluent limitations pursuant to Nevada Administrative Code 445.155, (2) contains a schedule for complying with the effluent limitations pursuant to Nevada Administrative Code 445.156, and (3) describes any other special conditions of the permit. Considering that neither surface nor groundwater will be affected to any degree by discharges during site characterization, it seems very unlikely that a permit would be denied.

A public notice of an application for an NPDES permit, and the WQO's proposed determination to either deny or issue the permit, will be advertised in newspapers and by mailings to interested or potentially interested parties. Comments on the application are received by the WQO for 30 days after the date of the public notice, although the comment period can be extended at the discretion of the WQO. The WQO will also identify appropriate Federal, State, and local agencies of the application, and send these agencies a fact sheet about the proposed discharges for their comment.

If sufficient interest in the application is voiced during the comment period, and requests for public hearings are made, the WQO will hold a public hearing at a site near the proposed discharge. The notice for the hearing must be 30 days in advance of the hearing; 60 days could elapse from the initial public notice to the actual hearing.

The WQO will notify the DOE in writing whether the NPDES permit will or will not be issued. If issued, the permit is valid for no more than 5 years (the expiration date will be recorded on the permit). Renewal of the permit must be made to the WQO within 180 days of expiration, and the same procedures as those described above for the initial application must be followed for the renewal.

NPDES permits may contain written effluent limitations that must be complied with by the DOE. These limitations are based on a variety of criteria including the effects of the discharge on the receiving waters and the use of these receiving waters (Nevada Administrative Code 445.155). Because discharges at Yucca Mountain will have no effect on existing waters, it seems unlikely that very stringent limitations would be imposed on such a permit or that a compliance schedule would be necessary. The permit may also require, at the WQO's discretion, the installation, use, and maintenance of equipment to monitor specified pollutants, and that the records of monitoring be maintained (generally for three years). If monitoring is required, the results of the monitoring will be reported to the WQO on a schedule specified in the permit, but not less than once a year.

The WQO has the authority to enter any premises where a permitted discharge is located to access and copy records, to inspect monitoring equipment, and sample discharges. The costs of any tests associated with these visits are the responsibility of the DOE.

Any modifications to the facility or increases in the rate or type of permitted discharge must be reported to the WQO. If the modifications exceed permit conditions, a new NPDES permit must be obtained. An NPDES permit can

be modified, suspended, or revoked by the WQO if, among other things, the terms of the permit are violated.

3.3.2.3 Process

Figure 3-11 shows the steps to be taken by DOE to comply with the Clean Water Act.

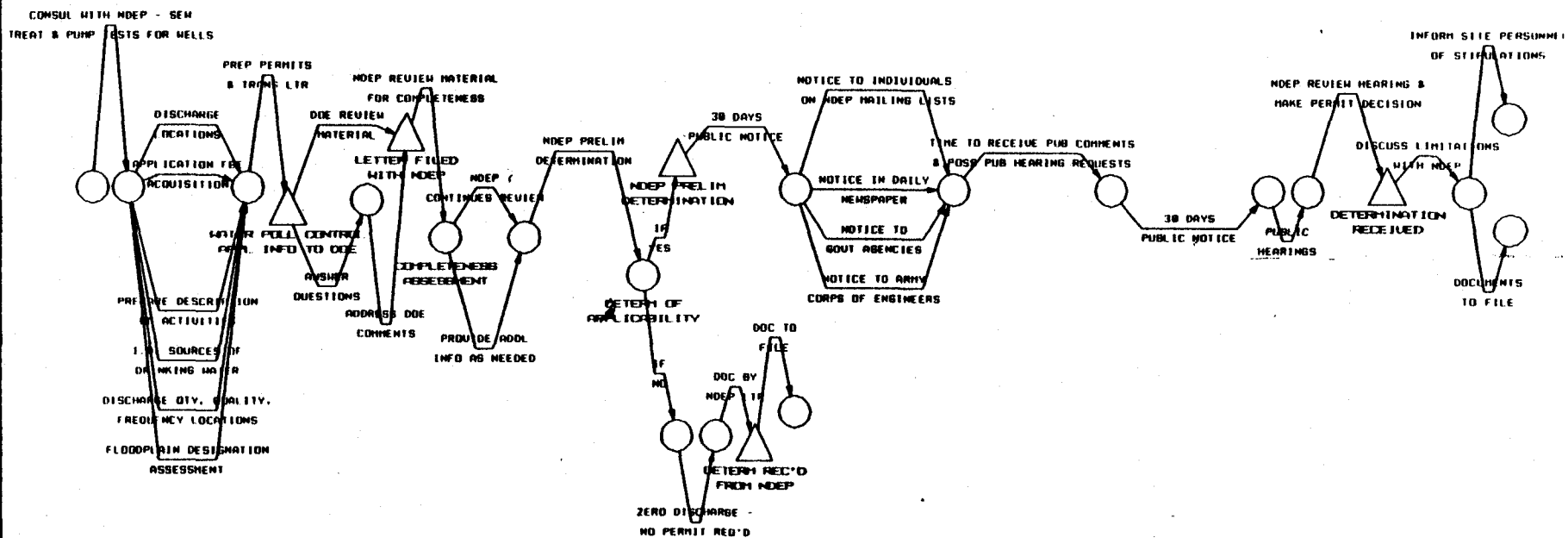
The DOE files an application for an NPDES permit within 180 days prior to any planned discharges. A copy of the Environmental Assessment of Yucca Mountain (U.S. DOE, 1986a), which describes the surface and underground waters in the vicinity of Yucca Mountain, may also be supplied with the application. The WQO may determine that the DOE does not need an NPDES permit and this would constitute final action on the permit application. If, however, a permit is required, a 30-day period for public comment will be made available by the WQO, and this could be followed by an additional 30 days for preparation of a public hearing.

3.3.3 RESOURCE CONSERVATION AND RECOVERY ACT OF 1976, as amended (P.L. 94-580; 42 USC 6901-6987; 40 CFR 124, 240-247, 260-264, 266, 270, 271, and 280; NRS 459.400 et seq. Nevada Administrative Code 444.570 through 444.748, and 444.842 through 444.9335)

3.3.3.1 Purpose and Applicability

The Resource Conservation and Recovery Act (RCRA) is a comprehensive program for regulating and managing hazardous wastes (Subtitle C), non-hazardous solid wastes (Subtitle D), and underground storage tanks (Subtitle I), and promoting the use of recycled and recovered materials (Subtitle F).

FIGURE 3-11. FEDERAL WATER POLLUTION CONTROL ACT - N.P.D.E.S.
 (NATIONAL POLLUTION DISCHARGE ELIMINATION SYSTEM)



NDEP - NEVADA DEPARTMENT OF ENVIRONMENTAL PROTECTION

TRANS - TRANSMITTAL

DOE - DEPARTMENT OF ENERGY

* SYMBOLS ARE FOR INTERNAL DOE USE

RCRA sets a Federal policy of limiting land disposal of wastes in favor of other disposal methods.

On November 1, 1985, the U.S. EPA granted final authorization to the State of Nevada for Subtitle C of RCRA (management and disposal of hazardous wastes). The Nevada Division of Environmental Protection (NDEP) within the Nevada Department of Conservation and Natural Resources is the agency responsible for implementing and enforcing this part of RCRA.

Subtitle D of RCRA encourages solid-waste management practices that promote environmentally sound disposal methods, maximize the reuse of recoverable resources, and foster resource conservation. To achieve these goals under Subtitle D, the U.S. EPA established both technical standards for solid-waste management facilities and a program under which participating states may voluntarily develop and implement solid-waste management plans; EPA is now in the process of revising the existing Subtitle D requirements. The State has an existing solid waste management plan which has been in effect since 1974.

Section 6001 of RCRA requires Federal agencies to comply with all Federal, State, interstate, and local requirements respecting control and abatement of solid waste or hazardous waste disposal in the same manner, and to the same extent, as any person is subject to such requirements.

With the passage of the 1984 amendments to RCRA, and the lowering of regulated quantities of hazardous waste from 1,000 kg per month to 100 kg per month, more than 100,000 previously unregulated small-generators of hazardous waste were included under RCRA. Site characterization at Yucca Mountain will probably generate more than 100 kg per month of RCRA-defined hazardous wastes. These wastes may come from many different activities such as laboratory studies, routine cleaning and maintenance, and construction (to name but a few possible sources). As long as no more than 1,000 kg per month of hazardous wastes are generated, the DOE will be classified as a "small-quantity generator." The small-quantity generator classification will require the DOE to apply for a generator identification number by submitting a "Notification of Hazardous Waste Activity" to the NDEP. Hazardous waste

will be handled in accordance with RCRA as described in Section 3.3.3.3. No on-site treatment or disposal of hazardous waste or storage of hazardous waste beyond ninety days is anticipated. Thus, no Treatment, Storage, and Disposal (TSD) permit will be required.

The Yucca Mountain Project (the Project), while partially located on NTS land, also has project facilities and activities planned outside the NTS boundaries on BLM administered land. In addition, the Project is authorized by the Nuclear Waste Policy Act; as amended, and is managed by the Office of Civilian Waste Management which is funded separately from the NTS by a civilian program. Since the Project is funded and managed under a separate authority and project facilities and activities lie outside the NTS boundaries, the Project proposes to apply for a separate facility RCRA Generator I.D. Number from the NDEP. The Project would then manage, handle, and arrange for the transportation and disposal of its RCRA wastes using authorized carriers and treatment, storage, and disposal facilities. The Yucca Mountain Project Office (Project Office) will consult the NDEP and EPA Region IX to discuss further the facility status of the Project.

The site characterization program at Yucca Mountain is chiefly a drilling/testing program. It is not expected that the DOE will generate more than 1,000 kg of hazardous waste in any calendar month nor is it expected that acutely hazardous wastes will be generated. Thus, the more-involved regulatory requirements associated with large quantity waste generator status will not be discussed further in this section. The remainder of this discussion is limited to the requirements imposed by RCRA on small-quantity generators.

Many of the deadlines in the 1984 amendments to RCRA (referred to as HSWA - Hazardous and Solid Waste Amendments of 1984) will be implemented over the next several years. At the present time there are no RCRA requirements related to mining wastes (tailings). However, HSWA (Section 209) included a new provisions covering mining waste and other special wastes. If these wastes contain hazardous materials, the U.S. EPA is authorized to modify requirements of Subtitle C to take into account the special characteristics of these tailings, the practical difficulties associated with implementation

of the Subtitle C requirements, and site-specific characteristics, including, but not limited to, the climate, geology, hydrology, and soil chemistry at the site, so long as such modified requirements assure protection of human health and the environment. The DOE will stay in close communication with EPA and the NDEP to determine what actions might be required of the DOE after the chemical characteristics of the waste rock are determined.

If plans for site characterization call for the use of underground storage tanks (USTs), Subtitle I of RCRA may be applicable. The reporting, installation, and monitoring of USTs will be conducted in accordance with regulations promulgated under Subtitle I. Region IX of EPA presently administers this program; however, it is expected that the State of Nevada will eventually be authorized to implement a UST program. Until such authorization, the DOE will coordinate its activities with both agencies to ensure compliance with both the Federal and State programs.

3.3.3.2 Requirements

The DOE must determine and document the amount of hazardous waste being generated during each month of site characterization. If the cumulative amount of hazardous wastes generated each month is less than 100 kg, the DOE follows the steps outlined in Section 3.3.3.3 for the proper disposal of these wastes.

It is anticipated that DOE will exceed the 100 kg per month hazardous-waste threshold and will be required to report to and receive an identification number from the NDEP. The DOE must then follow the process outlined in Section 3.3.3.3 for managing, storing, and shipping the wastes.

DOE, as a Federal agency, must comply with certain provisions of Subtitles C and F of RCRA, governing waste minimization and the use of recycled and recovered materials. DOE will implement a "waste minimization plan" to reduce the volume or quantity and toxicity of such waste to the degree determined by DOE to be economically practicable. Major procurements made by

DOE must include specifications for the use of recycled and recovered materials in services and materials purchased. In addition, Federal agencies that generate heat from fossil fuel systems must, to the extent practicable, also use fuels derived from solid waste as primary or supplementary fuels. Details for meeting these requirements are contained in 40 CFR 247 and 249 (Subtitle F). Requirements necessary to satisfy Subtitle I will be determined through consultations with the State of Nevada and EPA Region IX.

3.3.3.3 Process

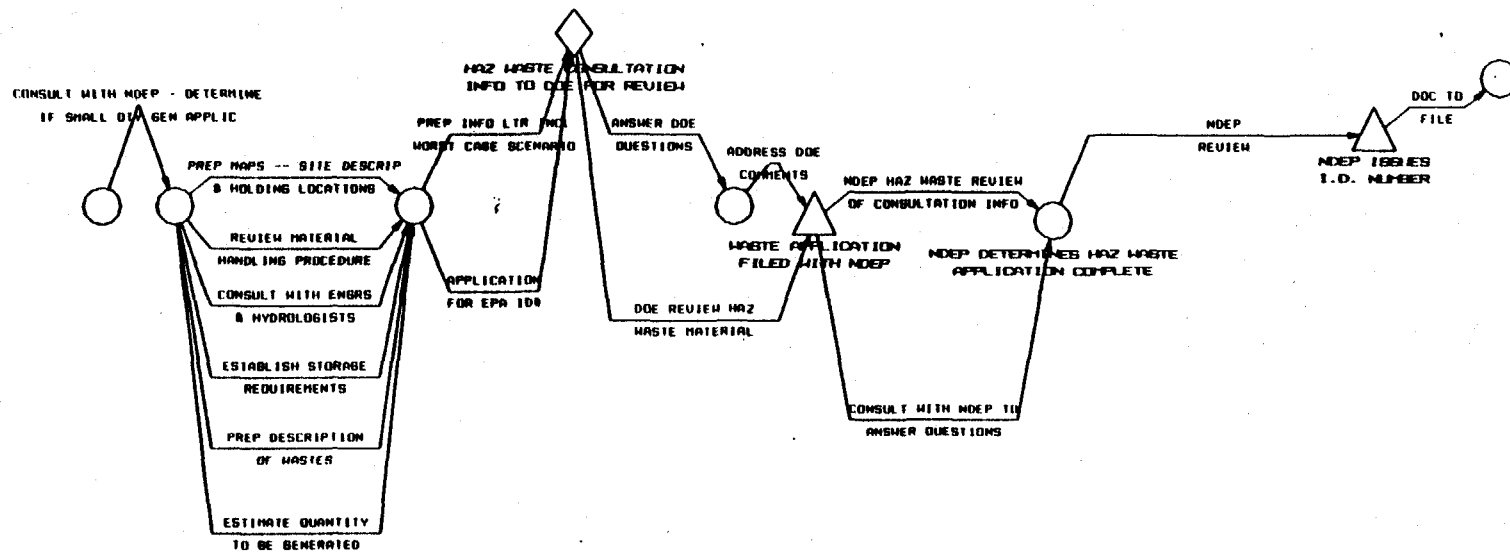
Figure 3-12 shows the steps to be taken by the DOE to comply with RCRA.

The compliance process under RCRA for small-quantity waste generators described below is summarized from the U.S. EPA (1986) and from Nevada Administrative Code 444.8500 through 444.8700.

The DOE is responsible for analyzing its waste streams to determine if they contain hazardous wastes, and to determine the cumulative weight of the various hazardous wastes generated each month. Hazardous wastes are identified in 40 CFR 261 as either listed as "characteristic" wastes. A characteristic waste is a hazardous waste if it meets the requirements of any of the following RCRA-defined characteristics: ignitable, corrosive, reactive, or EP toxic.

Once it has been determined that a generated waste is hazardous, it is necessary to determine a generator classification. Three categories of waste generators exist under RCRA; they are (1) conditionally-exempt small-quantity generators that generate no more than 100 kg (about 25 gallons) of hazardous waste in a calendar month; (2) small-quantity generators that generate between 100 and 1,000 kg of hazardous waste in a calendar month; and (3) generators of more than 1,000 kg of hazardous waste in a calendar month. To determine the category into which the DOE will fall, the DOE must tally, as specified under Subtitle C, the weight of all hazardous wastes generated during each month of site characterization (exempted from the tally are such

FIGURE 3-12. RESOURCE CONSERVATION AND RECOVERY ACT



NDEP - NEVADA DEPARTMENT OF ENVIRONMENTAL PROTECTION

QTY GEN - QUANTITY GENERATOR

DOE - DEPARTMENT OF ENERGY

* SYMBOLS ARE FOR INTERNAL DOE USE

things as used batteries that are sent off-site for reclamation, used oil that has not been mixed with hazardous substances, and residue left in emptied containers). If the weight of waste varies sufficiently from month to month, the waste-generator category and associated requirements will vary. The discussion below focuses on the requirements of the small-quantity generator (category #2, above), which is the most likely category into which the DOE will fall during site characterization of Yucca Mountain.

RCRA requires that hazardous wastes generated on-site be disposed of at a permitted hazardous-waste management facility. If it is established that more than 100 kg of hazardous waste are generated in a month, the DOE must submit a "Notice of Hazardous Waste Activity" to NDEP and receive a generator ID number. This is done by requesting a 2-page notification form from the NDEP, filling it out, and returning it to the NDEP. Among other things, the form requires that the DOE identify the types and volume of wastes that are generated. The NDEP will then issue the DOE a U.S. EPA ID Number which will be unique to the Yucca Mountain site.

Up to 6,000 kg of hazardous wastes can be stored at the Yucca Mountain site for up to 180 days (or for 270 days if the wastes are to be shipped to a disposal facility more than 200 miles away). DOE will comply with the "accumulation and storage" restrictions for small quantity generators as required by the NDEP.

Hazardous wastes will be stored on-site in suitable containers labeled "HAZARDOUS WASTE," along with the date the waste was first collected. The wastes will be stored on-site until being shipped to an appropriate RCRA "permitted" treatment, storage, and disposal facility.

The DOE must select a waste hauler that has a U.S. EPA Identification Number, appropriate permits, and sufficient insurance. Packaging and labeling the hazardous-waste containers for transport must be in accordance with U.S. Department of Transportation regulations (49 CFR Part 172). The DOE must obtain an appropriate "Uniform Hazardous Waste Manifest" form from the NDEP prior to any waste shipments. The DOE must then fill out appropriate parts

of the form and provide enough copies to provide two copies to the NDEP (one copy each to Headquarters, each transporter, the operator of the designated facility, and another copy to be returned to the generator upon completion of the shipment. Upon delivery of the wastes to the permitted disposal facility, the transporter and operator of the facility each sign the form, and the manager of the facility and the hauler keep copies of the manifest. Within 30 days of shipping the waste, the DOE must receive a signed copy of the manifest from the disposal facility. If the DOE does not receive a copy of the manifest within this period, the DOE should determine why the manifest was not received and what happened to the waste shipment (as well as alert the NDEP and the U.S. EPA) and submit a report to the NDEP within 45 days. All records and manifests must be retained for a minimum of 3 years unless determined otherwise by the NDEP or EPA administrator.

3.3.4 SAFE DRINKING WATER ACT OF 1974, as amended (P.L. 93-523; 42 USC 300f-300j-10; 40 CFR 124, 141, 143; EO 12088; NRS 445.361 et seq; Nevada Administrative Code 445.244-445.420)

3.3.4.1 Purpose and applicability

The Safe Drinking Water Act grants the U.S. EPA authority to regulate public drinking-water supplies by establishing drinking water regulations, delegating authority for enforcement of drinking water standards to the States, and protecting aquifers from such things as injection of wastes and other materials into wells.

In 1978 the U.S. EPA approved Nevada's program to enforce the drinking water standards established by the U.S. EPA. The Nevada Division of Health within the Nevada Department of Human Resources is the agency responsible for this enforcement. Enforcement of the Underground Injection Control (UIC) program has been delegated to the State of Nevada and is discussed in Section 3.3.4a.

The water supply planned for Yucca Mountain is considered a 'public water supply' because it will probably service 15 or more connections or 25 people for more than 60 days per year (as defined in the Safe Drinking Water Act). The water supplied by the distribution system must therefore meet all Federal, State, and local drinking water standards and administrative authority. To ensure that public water systems are adequate to meet the requirements of the Safe Drinking Water Act, the State of Nevada has implemented regulations pertaining to the construction of water distribution systems (Nevada Administration Code 445.370 to 445.420).

In 1986 Congress passed amendments to the Safe Drinking Water Act. Section 205 of the amendments directs states to establish wellhead protection programs by June 1989, but it is unlikely that this program will affect the Yucca Mountain Project. Section 205(h) provides that Federal agencies having jurisdiction over any containment source are subject to the requirements of

the State programs. Once the State of Nevada has implemented these amendments, the DOE will consult with the State to determine the applicability of the requirements to the Project.

3.3.4.2 Requirements

All public drinking water supplies must meet the requirements of Nevada Administrative Code 445.244 to 445.262 and the National Primary Interim Drinking Water Regulations as set forth in 40 CFR 141 (as they existed on August 27, 1980). Secondary standards for chloride, color, copper, foaming agents, iron, magnesium, manganese, odor, pH, sulfate, TDS, and zinc are established in Nevada Administrative Code 445.248. Moreover, the 1986 amendments to the Safe Drinking Water Act of 1986 restrict the use of lead in any public water system.

The State Health Officer (SHO) within the Nevada Division of Health requires that all plans and specifications for a public water-supply system be approved before a written permit can be issued for construction and operation of the system. A \$60 fee must accompany the permit application, and the SHO charges \$67.50 to sample and test the water when the system becomes operational to assure that it meets all Federal and State water-quality standards. A fee of \$90 per year is charged to operate the system (only if the system serves between 15 and 300 people; if more than 300 people are to be served, the annual fee is more than \$90).

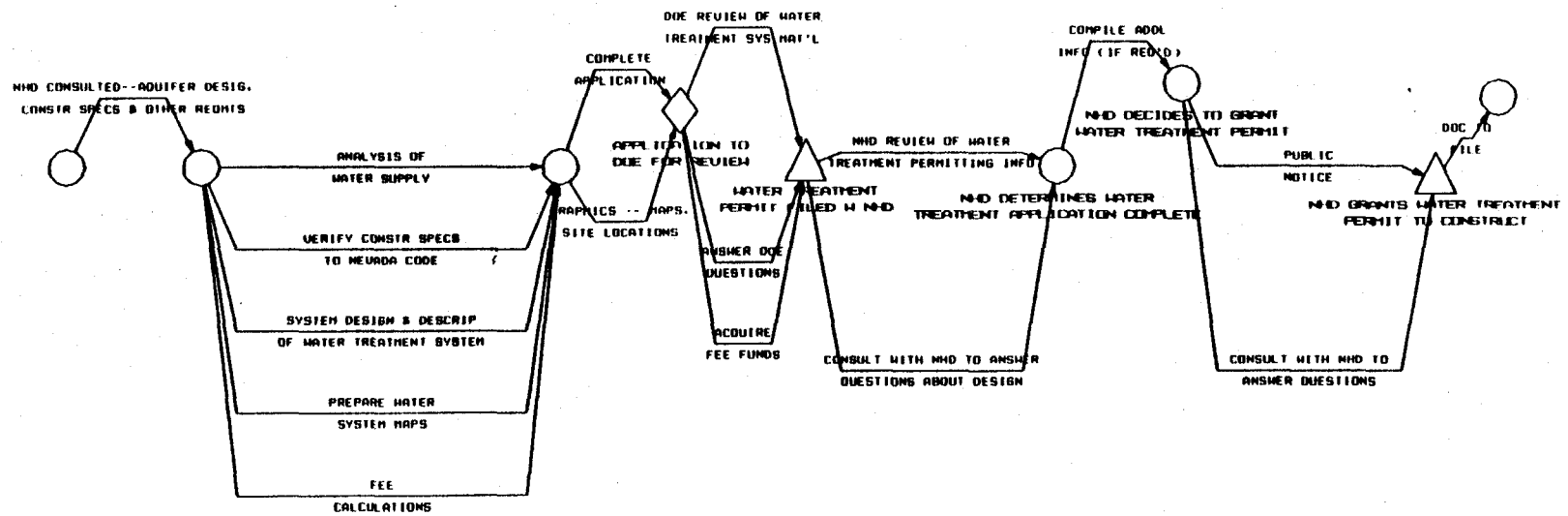
Nevada Administrative Code 445.378 through 445.400 specifies the construction characteristics of water-supply wells. Nevada Administrative Code 445.410 through 445.418 describes the storage and distribution specifications that are required for a public drinking-water supply.

3.3.4.3 Process

Figure 3-13 shows the steps to be taken by DOE to comply with the Safe Drinking Water Act.

Upon receiving permits for the system, the SHO will sample the water to be supplied from the system. The sample will be analyzed by the Nevada State Laboratory. Based on the high quality of water from other wells in the vicinity of Yucca Mountain, chlorination is the only treatment that is now planned for the Yucca Mountain water-supply system. Periodic testing of the system's water quality (at the discretion of the SHO, but probably monthly for bacteriological content) will be the responsibility of the DOE.

FIGURE 3-13. THE SAFE DRINKING WATER ACT



NHD - NEVADA HEALTH DIVISION

DOE - DEPARTMENT OF ENERGY

* SYMBOLS ARE FOR INTERNAL DOE USE

3.3.4a UNDERGROUND INJECTION CONTROL PROGRAM OF THE SAFE DRINKING WATER ACT OF 1974 (91 Stat 1397; P.L. 93-523; 42 USC 300h (Part C); 40 CFR Part 124, 144-147, 149; Chapter 445 of the Nevada Administrative Code, Sections 1 through 96.1; NRS 445.131-445.354

Section 300j-6 of Title 42, United States Code, the Safe Drinking Water Act, requires all Federal agencies engaged in any activity resulting in an underground injection that endangers drinking water to comply with all Federal, State, and local requirements concerning underground injections.

On October 5, 1988, the EPA granted to the State of Nevada's Division of Environmental Protection the authority to implement and enforce a UIC program (53 FR 39088).

3.3.4a.1 Purpose and Applicability

The UIC program was established to prevent contamination of underground sources of drinking water due to improper design, construction, and operation of injection wells. Nevada's UIC program seeks to prohibit the pollution of existing and potential sources of underground drinking water in Nevada (Chapter 445 of the Nevada Administrative Code, Sections 2 through 96).

Site characterization of Yucca Mountain may require the use of tracers to be injected through wells into underground aquifers. These studies will be conducted to characterize the hydrologic environment of Yucca Mountain. DOE compliance with the UIC program may therefore be required.

3.3.4a.2 Requirements

Unless exempted by the Director of the Nevada Department of Conservation and Natural Resources, anyone considering to intentionally inject fluids into ground-water of the State of Nevada must first acquire a permit for such injections from the Director. Exemptions to obtaining a permit would be granted only if the affected ground water is not now and will not be a source of drinking water, or if the total dissolved solids of the affected ground water exceeds 10,000 milligrams per liter and the water is not reasonably expected to become a supply of drinking water (Chapter 445 of the Nevada Administrative Code, Section 30).

The UIC program regulates five classes of injection wells (Classes I, II, III, IV, and V). Informal consultations with staff members of the Nevada Division of Environmental Protection indicate that the injection wells now being considered by the DOE for site characterization of Yucca Mountain would probably be considered Class V wells (NAC 445, Section 29, Item #16, "Injection wells used in experimental technologies.").

An applicant for a UIC permit must satisfy the Director of the Nevada Department of Conservation and Natural Resources that the injection will not endanger any source of drinking water. Among the information to be included in the application are the proposed (or actual) location of the wells; a report on the geology and hydrology of the area; the plans and drawings for each injection well; the types, rates, and volumes of material to be injected; the injection pressures; a plan for plugging and abandoning the wells; and any other information required by the Director of the Nevada Department of Conservation and Natural Resources.

Under NAC 445, Section 39, the Director may allow the permit requirements for a Class V well to be less stringent than the requirements would otherwise be if it can be demonstrated that a relaxation of the requirements would not result in an increased risk of movement of fluids from the zone of injection. The tentative plans for injection of small quantities of fluids into several wells at Yucca Mountain would probably meet this requirement for less

stringent information requirements, but this is a determination to be made by the Director.

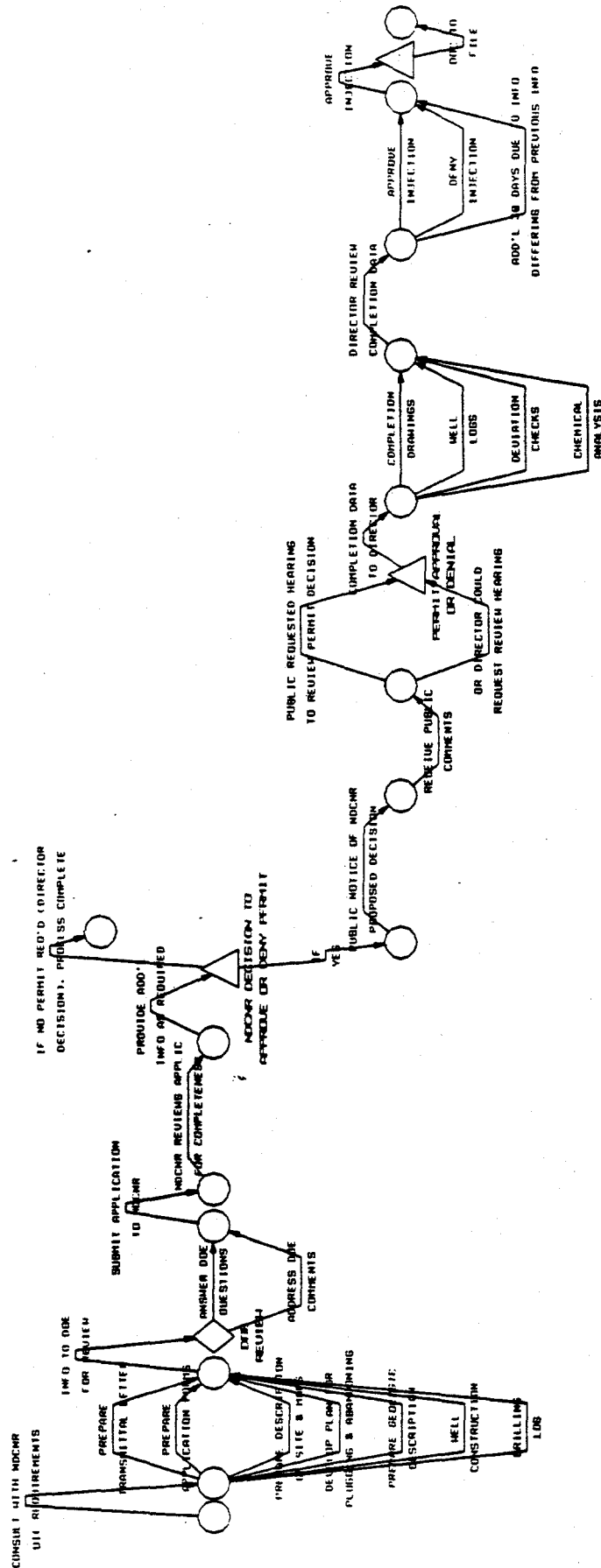
3.3.4a.3 Process

Figure 3-14 shows the steps to be taken by DOE to comply with Nevada's Underground Injection Control Program.

The DOE submits an application form with a \$500 fee. The Director then has 30 days to notify the DOE of the completeness of the application. A draft permit is then prepared by the Director along with a tentative exemption for the aquifer, or a notice of intent to deny the permit. A public notice is issued by the Director at least 30 days before issuance, exemption, or denial of the permit. A public hearing can be requested by interested parties or the Director. If the permit is granted, it expires five years after the date of issuance. Permit renewals must be applied for 180 days prior to their expiration.

Within 30 days after completion (construction) of the injection wells, the DOE must furnish the Director a notice of completion containing information such as well logs and chemical analyses of fluids in the injection zone. Based on the information submitted, the Director will notify the DOE in writing within 30 days whether approval is granted to begin injections. At the discretion of the Director, the DOE must periodically monitor the pressure of injection, the rate of flow, and the total volume of fluid injected.

FIGURE 3-14. UNDERGROUND INJECTION CONTROL PROGRAM



NDCNR - NEVADA DEPARTMENT OF CONSERVATION & NATURAL RESOURCES

UIC - UNDERGROUND INJECTION CONTROL

DOE - DEPARTMENT OF ENERGY

* SYMBOLS ARE FOR INTERNAL DOE USE

3.4 STATE AND LOCAL REGULATIONS

The permits and approvals described in this section are administered solely by the State of Nevada in that there are no Federal laws that mandate compliance with these State laws by Federal agencies. No local or county environmental regulatory approvals have thus far been identified that are applicable to site characterization of Yucca Mountain (U.S. DOE, 1986). DOE will, as a matter of comity, address the concerns evidenced by State and local laws for which Federal sovereign immunity has not been waived, to the extent that these regulations are not inconsistent with the DOE's responsibilities under the NWPA, the Atomic Energy Act, and other Federal statutes.

3.4.1 APPROVAL OF PLANS TO CONSTRUCT SANITARY AND SEWAGE-COLLECTION SYSTEM AND PERMIT TO OPERATE SYSTEM (Nevada Administrative Code 445.179 through 445.182; 445.750 through 445.840; NRS 444.650)

3.4.1.1 Purpose and Applicability

The purpose of this permit system is to regulate the design, construction, and operation of sanitary and sewage-collection systems and grant operating permits for such facilities in an effort to prevent and/or limit discharges of pollutants into waters of the State.

DOE will, as a matter of comity, address the concerns evidenced by this State law consistent with the DOE's responsibilities under the NWPA, the Atomic Energy Act, and other Federal statutes.

3.4.1.2 Requirements

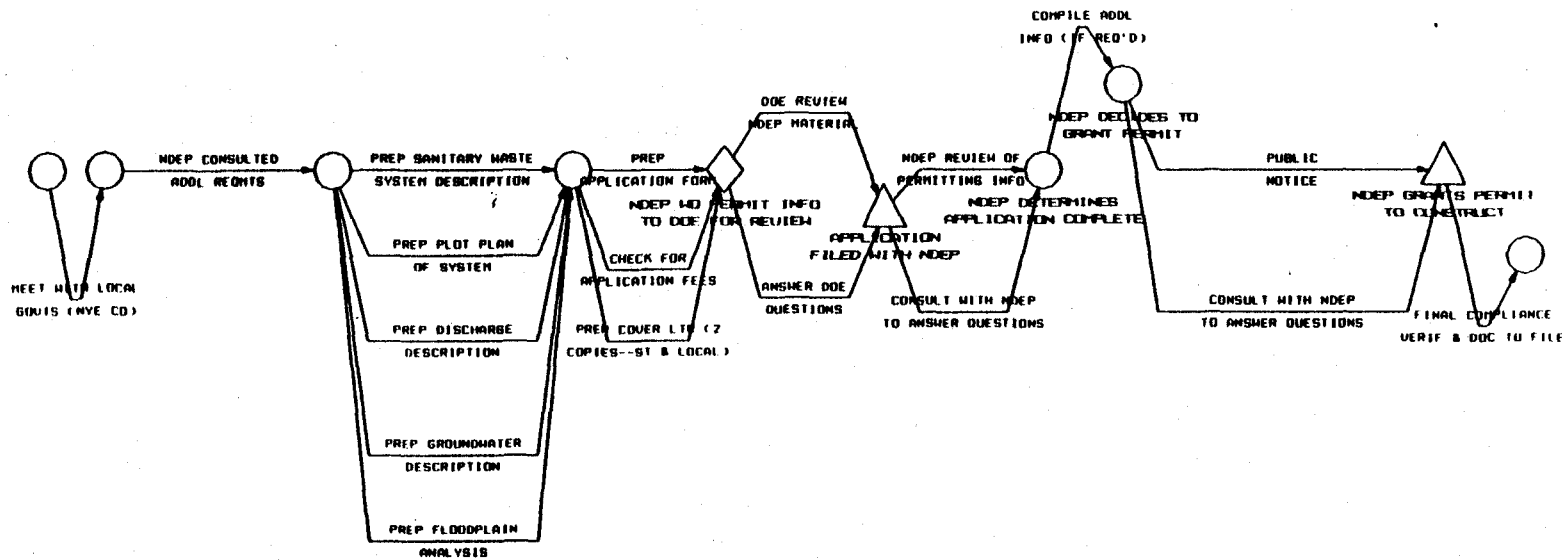
The Nevada Department of Conservation and Natural Resources (NDCNR) requires that complete engineering plans and specifications for the disposal of sanitary wastes and sewage be submitted to the agency for review and approval (Nevada Administrative Code 445.180). The materials must be prepared by an engineer authorized under State law to prepare such plans and specifications. The system should, to the extent possible, be located outside the 100-year floodplain. Before issuing the permit, the proposed location of the system must be approved by local government (Nevada Administrative Code 445.179 and 445.181). The design of the system must ensure compliance with Nevada Administrative Code 445.140 through 445.174 (NPDES discharge permits; see Section 3.3.2).

3.4.1.3 Process

Figure 3-15 shows the steps to be taken by the DOE to address these regulations.

The DOE will submit plans for sewage disposal at Yucca Mountain to the NDCNR prior to construction of the system. Before the NDCNR can approve the plans, they must first be approved by local government. Upon approval of the system, the NDCNR will issue a permit to construct the system (NAC 445.179).

FIGURE 3-15. STATE REGULATIONS ON SEWAGE DISPOSAL



NDEP - NEVADA DEPARTMENT OF ENVIRONMENTAL PROTECTION
 WQ - WATER QUALITY
 DOE - DEPARTMENT OF ENERGY

* SYMBOLS ARE FOR INTERNAL DOE USE

3.4.2 PERMIT TO APPROPRIATE PUBLIC WATERS OF NEVADA (NRS 533.325 to 533.540;
NRS 534.010 to 534.190)

3.4.2.1 Purpose and Applicability

The purpose of a Water Appropriation Permit is to prevent possible interference with prior water rights and/or improper use of non-available waters. DOE will, as a matter of comity, address the concerns evidenced by this State law for which Federal sovereign immunity has not been waived, consistent with the DOE's responsibilities under the NWPAA, the Atomic Energy Act, and other Federal statutes.

The DOE currently plans to use up to 402 acre-feet of water during site characterization. The DOE submitted an application for a Water Appropriation Permit to the Nevada State Engineer within the Department of Conservation and Natural Resources on July 21, 1988.

3.4.2.2 Requirements

The contents of the application form for a Water Appropriation Permit (NRS 533.335) include, among other things:

1. The source from which the appropriation is to be made.
2. The amount of water to be appropriated.
3. The purpose for which the water will be used.
4. A description of the water source.
5. A description of the proposed works.
6. The estimated cost of the works.
7. The estimated time required to construct the works.
8. The estimated time required to put the water to beneficial use.

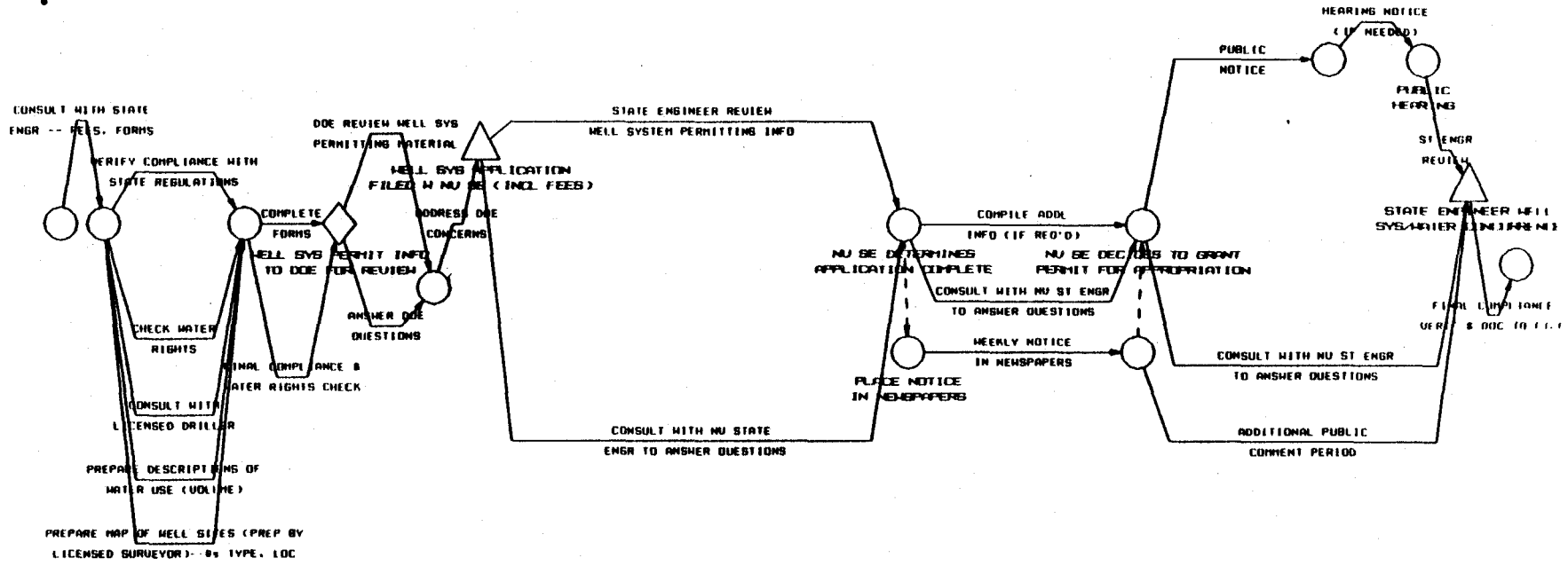
The Nevada State Engineer, under authority of NRS 533.350 and 533.375, can ask for additional information to accompany the permit application such as maps and drawings and any other data that is deemed to be needed.

3.4.2.3 Process

Figure 3-16 shows the steps to be taken by the DOE to obtain a Water Appropriation Permit.

After the DOE submits an application for a Water Appropriation Permit, the Nevada State Engineer (NSE) will review it for completeness. The NSE will then prepare a public notice within 30 days of receipt of a complete application. The notice will be published five times during a four-week period. A protest period of 30 days follows the publication period. At the end of the protest period the NSE will approve or reject the application. A public hearing can be called if outside parties have, in the opinion of the NSE, sufficient grounds for protesting the issuance of the permit or if the NSE believes it to be in the public interest to have a public hearing.

FIGURE 3-16. NEVADA'S STATUTES & REGS FOR APPROPRIATION OF PUBLIC WATERS



DOE - DEPARTMENT OF ENERGY
 SE - STATE ENGINEER
 * SYMBOLS ARE FOR INTERNAL DOE USE

3.4.3 NEVADA WATER POLLUTION CONTROL LAW (NEVADA REVISED STATUTES 445.131 through 445.354)

3.4.3.1 Purpose and Applicability

The Nevada Water Pollution Control Law was enacted to maintain the quality of the waters of the State of Nevada for public health and enjoyment, protection of animal life, operation of existing industries, the pursuit of agriculture, and the economic development of the State.

DOE will, as a matter of comity, address the concerns evidenced by this State law for which Federal sovereign immunity has not been waived, consistent with DOE's responsibilities under the NWPA, the Atomic Energy Act, and other Federal statutes.

3.4.3.2 Requirements

The Nevada Division of Environmental Protection (NDEP) within the Department of Conservation and Natural Resources defines "Waters of the State" to include water courses, waterways, and drainage systems, as well as all underground waters (Nevada Revised Statutes 445.191). Dry washes such as those at Yucca Mountain are considered by the State to fall within this definition. Disposal of sewage at Yucca Mountain--either into a septic-tank system or into (or from) a sewage lagoon--could therefore constitute a discharge into "Waters of the State" if the sewage system is located in a dry wash. In general, the State requires an NPDES permit if the sewage system will discharge more than 5,000 gallons per day of sewage. At the time of this writing, details on the sewage-disposal system to be used at Yucca Mountain were not available. Based on a minimum system design of 100 gallons per person per day, as required in Nevada Administrative Code 445.180, and a daily site-population at Yucca Mountain of more than 100 people during site characterization, sewage discharges of at least 10,000 gallons per day are

likely. NDEP requires that discharges of pollutants into the subsurface be controlled if there is the potential for contamination of groundwater supplies. Water impoundments such as sewage lagoons, wastewater ponds, and mud-and-cuttings pits will be evaluated by the NDEP to determine if seepage from these impoundments could affect the quality of groundwater. If the NDEP determines that there is a potential for contamination, it will generally require--through issuance of zero-discharge permits--that the impoundments be lined sufficiently to prevent seepage of pollutants into the ground.

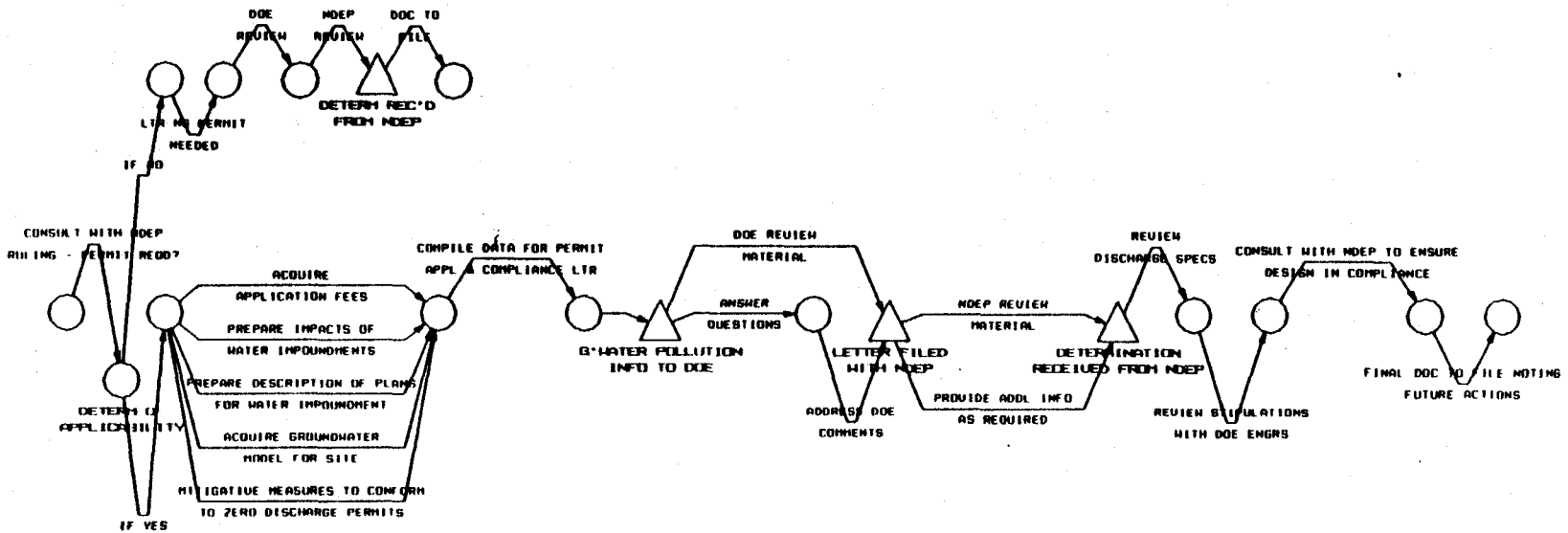
The Nevada Water Pollution Control Law (NRS 445.2533) also empowers the State Environmental Commission to prescribe controls on diffuse sources of pollutants if these sources could seriously degrade the quality of waters of the State. Although runoff from site characterization is a "diffuse" source of pollutants, such runoff will not seriously degrade any waters of the State; this provision of the Nevada Water Pollution Control Law is therefore not considered to be applicable to site characterization of Yucca Mountain, and it is not discussed further in this document.

3.4.3.3 Process

Figure 3-17 shows the steps to be taken by the DOE to address the Nevada Water Pollution Control Law. These steps are essentially the same as those listed for an NPDES permit under the Clean Water Act (Section 3.3.2).

The DOE will consult with the NDEP regarding the potential for site characterization activities to pollute groundwater. Initial analyses in the Yucca Mountain Environmental Assessment (U.S. DOE, 1986a) suggest that the potential for groundwater pollution caused by site characterization is remote because of the nature of the testing program and because of the great depth to groundwater beneath Yucca Mountain.

FIGURE 3-17. NEVADA WATER POLLUTION CONTROL LAW



NDEP - NEVADA DEPARTMENT OF ENVIRONMENTAL PROTECTION

DOE - DEPARTMENT OF ENERGY

G*WATER - GROUNDWATER

* SYMBOLS ARE FOR INTERNAL DOE USE

3.4.4 NEVADA STATE WILDLIFE STATUTES (NRS 501.105 to 501.110 NAC 503.010 to 503.080).

3.4.4.1 Purpose and Applicability

Nevada law (NRS 501.105 to 501.110) provides for management and protection of various types of wildlife including game animals, birds, fish, and amphibians; fur-bearing animals; and protected, rare, or endangered species.

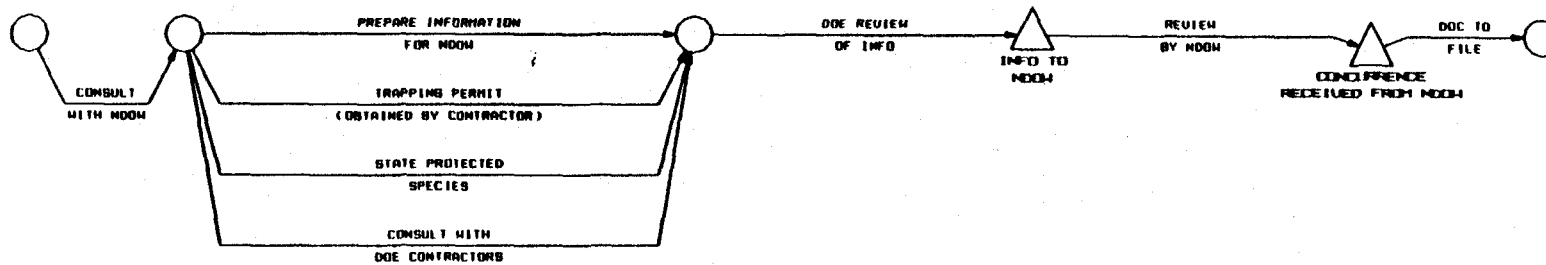
The State of Nevada via the Nevada Department of Wildlife (NDOW) manages game on BLM lands through cooperative agreements with the BLM. Because the Yucca Mountain site is partly on BLM land, the NDOW must be contacted to ensure that the wildlife managed by the NDOW is adequately protected. Moreover, if protected animals are to be captured, removed, or destroyed, a permit must first be obtained from the NDOW. (Because EG&G is the DOE's primary subcontractor for ecological studies at Yucca Mountain, EG&G has and will continue to obtain all necessary permits from the NDOW.)

DOE will, as a matter of comity, address the concerns evidenced by these State regulations for which Federal sovereign immunity has not been waived, consistent with DOE's responsibilities under the NWPA, the Atomic Energy Act, and other Federal statutes.

3.4.4.2 Requirements

The DOE will consult with the NDOW concerning all non-protected animals, and will seek to obtain (through EG&G) permits for capturing, or removing, protected species. The desert tortoise, classified by the State as rare, is the only State-protected animal known to be present on Yucca Mountain.

FIGURE 3-18. NEVADA STATUTES REGARDING WILDLIFE



NDDW - NEVADA DEPARTMENT OF WILDLIFE

DOE - DEPARTMENT OF ENERGY

* SYMBOLS ARE FOR INTERNAL DOE USE

3.4.4.3 Process

Figure 3-18 shows the steps to be taken by the DOE to address Nevada's wildlife statutes and regulations.

The NDOW will be consulted to ensure that all wildlife are adequately protected and seek to obtain a permit prior to capturing, removing, or destroying State-protected species. The information already gathered at Yucca Mountain about the desert tortoise is believed to be more than sufficient to meet the requirements of this permit (see Section 3.2.5 for additional information).

3.4.5 NEVADA STATE VEGETATION STATUTES (NRS 501.105; 504.520; 527.050; 527.100; 527.105; 527.260; 527.270; NAC 527.010 to 527.020)

3.4.5.1 Purpose and Applicability

Nevada law provides for broad protection of the indigenous flora of the State as well as for selected species classified as Critically Endangered.

In regard to site characterization of Yucca Mountain, it is unlawful, without written permission from the Nevada State Forester Firewarden to destroy any plant declared endangered by the State on Federal or State lands (NRS 527.050). The destruction, mutilation, or possession of any cactus or yucca from State and Federal lands is also prohibited without written permission (NRS 527.100).

DOE will, as a matter of comity, address the concerns evidenced by these State regulations for which Federal sovereign immunity has not been waived, consistent with the DOE's responsibilities under the NWPA, the Atomic Energy Act, and other Federal Statutes.

3.4.5.2 Requirements

Plant species whose existence is considered endangered by the State of Nevada are provided protection under NRS 527.270. Nineteen plant species are currently listed as Endangered by the State, but none occur on Yucca Mountain.

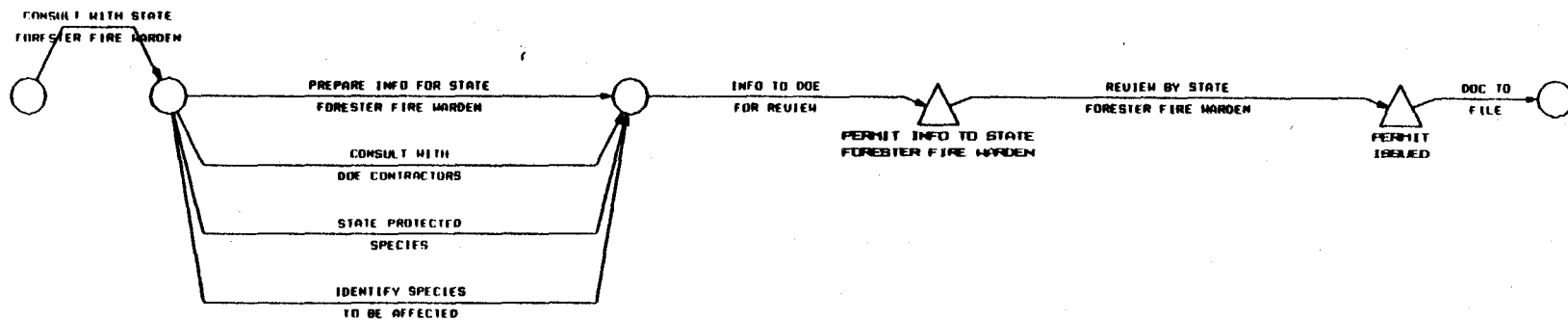
Construction activities associated with the project will result in the loss at some locations of several species of cactus and one species of yucca. Written permission for these losses on BLM lands will be requested from the Nevada State Forester Firewarden.

3.4.5.3 Process

Figure 3-19 shows the steps to be taken by the DOE to address Nevada's vegetation statutes.

The Nevada State Forester Firewarden will be consulted to ensure (1) that permits are obtained prior to the destruction of cactus and yucca at the site, and (2) that no state-protected vegetation will be affected by site characterization.

FIGURE 3-19. NEVADA STATUTES REGARDING VEGETATION



DOE - DEPARTMENT OF ENERGY

* SYMBOLS ARE FOR INTERNAL DOE USE

3.5 DOE ORDERS

DOE Orders that relate to environmental protection during site characterization are listed in Table 3-1. A brief discussion of each DOE Order is included below.

1. DOE 5000.3 "Unusual Occurrence Reporting System"

This Order sets the policy, assigns responsibilities, and establishes criteria and instructions for reporting unusual occurrences that have programmatic significance at DOE facilities. It provides a way to analyze the information reported and disseminate the analyzed results. This Order applies to all DOE elements and contractors performing work for the DOE as provided by law and/or contract, and as implemented by the appropriate contracting officer.

This Order is a means of demonstrating safe operating procedures and disclosing to the public occurrences at facilities that may endanger public health and safety. The procedures are to be followed after such an unusual occurrence.

2. DOE 5400.2 "Environmental Compliance Issue Coordination"

This Order establishes the DOE requirements for coordination of significant environmental compliance issues to ensure timely development and consistent application of DOE policy and guidance. This Order applies to all Departmental elements and contractors performing work for the Department as provided by law and/or contract.

This Order is a means of identifying significant environmental compliance issues for their timely resolve. Furthermore, the Order provides coordination among various Departmental elements in resolving environmental compliance issues.

Table 3-1. DOE Orders that apply to environmental protection during site characterization

Number	Date	<u>DOE ORDERS</u>	Subject
1. DOE 5000.3	11-07-84	Unusual Occurrence Reporting System	(Safety and Environment)
2. DOE 5400.2	08-13-87	Environmental Compliance Issue Coordination	(Environment)
3. DOE 5440.1C	04-09-85	Implementation of National Environmental Policy Act	(Environment)
4. DOE 5480.1B	09-23-86	Environmental Protection, Safety, and Health Protection Program for DOE Operations (Certain Chapters of 5480.1 and 5480.1A are still in effect)	(Both)
5. DOE 5480.3	07-09-85	Safety Requirements for the Packaging and Transportation of Hazardous Materials, Hazardous Substances and Hazardous Wastes	(Safety)
6. DOE 5480.4	05-15-84	Environmental Protection, Safety, and Health Protection Standards	(Safety)
7. DOE 5481.1B	09-23-86	Safety Analyses and Review System	(Safety)
8. DOE 5482.1B	09-23-86	Environmental, Safety, and Health Appraisal Program	(Both)

Table 3-1. DOE Orders that apply to environmental protection during site characterization (continued)

<u>DOE ORDERS</u>				
Number	Date	Subject		
9.	DOE 5484.1	02-24-81	Environmental Protection, Safety, and Health Protection Information	(Both)
10.	DOE 5500.1A	02-26-87	Department of Energy Emergency Management System	(Both)
11.	DOE 5820.2A	09-26-88	Radioactive Waste Management	(Both)
12.	DOE 5480.17	10-05-88	Site Safety Representatives	(Safety)

Note: Environmental protection orders are undergoing revisions and are scheduled to be issued in December 1988 and 1989. The following list represents proposed revisions to the environmental protection section of the DOE directives system. The proposed list is as follows:

5400.1	Environmental Protection Program Requirements
5400.3	Radiation Protection of the Public and Environment
5400.yy	Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Requirements
5400.zz	Hazardous and Radioactive Mixed Waste Requirements
5400.xy	Radiological Effluent Moni- toring and Environmental Surveillance

3. DOE 5440.1C "Implementation of the National Environmental Policy Act"

This Order establishes procedures to implement the National Environmental Policy Act (NEPA) of 1969 while establishing requirements for the Assistant Secretary for Policy, Safety, and Environment; the Office of Environmental Compliance; Responsible Supervisory Officials, the General Council; the Director of Administration through the Director of Administrative Services; and the Secretary of Energy.

The primary objectives of the Order are: to determine the level of review necessary under NEPA; to promote the smooth generation, review, and release of documents prepared pursuant to the NEPA; and to provide for cooperation between the various elements of DOE. In following HQ and Project Office directives, the Yucca Mountain Project should be in compliance with this Order.

4. DOE 5480.1B "Environmental Protection, Safety, and Health Protection Program for DOE Operations"

This Order, issued in 1986, canceled certain provisions of DOE Order 5480.1A, while retaining the thirteen supplemental chapters until they are replaced by new, separate directives. The purpose of the Order is the establishment of the Environmental, Safety, and Health Protection Program for DOE operations. Provisions of the Order apply to all Departmental elements and contractors performing work for the DOE as provided by land and/or contract.

The Order re-states DOE policy with regard to environmental protection, public health and safety, accidental damage or loss of property, statutory compliance, quality assurance, and line management. The Order focuses on the responsibilities and authorities of DOE line management officials. The intent of the Order is applicable to the site characterization program and the requirements of the thirteen chapters will be addressed as stated in the discussion of DOE Order 5480.1A.

5. DOE 5480.3 "Safety Requirements for the Packaging and Transportation of Hazardous Materials, Hazardous Substances, and Hazardous Waste"

The purpose of DOE 5480.3 is to establish requirements for the packaging and transportation of hazardous materials, hazardous substances, and hazardous wastes. The provisions of the Order apply to all of DOE and to its contractors performing work for the Department as provided by law and/or contract.

The Order establishes requirements for compliance with Federal Regulations promulgated by the DOE, the U.S. Department of Transportation, and the packaging standards of the Nuclear Regulatory Commission (10 CFR 71).

This Order primarily applies to radioactive materials - none of which will be used during site characterization. Hazardous wastes, however, will be generated. DOE will package and transport them according to applicable DOE and RCRA regulations, as described in this ERCP.

6. DOE 5480.4 "Environmental Protection, Safety, and Health Protection Standards"

This Order specifies requirements for mandatory environmental protection, safety, and health standards that are applicable to all DOE and DOE-contractor operations; it provides a list of standard references for environmental protection, safety, and health; and it identifies the sources of these standard references.

This Order must be compiled with during facility design, construction, operation, modification, and decommissioning. Facilities include those owned, leased, or otherwise controlled by the DOE or leased by DOE contractors for use in work for the DOE, and includes both permanent or temporary facilities.

This Order is applicable to DOE and DOE-contractor employee-safety and health programs which are not subject to the U.S. Department of Labor

Occupational Safety and Health Administration (OSHA). The Order, however, mandates compliance with certain OSHA Standards (29 CFR 1910, 29 CFR 1915, 29 CFR 1918, 29 CFR 1926, and 29 CFR 1928).

The Order lists those standards that are mandatory as a result of non-DOE Federal or State environmental protection, safety, and health statutes and/or implementing requirements. The majority of the statutes and requirements listed in the Order are believed to be applicable to site characterization, and they form the bulk of the discussions in Chapter 3 of this ERCP.

7. DOE 5481.1B "Safety Analysis and Review System"

The purpose of DOE 5481.1B is to establish uniform requirements for the preparation and review of safety analyses of DOE operations, including identification of hazards, their elimination or control, assessment of their risk, and documenting management authorization of the operation.

The provisions of this Order apply to all of DOE and its contractors performing work for the DOE. Operations having hazards only of a type and magnitude routinely encountered and/or accepted by the general public and construction-related work are excluded.

8. DOE 5482.1B "Environmental, Safety, and Health Appraisal Program"

The purpose of this Order is to establish an appraisal program for DOE. The provisions of this Order apply to all of DOE, and to its contractors performing work for DOE where DOE has established environmental, safety, and health control under the contractual arrangement for the work to be performed.

The objectives of the appraisal program are: to determine that environmental, safety, and health (ES&H) policies and requirements are appropriately interpreted and implemented by DOE; to evaluate the effectiveness of implementation; and to provide management with accurate

information regarding ES&H policies, performance, and recommendations for performance.

This DOE Order serves as a type of quality assurance program to periodically provide for the review of environmental, safety, and health program sufficiency.

9. DOE 5484.1 "Environmental Protection, Safety, and Health Protection Information"

The purpose of this Order is to establish the requirements and procedures for the reporting of information having environmental protection, safety, or health-protection significance for DOE operations. The Order applies to all DOE contractor operations where DOE has established control over environmental protection, safety, and health protection.

The Order defines environmental monitoring as "sample collection and analysis of environmental media...from the environs of DOE sites for the purpose of assessing effects of DOE operations at the site on the local environment. Generally, environmental monitoring is required to determine compliance with applicable environmental radiation standards."

There are currently four documents in various stages of release that address radiological monitoring; (1) the Preliminary Site Characterization Radiological Monitoring Plan (PSCPMP), (2) the Radiological Monitoring Plan (RMP), (3) the Environmental Pathway Analysis Scoping Study (EPASS), and (4) the Radiological Compliance Guide (RCG). The RCG specifically addresses the requirements of DOE Order 5484.1.

10. DOE 5500.1A "Department of Energy Emergency Management System"

This Order is the first in a series of new or revised Orders on emergency preparedness. Specifically, this Order establishes overall policy and requirements for an Emergency Management System that will provide for development, coordination, and direction of DOE planning, preparedness, and readiness assurance for response to operational, energy, and

continuity of Government emergencies involving the DOE or requiring DOE assistance.

The provisions of this Order apply to all Departmental elements and contractors performing work for DOE as provided by law and/or contract.

The Order states that it is DOE policy to: develop and maintain an emergency management system with appropriate capabilities to deal effectively with various emergency situations; establish planning, preparedness, response, and economic and governmental recovery capabilities to minimize the consequences of emergencies to people, property, the environment, the national economy and security; assign responsibility for response to specific emergencies to the DOE element best able to execute that responsibility; and establish programs and procedures to ensure readiness of the emergency management system to meet its responsibilities.

11. DOE 5820.2A "Radioactive Waste Management"

The purpose of DOE Order 5820.2A is to establish policies and guidelines by which the DOE manages its radioactive and mixed waste, waste byproducts, and radioactively contaminated surplus facilities. The Order's provisions apply to all of DOE and its contractors who perform work that involves management of radioactive and mixed waste and/or radioactively contaminated facilities for DOE under the Atomic Energy Act of 1954, as amended.

The objective of DOE Order 5820.2A is to assure that all DOE facilities involving the use radioactive and mixed waste, waste byproducts, or surplus facilities are operated in a manner that protects the public health and safety.

Compliance with the Nuclear Waste Policy Act of 1982 (as amended) will demonstrate compliance with this DOE Order (5820.2A).

12. DOE 5480.17 "Site Safety Representatives"

This Order establishes the interim functions and procedures for Environment, Safety, and Health (EH) organization Site Safety Representatives. The EH Site Safety Representative presence in the field is to enhance EH's independent oversight role by providing firsthand observation of field activities. The objective is to assure that DOE's safety performance is sound. These representatives are being assigned to selected field sites through a multiphased program that will be implemented over a period of years.

This Order applies to DOE management and operating contractors and their appropriate contracting officers, excluding facilities and activities conducted under Executive Order 12344 and Public Law 98-525, Section 1634.

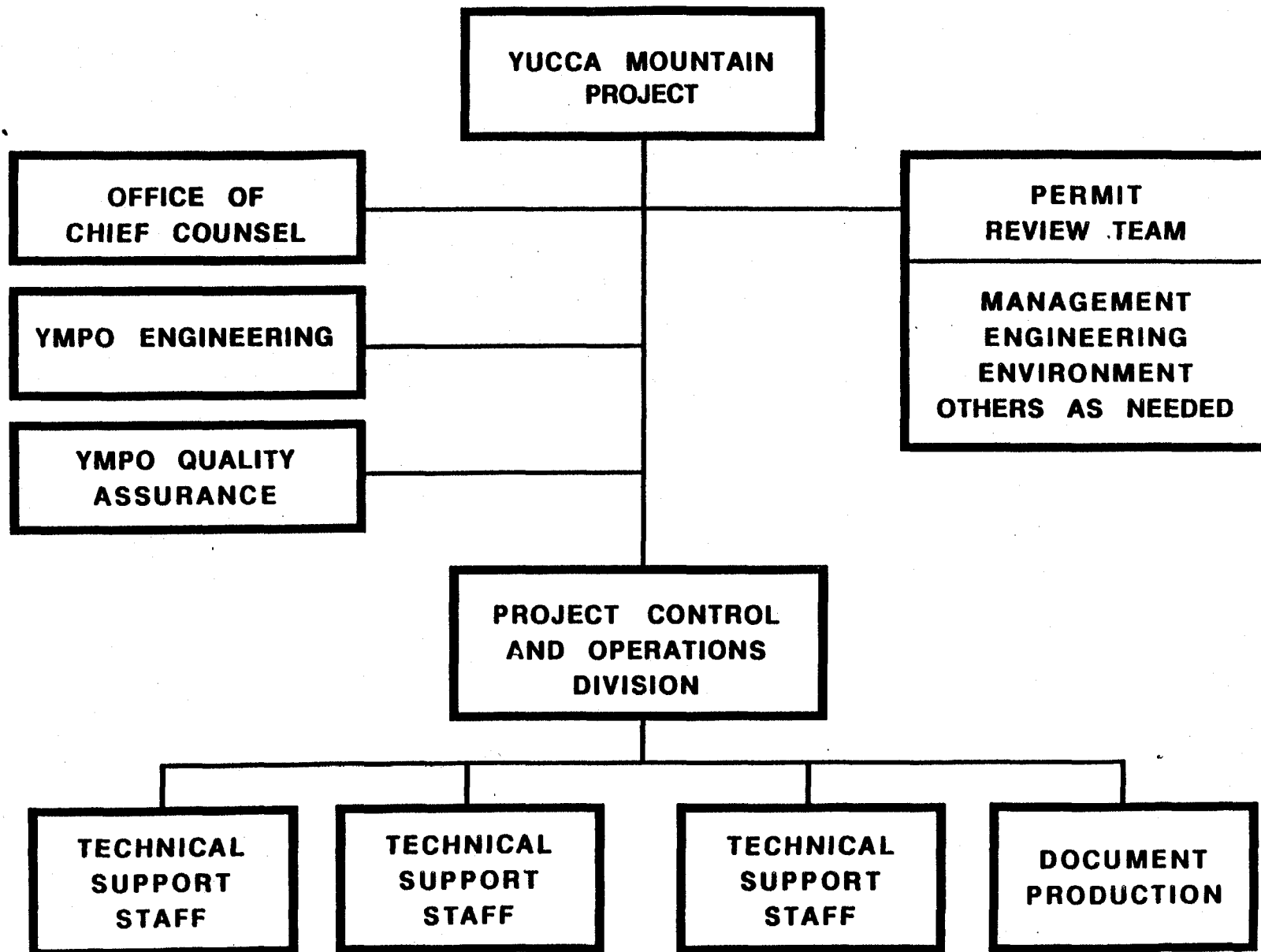
4.0 STATUTORY COMPLIANCE PLANNING

4.1 ORGANIZATION AND RESPONSIBILITIES

The DOE has responsibility for obtaining permits for the Yucca Mountain Project site characterization activities. Development of this ERCP is a DOE Yucca Mountain Project Office responsibility. Interaction with regulatory agencies is coordinated through the DOE Nevada Operations Office, Health Physics and Environmental Division, as requested by the Project Office, and may require involvement of other Yucca Mountain Project participants. Permit applications, supporting documents, and filing fees are submitted to the appropriate agencies by DOE. The DOE Headquarters has principal responsibility for establishing environmental regulatory compliance policy guidance that the program must follow, and the Project Office is responsible for developing and implementing the program based upon this guidance.

As described in the previous chapter, various permit applications and supporting documents must be prepared to obtain the permits. Figure 4-1 illustrates the organization for preparation and approval of environmental regulatory compliance documents. The Project Office manages staff activities, coordinates document review, and approves all documents prior to submittal to regulatory agencies. The Project Office Project Control and Operations Division (PCOD) is responsible for managing the activities necessary to prepare permits for site characterization. The PCOD has the following responsibilities:

1. Coordinating with management, engineers, and scientific investigators to ensure that field activity planning is reviewed to identify activities that may require compliance actions.
2. Coordinating with management, engineers, and scientific investigators to ensure that environmental regulatory compliance requirements are incorporated into field activity planning.



4-2

Figure 4-1. Organizational chart for preparation and review of environmental regulatory compliance documents.

3. Planning, scheduling, and directing activities to prepare permit applications and other environmental compliance documents.
4. Issuing status reports to management.
5. Representing the Project Office at regulatory agency meetings.
6. Maintaining a record of permit activities and compliance actions.
7. Controlling costs.

The Permit Review Team is responsible for reviewing draft permit applications and any supporting documents as required by the PCOD. Comments will be coordinated with the PCOD. Engineering reviews permit applications for correct presentation of engineering information and coordinates with other project participants to provide engineering data, calculations, and design information. The Office of Chief Counsel (OCC) interprets regulations, answers legal questions, and reviews each permit application prior to its submittal to a regulatory agency. Quality Assurance (QA) provides QA input and auditing for the implementation of this ERCP. QA has overall responsibility for verifying implementation of QA controls and procedures. Technical support staff will be assigned as needed.

All Yucca Mountain Project organizations are expected to participate, as needed, in preparing permit applications for site characterization. Individuals will be requested, through their Technical Project Officer (TPO), to serve as technical support staff, and as members of the Permit Review Team. When specific requests for assistance are made, the TPO or designee will be contacted by the PCOD and arrangements for assistance will be made. Schedule conflicts will be resolved through communication with the individual concerned, the TPO, the PCOD, and Project Office management.

4.2 QUALITY ASSURANCE

The QA controls to be used by personnel during the preparation of permit documents are contained in the Project participant Quality Assurance Program Plans (QAPPs) and applicable supporting Quality Procedures (QPs). The program set forth in the QAPPs, the supporting procedures, and this ERCP are designed to provide assurance that the data upon which the permits are based is adequate, and that necessary documentation is maintained.

The process by which permits will be developed will be evaluated and assigned a QA level in accordance with NVO-196-17 and Quality Procedure 2.4 (Assignment of Quality Levels). The quality level classification applies to those activities shown in this ERCP, and not to support documents that may be required. Activities associated with the individual support documents shall be assigned a QA level by the Project participant responsible for the respective activity.

4.3 TRACKING SYSTEM AND EVIDENCE FILE

A complete administrative record will be kept for the environmental regulatory compliance program. A separate file will be maintained for each regulation that applies to site characterization. The file will record the actions taken to demonstrate compliance and obtain regulatory approvals. A computer-based permit tracking system will be implemented to monitor changing requirements and to demonstrate compliance with the necessary requirements.

4.4 PROCEDURES FOR REVISING ENVIRONMENTAL REGULATORY COMPLIANCE PLAN

Modifications to the Site Characterization Plan, project study plans, and/or regulatory changes may require revisions to the ERCP. Proposed revisions to the ERCP will be reviewed in accordance with Section 4.1 of the

ERCP. Revisions approved by the Project Office that are not organizational or administrative in nature will be submitted to the DOE Headquarters for further evaluation. [Revisions that are organizational or administrative in nature will not be submitted to the Headquarters]. The Headquarters will evaluate the proposed changes for consistency with overall OCRWM policy. The proposed revisions, along with comments, will then be forwarded to other various Headquarters offices for concurrence. Upon concurrence, the ERCP will be modified.

4.5 ENVIRONMENTAL REGULATORY COMPLIANCE AUDIT PROGRAM

An environmental regulatory compliance audit program will be developed and implemented by DOE to provide assurances that environmental regulatory requirements are being properly satisfied. The audit program will be designed to document by investigation, examination, or evaluation of objective evidence the adequacy of and compliance with applicable regulations, possible permit conditions, compliance stipulations in DOE Orders, and any other conditions that may be identified while obtaining regulatory approvals for site characterization. The audit program will identify procedures for 1) audit management responsibilities, 2) audit reporting and record keeping, 3) field surveillances, 4) an audit team, 5) audit scheduling, and 6) corrective action. The audit program will be further defined and documented once permits are obtained and possible permit conditions are known.

5.0 SCHEDULE

The DOE approach to environmental regulatory compliance scheduling has been divided into five phases. In the first phase, required approvals were identified by comparing proposed site characterization activities with Federal, State, and local statutes, regulations, and guidelines. The findings of this first phase are presented in this ERCP. In the second phase, regulatory agencies will be contacted to further identify required approvals and the information needed for each approval. In phase three, the applications for approvals will be prepared and submitted to the authorizing agencies. In phase four, the agencies act on the applications, interacting with the DOE and the public as required. In phase five, the DOE will continue the above activities over the term of site characterization to ensure that permit conditions and new or changing regulations are satisfied. An environmental regulatory compliance audit program will be implemented during this phase as discussed in Section 4.5.

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- 33 CFR Part 325, 1987. Title 33, "Navigation and Navigable Waters," Part 325, "Processing of Department of Army Permits," U.S. Government Printing Office, Washington, D.C.
- 33 CFR Part 326, 1987. Title 33, "Navigation and Navigable Waters," Part 326, "Enforcement, Supervision and Inspection," U.S. Government Printing Office, Washington, D.C.
- 33 CFR Part 327, 1987. Title 33, "Navigation and Navigable Waters," Part 327, "Public Hearings," U.S. Government Printing Office, Washington, D.C.
- 33 CFR 329, 1987. Title 33, "Navigation and Navigable Waters," Part 329, "Definition of Navigable Waters of the United States," U.S. Government Printing Office, Washington, D.C.
- 33 CFR 330, 1987. Title 33, "Navigation and Navigable Waters," Part 330, "Nationwide Permits," U.S. Government Printing Office, Washington, D.C.
- 36 CFR Part 60, 1987. Title 36, "Parks, Forests, and Public Property," Part 60, "National Register of Historic Places," U.S. Government Printing Office, Washington, D.C.

- 36 CFR Part 61, 1987. Title 36, "Park, Forests, and Public Property," Part 61, "Procedures for Approved State and Local Government Historic Preservation Programs," U.S. Government Printing Office, Washington, D.C.
- 36 CFR Part 63, 1987. Title 36, "Parks, Forests, and Public Property," Part 63, "Determinations of Eligibility for Inclusion in the National Register of Historic Places," U.S. Government Printing Office, Washington, D.C.
- 36 CFR Part 65, 1987. Title 36, "Parks, Forests, and Public Property," Part 65, "Nation Historic Landmarks Program," U.S. Government Printing Office, Washington, D.C.
- 36 CFR Part 67, 1987. Title 36, "Parks, Forests, and Public Property," Part 67, "Historic Preservation Certifications Pursuant to the Tax Reform Act of 1976, the Revenue Act of 1978, the Tax Treatment Extension Act of 1980, and the Economic Recovery Tax Act of 1981," U.S. Government Printing Office, Washington, D.C.
- 36 CFR Part 68, 1987. Title 36, "Parks, Forests, and Public Property," Part 68, "The Secretary of the Interior's Standards and Guidelines for Preservation Projects," U.S. Government Printing Office, Washington, D.C.
- 36 CFR Part 296, 1986. Title 36, "Protection of Archaeological Resources: Uniform Regulations," U.S. Government Printing Office, Washington, D.C.
- 36 CFR Part 800, 1987. Title 36, "Parks, Forests, and Public Lands," Part 800, "Protection of Historic Properties," U.S. Government Printing Office, Washington, D.C.
- 40 CFR Part 50, 1987. Title 40, "Protection of Environment," Part 50, "National Primary and Secondary Ambient Air Quality Standards," U.S. Government Printing Office, Washington, D.C.
- 40 CFR Part 51, 1987. Title 40, "Protection of Environment," Part 51, "Requirements for Preparation, Adoption, and Submittal of Implementation Plans," U.S. Government Printing Office, Washington, D.C.
- 40 CFR Part 52, 1987. Title 40, "Protection of Environment," Part 52, "Approval and Promulgation of Implementation Plans," U.S. Government Printing Office, Washington, D.C.
- 40 CFR Part 53, 1987. Title 40, "Protection of Environment," Part 53, "Ambient Air Monitoring Reference and Equivalent Methods," U.S. Government Printing Office, Washington, D.C.
- 40 CFR Part 58, 1987. Title 40, "Protection of Environment," Part 58, "Ambient Air Quality Surveillance," U.S. Government Printing Office, Washington, D.C.
- 40 CFR Part 61, 1987. Title 40, "Protection of Environment," Part 61, "National Emission Standards for Hazardous Air Pollutants," U.S. Government Printing Office, Washington, D.C.

- 40 CFR Part 81, 1987. Title 40, "Protection of Environment," Part 81, "Designation of Areas for Air Quality Planning Purposes," U.S. Government Printing Office, Washington, D.C.
- 40 CFR Part 110, 1987. Title 40, "Protection of Environment," Part 110, "Discharge of Oil," U.S. Government Printing Office, Washington, D.C.
- 40 CFR Part 112, 1987. Title 40, "Protection of Environment," Part 112, "Oil Pollution Prevention," U.S. Government Printing Office, Washington, D.C.
- 40 CFR Part 116, 1987. Title 40, "Protection of Environment," Part 116, "Designation of Hazardous Substances," U.S. Government Printing Office, Washington, D.C.
- 40 CFR Part 117, 1987. Title 40, "Protection of Environment," Part 117, "Determination of Reportable Quantities for Hazardous Substances," U.S. Government Printing Office, Washington, D.C.
- 40 CFR Part 121, 1987. Title 40, "Protection of Environment," Part 121, "State Certification of Activities Requiring a Federal License or Permit," U.S. Government Printing Office, Washington, D.C.
- 40 CFR Part 122, 1987. Title 40, "Protection of Environment," Part 122, "EPA Administered Permit Programs: The National Pollution Discharge Elimination System," U.S. Government Printing Office, Washington, D.C.
- 40 CFR Part 123, 1987. Title 40, "Protection of Environment," Part 123, "State Program Requirements," U.S. Government Printing Office, Washington, D.C.
- 40 CFR Part 124, 1987. Title 40, "Protection of Environment," Part 124, "Procedures for Decisionmaking," U.S. Government Printing Office, Washington, D.C.
- 40 CFR Part 125, 1987. Title 40, "Protection of Environment," Part 125, "Criteria and Standards for the National Pollution Discharge Elimination System," U.S. Government Printing Office, Washington, D.C.
- 40 CFR Part 129, 1987. Title 40, "Protection of Environment," Part 129, "Toxic Pollutant Effluent Standards," U.S. Government Printing Office, Washington, D.C.
- 40 CFR Part 133, 1987. Title 40, "Protection of Environment," Part 133, "Secondary Treatment Regulation," U.S. Government Printing Office, Washington, D.C.
- 40 CFR Part 136, 1987. Title 40, "Protection of Environment," Part 136, "Guidelines Establishing Test Procedures for the Analysis of Pollutants," U.S. Government Printing Office, Washington, D.C.
- 40 CFR Part 141, 1987. Title 40, "Protection of Environment," Part 141, "National Primary Drinking Water Regulations," U.S. Government Printing Office, Washington, D.C.

- 40 CFR Part 142, 1987. Title 40, "Protection of Environment," Part 142, "National Primary Drinking Water Regulations Implementation," U.S. Government Printing Office, Washington, D.C.
- 40 CFR Part 143, 1987. Title 40, "Protection of Environment," Part 143, "National Secondary Drinking Water Regulations," U.S. Government Printing Office, Washington, D.C.
- 40 CFR Part 144, 1987. Title 40, "Protection of Environment," Part 144, "Underground Injection Control Program," U.S. Government Printing Office, Washington, D.C.
- 40 CFR Part 145, 1987. Title 40, "Protection of Environment," Part 145, "State Underground Injection Control Programs," U.S. Government Printing Office, Washington, D.C.
- 40 CFR Part 146, 1987. Title 40, "Protection of Environment," Part 146, "Underground Injection Control Program: Criteria and Standards," U.S. Government Printing Office, Washington, D.C.
- 40 CFR Part 147, 1987. Title 40, "Protection of Environment," Part 147, "State Underground Injection Control Programs," U.S. Government Printing Office, Washington, D.C.
- 40 CFR Part 149, 1987. Title 40, "Protection of Environment," Part 149, "Sole Source Aquifers," U.S. Government Printing Office, Washington, D.C.
- 40 CFR Part 191, 1984. Title 40, "Protection of Environment," Part 191, "Standards for Radioactive Releases to the Accessible Environment (Draft 4)," U.S. Government Printing Office, Washington, D.C. [A decision on July 17, 1987, by the U.S. Court of Appeals for the First Circuit has vacated and remanded to the EPA for further proceedings the post-closure standards (Subpart B) in 40 CFR 191].
- 40 CFR Part 230, 1987. Title 40, "Protection of Environment," Part 230, "Section 404(b) (1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material," U.S. Government Printing Office, Washington, D.C.
- 40 CFR Part 240, 1987. Title 40, "Protection of Environment," Part 240, "Guidelines for the Thermal Processing of Solid Wastes," U.S. Government Printing Office, Washington, D.C.
- 40 CFR Part 241, 1987. Title 40, "Protection of Environment," Part 241, "Guidelines for the Land Disposal of Solid Wastes," U.S. Government Printing Office, Washington, D.C.
- 40 CFR Part 243, 1987. Title 40, "Protection of Environment," Part 243, "Guidelines for the Storage and Collection of Residential, Commercial, and Institutional Solid Waste," U.S. Government Printing Office, Washington, D.C.

- 40 CFR Part 244, 1987. Title 40, "Protection of Environment," Part 244, "Solid Waste Management Guidelines for Beverage Containers," U.S. Government Printing Office, Washington, D.C.
- 40 CFR Part 245, 1987. Title 40, "Protection of Environment," Part 245, "Promulgation Resource Recovery Facility Guidelines," U.S. Government Printing Office, Washington, D.C.
- 40 CFR Part 246, 1987. Title 40, "Protection of Environment," Part 246, "Source Separation for Materials Recover Guidelines," U.S. Government Printing Office, Washington, D.C.
- 40 CFR Part 247, 1987. Title 40, "Protection of Environment," Part 247, "Guidelines for Procurement of Products that Contain Recycled Material," U.S. Government Printing Office, Washington, D.C.
- 40 CFR Part 260, 1987. Title 40, "Protection of Environment," Part 260, "Hazardous Waste Management System: General," U.S. Government Printing Office, Washington, D.C.
- 40 CFR Part 261, 1987. Title 40, "Protection of Environment," Part 261, "Identification and Listing of Hazardous Waste," U.S. Government Printing Office, Washington, D.C.
- 40 CFR Part 262, 1987. Title 40, "Protection of Environment," Part 262, "Standards Applicable to Generators of Hazardous Waste," U.S. Government Printing Office, Washington, D.C.
- 40 CFR Part 263, 1987. Title 40, "Protection of Environment," Part 263, "Standards Applicable to Transporters of Hazardous Waste," U.S. Government Printing Office, Washington, D.C.
- 40 CFR Part 264, 1987. Title 40, "Protection of Environment," Part 264, "Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities," U.S. Government Printing Office, Washington, D.C.
- 40 CFR Part 266, 1987. Title 40, "Protection of Environment," Part 266, "Standards of the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities," U.S. Government Printing Office, Washington, D.C.
- 40 CFR Part 270, 1987. Title 40, "Protection of Environment," Part 270, "EPA Administered Permit Programs: The Hazardous Waste Permit Program," U.S. Government Printing Office, Washington, D.C.
- 40 CFR Part 271, 1987. Title 40, "Protection of Environment," Part 271, "Requirements for Authorization of State Hazardous Waste Programs," U.S. Government Printing Office, Washington, D.C.
- 40 CFR Part 280, 1988. Title 40, "Protection of Environment," Part 280, "Underground Storage Tanks," U.S. Government Printing Office, Washington, D.C.

- 40 CFR Part 300, 1987. Title 40, "Protection of Environment," Part 300, "National Oil and Hazardous Substances Pollution Contingency," U.S. Government Printing Office, Washington, D.C.
- 40 CFR Part 302, 1987. Title 40, "Protection of Environment," Part 302, "Designation, Reportable Quantities, and Notification," U.S. Government Printing Office, Washington, D.C.
- 40 CFR Part 355, 1987. Title 40, "Protection of Environment," Part 355, "Emergency Planning and Notification," U.S. Government Printing Office, Washington, D.C.
- 40 CFR Part 401, 1987. Title 40, "Protection of Environment," Part 401, "Effluent Guidelines and Standards, General Provisions," U.S. Government Printing Office, Washington, D.C.
- 40 CFR Part 403, 1987. Title 40, "Protection of Environment," Part 403, "Effluent Guidelines and Standards, General Pretreatment Regulations for Existing and New Sources of Pollution," U.S. Government Printing Office, Washington, D.C.
- 40 CFR Chapter 5 (Parts 1500-1508), 1987. Title 40, "Protection of Environment," Parts 1500-1508, "Council on Environmental Quality," (CEQ) U.S. Government Printing Office, Washington, D.C.
- 43 CFR Part 3, 1988. Title 43, "Public Lands: Interior," Part 3, "Preservation of American Antiquities," U.S. Government Printing Office, Washington, D.C.
- 43 CFR Part 6220, 1988. Title 43, "Public Lands: Interior," Part 6220, "Protection and Preservation of Natural Values," U.S. Government Printing Office, Washington, D.C.
- 43 CFR Part 3600, 1988. Title 43, "Public Lands: Interior," Part 3600, "Mineral Materials Disposal; General," U.S. Government Printing Office, Washington, D.C.
- 49 CFR Part 171, 1988. Title 49, "Transportation," Subchapter C: Hazardous Materials Regulations, Part 171, "General Information, Regulations, and Definitions," U.S. Government Printing Office, Washington, D.C.
- 49 CFR Part 172, 1988. Title 49, "Transportation," Subchapter C: Hazardous Materials Regulations, Part 172, "Hazardous Materials Tables and Hazardous Materials Communications Regulations," U.S. Government Printing Office, Washington, D.C.
- 49 CFR Part 173, 1988. Title 49, "Transportation," Subchapter C: Hazardous Materials Regulations, Part 173, "Shippers - General Requirements for Shipments and Packagings," U.S. Government Printing Office, Washington, D.C.
- 49 CFR Part 174, 1988. Title 49, "Transportation," Subchapter C: Hazardous Materials Regulations, Part 174, "Carriage by Rail," U.S. Government Printing Office, Washington, D.C.

- 49 CFR Part 175, 1988. Title 49, "Transportation," Subchapter C: Hazardous Materials Regulations, Part 175, "Carriage by Aircraft," U.S. Government Printing Office, Washington, D.C.
- 49 CFR Part 176, 1983. Title 49, "Transportation," Subchapter C: Hazardous Materials Regulations," Part 176, "Carriage by Vessel," U.S. Government Printing Office, Washington, D.C.
- 49 CFR Part 177, 1983. Title 49, "Transportation," Subchapter C: Hazardous Materials Regulations, Part 177, "Carriage by Public Highways," U.S. Government Printing Office, Washington, D.C.
- 49 CFR Part 178, 1983. Title 49, "Transportation," Subchapter C: Hazardous Materials Regulations, Part 178, "Shipping Container Specifications," U.S. Government Printing Office, Washington, D.C.
- 50 CFR Part 17, 1986. Title 50, "Wildlife and Fisheries," Part 17, "Endangered and Threatened Wildlife and Plants," U.S. Government Printing Office, Washington, D.C.
- 50 CFR Part 402, 1986. Title 50, "Wildlife and Fisheries," Part 402, "Interagency Cooperation - Endangered Species Act of 1973, as amended," U.S. Government Printing Office, Washington, D.C.
- 50 CFR Part 424, 1986. Title 50, "Wildlife and Fisheries," Part 424, "Listing Endangered and Threatened Species," U.S. Government Printing Office, Washington, D.C.
- 50 CFR Part 450, 1986. Title 50, "Wildlife and Fisheries," Part 450, "General Provisions: Endangered Species Exemption Process," U.S. Government Printing Office, Washington, D.C.
- 50 CFR Part 451, 1986. Title 50, "Wildlife and Fisheries," Part 451, "Application Procedures: Endangered Species Exemption Process," U.S. Government Printing Office, Washington, D.C.
- 50 CFR Part 452, 1986. Title 50, "Wildlife and Fisheries," Part 452, "Consideration of Application by the Secretary: Endangered Species Exemption Process," U.S. Government Printing Office, Washington, D.C.
- 50 CFR Part 453, 1986. Title 50, "Wildlife and Fisheries," Part 453, "Endangered Species Committee: Endangered Species Exemption Process," U.S. Government Printing Office, Washington, D.C.

APPENDIX A

Locations, by Coordinates, by Existing Sites and Planned
Site Characterization Activities at and near Yucca Mountain

(Tables A1, A2, and A3)

December 1988

APPENDIX A

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Note: The majority of activities identified in this appendix are presented on Maps 1-4.

Table A-1. Nevada Central Grid (State Plane Coordinate System) coordinates of existing drillholes, trenches, and other facilities at or near Yucca Mountain (Source: Yucca Mountain Project Site Atlas, October 1988).

Activity	Location	
<u>EXISTING DRILLHOLES OVER 1000 FEET IN DEPTH</u>		
<u>Exploratory Coreholes</u>		
UE-25 a#1	N764900.15	E566349.98
UE-25 a#7	N766249.86	E565468.51
UE-25 b#1	N765243.37	E566416.39
UE-25 p#1	N756171.20	E571484.52
USW G-1	N770500.20	E561000.48
USW G-2	N778824.18	E560503.88
USW G-3	N752779.84	E558483.12
USW G-4	N765807.07	E563081.62
USW GU-3	N752690.10	E558501.32
UE-25a#3	N769321.1	E602938.8
UE-29a#2	N797744.95	E585546.92
<u>Saturated Zone Hydrologic Holes</u>		
USW H-1	N770254.32	E562387.96
USW H-3	N756542.10	E558451.65
USW H-4	N761643.62	E563911.11
USW H-5	N766634.27	E558908.72
USW H-6	N763298.86	E554074.94
UE-25 c#1	N757095.85	E569680.44
UE-25 c#2	N756848.8	E569633.8
UE-25 c#3	N756909.9	E569554.9
<u>Volcanic/Hydrologic Holes</u>		
USW VH-1	N743355.50	E533625.96
USW VH-2	N748319.43	E526264.21
<u>Unsaturated Zone Hydrologic Holes</u>		
USW UZ-1	N771275.82	E560220.80
USW UZ-6	N759731.0	E558325.0
<u>Water Table Holes</u>		
USW WT-1	N753940.57	E563739.18
USW WT-2	N760660.54	E561923.56
UE-25 WT#3	N745995.09	E573384.41
UE-25 WT#4	N768511.75	E568040.15
UE-25 WT#5	N761826.0	E574249.7

Table A-1. Nevada Central Grid (State Plane Coordinate System) coordinates of existing drillholes, trenches, and other facilities at or near Yucca Mountain (Source: Yucca Mountain Project Site Atlas, October 1988).

Activity	Location	
<u>Water Table Holes (continued)</u>		
UE-25 WT#6	N780575.8	E564523.9
USW WT-7	N755569.8	E553891.3
USW WT-10	N748770.9	E553302.1
USW WT-11	N739070.4	E558376.8
UE-25 WT#12	N739725.9	E567011.0
UE-25 WT#13	N756715.0	E578756.7
UE-25 WT#14	N761650.6	E575210.1
UE-25 WT#15	N766116.6	E579805.7
UE-25 WT#16	N774419.66	E570394.88
UE-25 WT#17	N748419.6	E566211.9
UE-25 WT#18	N771167.1	E564855.0
<u>Waterwell Holes</u>		
J-13	N749209.3	E579650.5
J-12	N733508.2	E581011.7
J-11	N740968.2	E611746.1
EXISTING DRILLHOLES LESS THAN 1000 FEET DEEP		
<u>Exploratory Coreholes</u>		
UE-25 a#4	N767971.92	E564471.64
UE-25 a#5	N766956.36	E564755.11
UE-25 a#6	N765899.48	E564500.73
USW GA-1	N779365.42	E559246.98
UE-25 h#1	N748353.08	E574461.38
(horizontal hole plunging -2 degrees west from collar)		
UE-29 a#1	N797729.01	E585574.86
<u>Unsaturated Zone Hydrologic Holes</u>		
UE-25 UZ#4	N768715.6	E566139.3
UE-25 UZ#5	N768591.0	E566135.2
USW UZ-6s	N759909.3	E558050.4
USW UZ-7	N760836.1	E562911.3
USW UZ-8	N760762.2	E562293.5
USW UZ-13	N751953.2	E558488.7

Table A-1. Nevada Central Grid (State Plane Coordinate System) coordinates of existing drillholes, trenches, and other facilities at or near Yucca Mountain (Source: Yucca Mountain Project Site Atlas, October 1988).

Activity	Location	
<u>Repository Surface Facilities Site Exploratory Coreholes</u>		
UE-25 RF#1	N762189.7	E570889.9
UE-25 RF#2	N758800.0	E570334.8
UE-25 RF#3	N765575.1	E571100.0
UE-25 RF#3B	N765695.3	E571065.6
UE-25 RF#4	N762090.8	E572063.2
UE-25 RF#5	N759198.7	E568097.7
UE-25 RF#7	N768804.0	E571170.9
UE-25 RF#7A	N768767.8	E570268.8
UE-25 RF#8	N765630.8	E568789.9
UE-25 RF#9	N765945.0	E570643.3
UE-25 RF#10	N765307.7	E570229.9
UE-25 RF#11	N765621.5	E570434.6
<u>Natural Infiltration Monitoring Holes</u>		
UE-25 UZN#1	N769328.9	E565224.3
UE-25 UZN#2	N768605.5	E566113.6 ^a
UE-25 UZN#3	N768630.4	E566119.4
UE-25 UZN#4	N768663.4	E566127.1
UE-25 UZN#5	N768689.4	E566133.8
UE-25 UZN#6	N768705.6	E566136.6
UE-25 UZN#7	N768724.1	E566141.2
UE-25 UZN#8	N768743.0	E566146.5
UE-25 UZN#9	N768781.5	E566155.9
UE-25 UZN#10	N769868.6	E564744.1 ^a
UE-25 UZN#12	N768650.9	E566695.2
UE-25 UZN#13	N768024.6	E568255.1
UE-25 UZN#14	N767967.2	E568232.9
UE-25 UZN#18	N766472.4	E565246.5
UE-25 UZN#19	N763688.9	E564570.6 ^a
UE-25 UZN#20	N763759.9	E564579.3
UE-25 UZN#21	N763806.1	E564591.0
UE-25 UZN#22	N763880.3	E564604.5
UE-25 UZN#23	N763973.1	E564545.4 ^a
USW UZ-N24	N768005.4	E562054.2 ^a
USW UZ-N25	N768430.4	E561218.9 ^a
USW UZ-N26	N768757.2	E561022.9 ^a
UE-25 UZN#28	N763091.2	E565319.7 ^a
UE-25 UZN#29	N762613.1	E565173.3 ^a
UE-25 UZN#30	N762047.6	E565232.8 ^a
USW UZ-N40	N766175.8	E564221.3
USW UZ-N41	N765867.2	E563520.9
USW UZ-N42	N765728.6	E562858.5 ^a

Table A-1. Nevada Central Grid (State Plane Coordinate System) coordinates of existing drillholes, trenches, and other facilities at or near Yucca Mountain (Source: Yucca Mountain Project Site Atlas, October 1988).

Activity	Location	
<u>Natural Infiltration Monitoring Holes (continued)</u>		
USW UZ-N43	N765997.0	E563263.6
USW UZ-N44	N766192.5	E563139.6 ^a
USW UZ-N45	N765976.7	E563429.2
USW UZ-N46	N772262.3	E559747.7 ^a
USW UZ-N47	N771967.5	E559783.5 ^a
USW UZ-N48	N760834.9	E562413.6 ^a
USW UZ-N49	N760860.4	E562321.8 ^a
USW UZ-N50	N760775.9	E562911.7
USW UZ-N51	N760860.8	E562909.4
USW UZ-N52	N760893.8	E562908.8
UE-25 UZN#56	N760393.5	E565480.0
UE-25 UZN#60	N759756.9	E566567.0
USW UZ-N65	N758627.1	E562537.1 ^a
USW UZ-N66	N758433.5	E561881.1 ^a
USW UZ-N67	N753634.2	E563799.0
USW UZ-N68	N753962.4	E564005.8
USW UZ-N69	N754460.9	E564401.7
USW UZ-N70	N769250.7	E560164.7
USW UZ-N71	N761025.9	E558405.6 ^a
USW UZ-N72	N761067.9	E558626.1
USW UZ-N73	N761049.1	E558926.0 ^a
USW UZ-N74	N761362.2	E558559.9 ^a
USW UZ-N75	N761462.4	E559075.9
USW UZ-N76	N761353.2	E559047.7 ^a
USW UZ-N77	N755526.1	E554397.2
USW UZ-N78	N757557.8	E556262.3
USW UZ-N79	N757733.2	E556333.9
USW UZ-N80	N757634.3	E557201.1 ^a
USW UZ-N81	N757807.1	E555595.1
USW UZ-N82	N757498.1	E554689.7
USW UZ-N83	N760624.2	E556349.0
USW UZ-N84	N760717.0	E555887.8
UE-25 UZN#85	N750715.8	E577567.8
USW UZ-N86	N760614.5	E556460.3
USW UZ-N87	N760714.1	E555887.1
USW UZ-N88	N760796.9	E556551.2
USW UZ-N89	N760610.4	E555588.7
USW UZ-N90	N760608.4	E555587.2
UE-29 UZN#91	N797275.0	E585340.9
UE-25 UZN#92	N778009.5	E583558.5
USW UZ-N93	N759584.3	E558320.7
USW UZ-N94	N759723.5	E558236.2 ^a
USW UZ-N95	N759899.0	E558172.3

Table A-1. Nevada Central Grid (State Plane Coordinate System) coordinates of existing drillholes, trenches, and other facilities at or near Yucca Mountain (Source: Yucca Mountain Project Site Atlas, October 1988).

Activity	Location	
<u>Natural Infiltration Monitoring Holes (continued)</u>		
USW UZ-N96	N759445.8	E558403.1 ^a
UE-25 UZN#97	N763093.8	E565320.6
USW UZ-N98	N767996.2	E562083.5
<u>Misc. Additional Shallow Drillholes</u>		
UE-25 UZNC#1	N764670.6	E566158.9
UE-25 UZNC#2	N764668.4	E566157.5
UE-25 TC#1	N756482.7	E612896.7
UE-25 TC#2	N756485.1	E612898.2
UE-25 TC#3	N756806.0	E613079.1
UE-25 TC#4	N756860.0	E613094.6
UE-25 TCI#1	N756778.0	E613450.1
UE-25 TCI#2	N756775.8	E613451.7
UE-25 TCI#3	N756781.8	E613435.4
UE-25 TCI#4	N756783.1	E613437.6
MISC. ADDITIONAL FACILITIES		
<u>Test Pits</u>		
SHAFT MAPPING TEST PIT #1	N748401	E574452
SHAFT MAPPING TEST PIT #2	N748459	E574454
SHAFT MAPPING TEST PIT #3	N745753	E573385
<u>Trenches</u>		
A-1	N770733	E576623
A-2	N771036	E576703
2	N757854	E562188
4	N763619	E562582
6	N754715	E560244
8	N749649	E555295
9	N757651	E561619
10-A	N763604	E555511
10-B	N763808	E556323

Table A-1. Nevada Central Grid (State Plane Coordinate System) coordinates of existing drillholes, trenches, and other facilities at or near Yucca Mountain (Source: Yucca Mountain Project Site Atlas, October 1988).

Activity	Location	
<u>Trenches (continued)</u>		
11	N782629	E561727
12	N778074	E560031
13	N783130	E559371
14-1	N765457	E569730
16	N753733	E572442
16-B	N752317	E572202
17	N756056	E571217
CF-1	N747514	E549363
CF-2	N740227	E545471
CF-3	N739731	E545228
P1	N770877	E511254
P2	N767473	E508485
P3	N748952	E512031
P4	N742062	E511350
P5	N745998	E512152
14	N765657	E569241
14-A	N765657	E569241
14-B	N756050	E569080
14-C	N764848	E569162
14-D	N764444	E569163
Rock Valley #1	N719302	E658903
Rock Valley #2	N719302	E658903
Frenchman Flat #1	N730697	E700992
Frenchman Flat #2	N732387	E696912
BF-1	N772257	E475137
BF-2	N770436	E475135
CFS (E)	N715837	E531755
CFS (W)	N715837	E531745
<u>Meteorological Monitoring Stations</u>		
NTS-60 Repository	N761795	E569127
NTS-10 Yucca Mountain	N766434	E558826
NTS-10 Coyote Wash	N766195	E562876
NTS-10 Alice Hill	N769661	E576810
NTS-10 Fortymile Wash	N733230	E580882
<u>Site Precipitation and Streamflow Gauging Stations</u>		
PS1	N882811	E616203
PS2	N780864	E583356
PS3	N748068	E577335
PS4	N700517	E567324

Table A-1. Nevada Central Grid (State Plane Coordinate System) coordinates of existing drillholes, trenches, and other facilities at or near Yucca Mountain (Source: Yucca Mountain Project Site Atlas, October 1988).

Activity		Location
<u>Site Precipitation and Streamflow Gauging Stations (continued)</u>		
PS5		N878479 E634893
PS6		N770745 E567897
PS7		N765796 E575428
PS8		N768071 E581671
PS9		N751350 E577346
PS10		N744467 E574697
PS11		N738786 E603884
PS12		N762241 E625500
PS13		N749630 E694169
PS14		N704813 E653320
PS15		N660462 E667277
PS16		N683650 E605005
PS17		N620106 E664676
PS18		N617446 E674840
PS19		N746757 E482618
PS20		N662790 E752936
PS44		N771275 E560220
PS45		N759731 E558325
<u>Bedrock Pavements</u>		
100		N765345 E561870
200		N766854 E562237
300		N766854 E562362
400		N740000 E573300
500		N764098 E565200
600		N767608 E561509
1000		N745000 E574200
<u>Regional Precipitation Monitoring Stations</u>		
Unnamed Tributary to Fortymile Wash	RRG ^c	N865620 E616670
Fortymile Wash at Narrows	PRG ^d	N778010 E583580
Yucca Wash	PRG	N770320 E579750
Exile Hill	RRG	N764990 E569340
North Fork Coyote Wash	PRG	N766120 E563030
Drillhole Wash	PRG	N753630 E578750
Fortymile Wash at J-13	PRG	N749400 E577890
Dune Wash	PRG	N743770 E575700
Fortymile Wash near US 95	PRG	N699320 E568200
Topopah Wash	PRG	N736070 E602410

Table A-1. Nevada Central Grid (State Plane Coordinate System) coordinates of existing drillholes, trenches, and other facilities at or near Yucca Mountain (Source: Yucca Mountain Project Site Atlas, October 1988).

Activity			Location
<u>Regional Precipitation Monitoring Stations (continued)</u>			
Cane Springs Wash Tributary	PRG	N749390	E667300
Skull Mountain Pass on Jackass Flats Highway	PRG	N723750	E627060
Rock Valley on Jackass Flats Highway	PRG	N704400	E651830
Rock Valley at US 95	PRG	N683380	E604810
Amargosa River Tributary near Mercury	PRG	N659900	E666890
Stockade Pass	PRG	N878700	E635610
<u>Regional Streamflow Monitoring Stations</u>			
Amargosa River near Beatty	CSG ^e	N780900	E472880
Tributary to Fortymile Wash	RSG ^f	N865620	E616670
Fortymile Wash at Narrows	RSG	N778010	E583580
Yucca Wash	CSG	N770320	E579750
Drillhole Wash	CSG	N753630	E578750
Fortymile Wash at J-13	RSG	N749400	E577890
Dune Wash	CSG	N743770	E575700
Fortymile Wash near US 95	RSG	N699320	E568200
Topopah Wash	CSG	N736070	E602410
Cane Spring Wash Tributary	CSG	N749390	E667300
Amargosa River Tributary near Mercury	CSG	N659900	E666890
Amargosa River Tributary #1 near Johnnie	CSG	N622800	E664360
Amargosa River Tributary #2 near Johnnie	CSG	N614160	E674320
Indian Springs Valley Tributary	CSG	N661500	E432950

^a = planned ponding study.

^cRRG = Recording Rain Gage (Tipping bucket).

^dPRG = Plastic Rain Gage.

^eCSG = Crest-stage Stream Gage.

^fRSG = Recording Stream Gage.

Table A-2. Nevada Central Grid (State Plane Coordinate System) coordinates of proposed drillholes shafts artificial infiltration experiments and other facilities at Yucca Mountain (Sources: Yucca Mountain Project Surface-Based Investigation Plan, December 1988 Draft).

Activity	Location	Comments
<u>Shafts</u>		
USW ES-1	N766255	E563630
USW ES-2	N766405	E563890
<u>Multipurpose Boreholes</u>		
USW MPBH-1	N766100	E563700
USW MPBH-2	N766168	E564035
		(these holes will be located on the Main Exploratory Shaft Facility pad)
DEEP DRILLHOLES REQUIRING DRILL PADS		
<u>Unsaturated Zone Hydrologic Holes</u>		
USW UZ-2	N759769	E558180
USW UZ-3	N759625	E558220
UE-25 UZ#9	N760600	E564750
UE-25 UZ#9A	N760600	E564800
UE-25 UZ#9B	N760600	E564850
USW UZ-10	N750139	E561123
USW UZ-11	N757400	E555800
USW UZ-12	N757400	E555800
USW UZ-14	N771275	E560220
		(use existing drill pad)
		(use existing drill pad)
		(share drill pad w/UZ-9)
		(share drill pad w/UZ-9)
		(not surveyed; near USW UZ-13)
		(share drill pad w/UZ-11)
		(not surveyed; near USW UZ-1)
<u>Vertical Seismic Profile Hole</u>		
UE-25 VSP-1	N760600	E564775
		(share drill pad w/UZ#9 complex)
<u>Unsaturated Zone Prototype Holes</u>		
UE-25 UZPH-1	N730400	E569200
UE-25 UZPH-1	N730400	E569200
		(both holes will be drilled from same drill pad, location is tentative)
<u>Calcite-Silica Holes</u>		
UE-25 ph#1a	N766000	E569300
UE-25 ph#1b	N766000	E569300
		(ph#1a consists of 5 slant holes, ph#1b will be a vertical hole drilled from approximately the same location)

Table A-2. Nevada Central Grid (State Plane Coordinate System) coordinates of proposed drillholes shafts artificial infiltration experiments and other facilities at Yucca Mountain (Sources: Yucca Mountain Project Surface-Based Investigation Plan, December 1988 Draft).

Activity	Location		Comments
<u>Geologic Coreholes</u>			
USW G-5	N781930	E563008	
USW G-6	N778722	E548922	
UE-25 G#7	N724586	E566090	
UE-25 G#8	(to be determined)		(not shown on maps, to be located in the vicinity of proposed hole UE-25 FM#2)
<u>Volcanic Holes</u>			
USW V-1	N729600	E518000	
USW V-2	N682450	E572900	
USW V-3			(not surveyed; ~8 km SW of V-2)
USW V-4			(not surveyed; ~8 km SW of V-2)
<u>In Situ Stress Study Hole</u>			
UE-25 ISS#1	(to be determined)		
<u>Fortymile Wash Recharge Study Holes</u>			
UE-25 FM#1	N766450	E581700	
UE-25 FM#2	N756050	E579975	
UE-25 FM#3	N710450	E572375	
Shallow infiltration monitoring neutron holes	(to be determined)		(plans for up to 10 holes)
<u>Water-Table Holes</u>			
USW WT-8	N762283	E557049	
USW WT-9	N769477	E557642	
UE-25 WT#19	N747978	E589973	
UE-25 WT#20	N728303	E565143	
USW WT-21	N760086	E550328	
USW WT-22	N778858	E528373	
USW WT-23	N771275	E560220	(not surveyed; north of UZ-1 in Drill Hole Wash)
USW WT-24	N776625	E565450	(not surveyed; between G-2 & WT-16)

Table A-2. Nevada Central Grid (State Plane Coordinate System) coordinates of proposed drillholes shafts artificial infiltration experiments and other facilities at Yucca Mountain (Sources: Yucca Mountain Project Surface-Based Investigation Plan, December 1988 Draft).

Activity	Location		Comments
<u>Southern Tracer Complex Holes, if needed</u>			(location not yet determined but will be southeast of CPDB. Complex will consist of 4 holes)
<u>Saturated Zone Hydrologic Holes</u>			
USW H-7	N763300	E557075	(not surveyed; 3,000 feet east of H-6)
<u>Horizontal Borehole</u>			
USW SCH-1			(location has yet to be determined, but near the northwest end of the repository block)
<u>Systematic Drilling Program</u>			
USW SD-1	N768220	E563370	
USW SD-2	N767875	E560665	
USW SD-3	N764760	E559345	
USW SD-4	N764390	E562375	
USW SD-5	N763175	E564195	
USW SD-6	N762230	E559375	
USW SD-7	N758605	E561060	
USW SD-8	N761415	E564010	
UE-25 SD#9	N761160	E564625	
USW SD-10	N760680	E563610	
USW SD-11	N760670	E564130	
USW SD-12	N760030	E564260	

SHALLOW DRILLHOLES NOT REQUIRING DRILL PADS

Natural Infiltration Monitoring Holes

USW UZ-N11	N760000	E556400*	
USW UZ-N15	N760150	E556600*	
UE-25 UZN#16	N765500	E565300*	
USW UZ-N17	N759350	E556250*	
USW UZ-N27	N770450	E562300*	

Table A-2. Nevada Central Grid (State Plane Coordinate System) coordinates of proposed drillholes shafts artificial infiltration experiments and other facilities at Yucca Mountain (Sources: Yucca Mountain Project Surface-Based Investigation Plan, December 1988 Draft).

Activity	Location	Comments	
<u>Natural Infiltration Monitoring Holes (continued)</u>			
USW UZ-N31	N757550	E560450 ^a	
USW UZ-N32	N757200	E559990 ^a	
USW UZ-N33	N751400	E559300 ^a	
USW UZ-N34	N750150	E559600 ^a	
USW UZ-N35	N750350	E559850 ^a	
USW UZ-N36	N765700	E557675 ^a	
USW UZ-N37	N765450	E557600 ^a	
USW UZ-N38	N765500	E557950 ^a	
USW UZ-N39	N765750	E557960 ^a	
USW UZ-N53	N766450	E560110 ^a	
USW UZ-N54	N760550	E564250 ^a	
USW UZ-N55	N757500	E561600 ^a	
USW UZ-N57	N754950	E560500 ^a	
USW UZ-N58	N754800	E560650 ^a	
USW UZ-N59	N755300	E560100 ^a	
USW UZ-N61	N755550	E560150 ^a	
USW UZ-N62	N755350	E560300 ^a	
USW UZ-N63	N755550	E560450 ^a	
USW UZ-N64	N767000	E559300 ^a	
<u>Large-plot Rainfall Simulation Tests (10 holes at each location)</u>			
LPRS-1	N751400	E559300	(designations are tentative)
LPRS-2	N761353	E559048	
LPRS-3	N757200	E559990	
LPRS-4	N760434	E561881	
LPRS-5	N760860	E562321	
LPRS-6	N765500	E565300	
LPRS-7	N755500	E560150	
LPRS-8	N770450	E562300	
LPRS-9	N765500	E557950	
LPRS-10	N765750	E557950	
LPRS-11	N763091	E565320	
LPRS-12	N762048	E565233	
LPRS-13	N762613	E565173	
LPRS-14	N760150	E556600	
<u>Small-plot Rainfall Simulation Tests (Approx. 4 holes at each location)</u>			
SPRS-1	N751400	E559300	(designations are tentative)
SPRS-2	N761026	E558406	tentative)
SPRS-3	N759446	E558403	

Table A-2. Nevada Central Grid (State Plane Coordinate System) coordinates of proposed drillholes shafts artificial infiltration experiments and other facilities at Yucca Mountain (Sources: Yucca Mountain Project Surface-Based Investigation Plan, December 1988 Draft).

Activity	Location	Comments
<u>Small-plot Rainfall Simulation Tests (Approx. 4 holes at each location)</u> (continued)		
SPRS-4	N761353	E559048
SPRS-5	N757200	E559990
SPRS-6	N765700	E557675
SPRS-7	N760434	E561881
SPRS-8	N760860	E562321
SPRS-9	N765500	E565300
SPRS-10	N762613	E565173
SPRS-11	N760550	E564250
SPRS-12	N763973	E564545
SPRS-13	N766400	E560100
SPRS-14	N765729	E562859
SPRS-15	N755550	E560150
SPRS-16	N770450	E562300
SPRS-17	N760150	E556600
SPRS-18	N760000	E556400
SPRS-19	N765500	E557950
SPRS-20	N759350	E556250
SPRS-21	N755120	E560400
SPRS-22	N763091	E565320
SPRS-23	N762048	E565233

Amargosa Desert Piezometers

(locations to be determined)

(Number not yet determined)

Playa Coring

(location to be determined)

(Number not yet determined)

ADDITIONAL PLANNED ACTIVITIES

Trenches

Midway Valley
1a - 1h

Location not yet
determined

(trenching at potential
site of Repository
Surface Facilities)

Table A-2. Nevada Central Grid (State Plane Coordinate System) coordinates of proposed drillholes shafts artificial infiltration experiments and other facilities at Yucca Mountain (Sources: Yucca Mountain Project Surface-Based Investigation Plan, December 1988 Draft).

Activity	Location	Comments
<u>Trenches (continued)</u>		
Midway Valley 2a - 2d	Location not yet determined	(trenching at potential site of Repository Surface Facilities)
Bare Mountain 1	N770500 E509000	
Bare Mountain 2	N749500 E511700	
Rock Valley 1 & 2	Location not yet determined	(southeast of Yucca Mountain on the NTS)
Stagecoach Road 1 & 2	Location not yet determined	(south of Yucca Mountain)
Yucca Mountain 1 - 8	Location not yet determined	(investigation of possible Quaternary faults proximal to Yucca Mountain)
Paleohydrologic trench	Near trench 14	
Lathrop Wells Cinder Cone trenches	Number and location to be determined	(trenching may consist of up to 4 trenches and several smaller pits)

Bedrock Pavements

The location of at least two additional bedrock pavement sites has not yet been determined.

Shallow Seismic Refraction Surveys

To be conducted in association with tectonic trenching

Shallow Seismic Reflection Surveys (potential survey profiles)

	West End		East End	
1	N762000	E562000	N752000	E578000
2	N721000	E553000	N738000	E579000
3a	N761000	E562000	N767000	E567000
3b	N767000	E567000	N777000	E571000
4	N746000	E532000	N757000	E552000
5	N769000	E561000	N776000	E572000

Table A-2. Nevada Central Grid (State Plane Coordinate System) coordinates of proposed drillholes shafts artificial infiltration experiments and other facilities at Yucca Mountain (Sources: Yucca Mountain Project Surface-Based Investigation Plan, December 1988 Draft).

Activity	Location			Comments
<u>Shallow Seismic Reflection Surveys (potential survey profiles) (continued)</u>				
6a	N757000	E570000	N676000	E578000
6b	N767000	E578000	N779000	E582000
7	N754000	E558000	N753000	E562000
8	N783000	E557000	N786000	E565000
9	N778000	E559000	N782000	E566000

^a = ponding study planned.

Table A-3. Nevada Central Grid coordinates of proposed precipitation streamflow and meteorological monitoring stations (Source: Section 8.1.3.1.2 of the SCP).

Instrumentation	Location
<u>Planned Site Precipitation and Streamflow Stations</u>	
S1 Wren Wash - Below UE-25 UZN#98 just below lower confluence	N767900 E562250
S2 Wren Wash - Above UE-25 UZN#26 just below upper confluence	N768890 E560450
S3 Wren Wash - Above USW UZ-N70 near top of drainage	N769450 E559830
S4 Drill Hole Wash - Just above USW UZ-N46	N772250 E559700
S5 Drill Hole Wash - Just below UE-25 UZN#18	N766350 E565240
S6 Coyote Wash - North Fork 30 m (100 ft) downstream from trench	N766300 E562500
S7 Coyote Wash - South Fork just upstream from USW UZN-42	N765650 E562700
S8 Coyote Wash - South Fork just below crest of Yucca Mountain	N766150 E559675
S9 Pagany Wash - Just below UE-25 UZN#12	N768550 E566800
S10 Pagany Wash - Just above UE-25 UZN#10	N770050 E564650
S11 Split Wash - 150 m (500 ft) above UE-25 UZN#19	N763910 E564125
S12 H4 Canyon - 300 m (1,000 ft) above USW H-4	N762275 E563150
S13 WT-2 Canyon - Just below USW UZ-7	N760850 E563000
S14 WT-2 Canyon - North Fork just below USW UZ-N73	N760950 E559010

Table A-3. Nevada Central Grid coordinates of proposed precipitation streamflow and meteorological monitoring stations (Source: Section 8.1.3.1.2 of the SCP).

Instrumentation	Location
<u>Planned Site Precipitation and Streamflow Stations (continued)</u>	
S15 Ghost Dance Wash - North Fork west of QTec deposit	N758700 E559600
S16 Ghost Dance Wash - lower part of South Central Fork	N757480 E560375
S17 Abandon Wash - Just below Ghost Dance fault trench	N755050 E560500
S18 Drainage South of USW UZ-13 - Just below USW UZ-N33	N750300 E559350
S19 Solitario Canyon - Near USW UZ-N35	N754525 E556875
S20 Solitario Canyon - Canyon Mouth near USW WT-7	N755300 E554225
S21 Solitario Canyon - Mid-part of canyon just above USW H6 road	N762750 E556190
S22 Solitario Canyon - Upper part of canyon-due west of Wren Wash	N768780 E557725
S23 Solitario Canyon - Unnamed tribu- tary between UZ N81 and USW UZ N79	N757675 E566000
S24 Solitario Canyon - Unnamed tribu- tary just above USW UZ N36	N765800 E557775
P1 Yucca Crest-north end (Precip. only)	N772100 E558670
P2 Yucca Crest near top of Split Wash (Precip. only)	N763920 E559300
P3 Yucca Crest near USW H3 (Precip. only)	N756540 E558450
P4 Yucca Crest near USW G3 (Precip. only)	N765780 E558480
<u>Meteorological Monitoring Stations</u>	
W2 USW UZ-1	N771270 E560220
W3 USW H-5	N766630 E558900
W4 ES-1	N765995 E563260

Table A-3. Nevada Central Grid coordinates of proposed precipitation streamflow and meteorological monitoring stations (Source: Section 8.1.3.1.2 of the SCP).

Instrumentation		Location	
<u>Meteorological Monitoring Stations (continued)</u>			
W5	USW H-6	N763300	E554070
W6	USW UZ-6	N759730	E558320
W7	UE-25 UZ#9	N760450	E564760
W8	USW UZ-N58	N754850	E560700
W9	USW UZ-N33	N750400	E559310
W10	USW WT-7	N755520	E554400
W1	Southeast of Area 25 subdock Coexisting station	N761250	E568950

Appendix B

Applicability of Environmental Statutes and Regulations to Site
Characterization of Yucca Mountain, Nevada

(Tables B1 and B2)

Applicability of Environmental Statutes and Regulations to Site Characterization of Yucca Mountain, Nevada

Table B1 lists the Federal and Federally-delegated environmental regulatory requirements that are believed to be applicable to the repository program in Nevada. Table B2 lists the potentially applicable State environmental regulations. The tables were compiled chiefly from (1) the Environmental Assessment for the Yucca Mountain Site in Nevada (U.S. DOE, 1986), (2) DOE Order 5480.4 ("Environmental Protection, Safety, and Health Protection Standards"), (3) a guidebook titled "Permit Requirements for Development of Energy and Other Selected Natural Resources for the State of Nevada" (U.S. Geological Survey, 1981, with updates; available from the Nevada Department of Conservation and Natural Resources in Carson City, NV), and (4) the Nevada Revised Statutes.

In the Environmental Assessment (EA) for the Yucca Mountain site (U.S. DOE, 1986), environmental regulatory requirements were included that relate not only to site characterization, but also to construction, operation, and decommissioning of a nuclear waste repository at Yucca Mountain. Thus, some of the requirements listed in Tables B1 and B2 are not applicable to site characterization. The environmental regulations listed in Tables B1 and B2 have been evaluated in terms of their applicability to site characterization of the Yucca Mountain site. With the exceptions noted in the next paragraph, those that are believed to be applicable to site characterization are discussed in Chapter 3 of this document.

Some of the statutes and Executive Orders (EOs) listed in Table B1 have no requirements for obtaining permits or approvals, even though the intent of the statute/EOs may be applicable to site characterization of Yucca Mountain (as indicated in the table). Because permits or approvals are not required by these statutes/EOs, they are not discussed in Chapter 3 of this document. Furthermore, some statutes such as the Migratory Bird Treaty Act, although applicable, require compliance only in the event that such birds or their nests are discovered at the site. Because such discoveries are not likely, this and similar statutes are not discussed in Chapter 3; a brief plan of action, however is outlined in Table B1 for each statute of this type.

The determination of applicability of the various statutes and regulations listed in Tables B1 and B2 is based on the plans for site characterization described in Chapter 2 of this document. If these plans change sufficiently, the applicability of some of the statutes to site characterization must be re-evaluated. As an example, the National Wildlife Refuge System Administration Act is inapplicable to site characterization of Yucca Mountain because there are no plans to use or traverse lands administered by the U.S. Fish and Wildlife Service. If, in the future, it becomes essential to gain access to these lands, the DOE would be required to comply with this Act.

TABLE B1 - APPLICABILITY OF FEDERAL AND FEDERALLY-DELEGATED ENVIRONMENTAL REGULATORY REQUIREMENTS TO SITE CHARACTERIZATION OF YUCCA MOUNTAIN (The sources for the statutes, regulations, and executive orders listed in the table are identified in paragraph one of this appendix. ERCP = Environmental Regulatory Compliance Plan)

Authority	Applicability to Site Characterization
National Environmental Policy Act.	Applicable; see Chapter 3 of ERCP.
Federal Land Policy and Management Act.	Applicable; see Chapter 3 of ERCP.
Fish and Wildlife Coordination Act.	Inapplicable because water-related habitat does not exist at Yucca Mountain.
Organic Act of the National Park Service; National Park System Mining Regulation Act.	Applicable, if regional field studies extend into National Park areas.
Department of Transportation Acts (various Acts).	There are no explicit permits or approvals associated with these Acts; the DOE intends, however, to consult with the DOT regarding applicability.
Coastal Barrier Resources Act; Coastal Zone Management Act.	Both are inapplicable because site characterization will not affect coastal areas.
Marine Protection, Research, Sanctuaries Act.	Inapplicable because ocean dumping is not required for site characterization.
Wild and Scenic Rivers Act	Inapplicable because site characterization will not affect any designated or soon-to-be designated Wild and Scenic Rivers.
Federal Cave Resources Protection Act of 1988 (P.L. 100-691)	Applicability will be addressed before any activity is conducted in a cave on Federal land.

TABLE B1 (continued) - APPLICABILITY OF FEDERAL AND FEDERALLY-DELEGATED ENVIRONMENTAL REGULATORY REQUIREMENTS TO SITE CHARACTERIZATION OF YUCCA MOUNTAIN

Authority	Applicability to Site Characterization
Wilderness Act.	Inapplicable because current plans do not require use or traverse of existing Wilderness areas, or areas currently under study for wilderness designation.
Taylor Grazing Act.	Inapplicable because current plans do not require activities on grazing districts designated by the Bureau of Land Management.
National Forest Organic Legislation; Multiple Use/Sustained Yield Act; Forest Rangeland Renewable Resources Planning and Research Acts, Management Act, and Renewable Resource Extension Act.	Inapplicable because current plans do not require the use or traverse of lands administered by the National Forest Service.
Farmland Protection Policy Act.	Applicable; see Chapter 3 of ERCP.
Protection of Floodplains/Wetlands; Executive Orders 11988/11990.	Applicable; see Chapter 3 of ERCP.
Exotic Organisms; Executive Order 11987.	Inapplicable because no exotic organisms will be used during site characterization.
Off-Road Vehicles on Public Lands; Executive Order 11989.	See discussion in Chapter 3 under Federal Land Policy and Management Act.
Protection and Enhancement of Environmental Quality; Executive Orders 11514 and 11991.	There are no explicit permits or approvals associated with these EOs, although the intent of the EOs is applicable to site characterization.

TABLE B1 (continued) - APPLICABILITY OF FEDERAL AND FEDERALLY-DELEGATED ENVIRONMENTAL REGULATORY REQUIREMENTS TO SITE CHARACTERIZATION OF YUCCA MOUNTAIN

Authority	Applicability to Site Characterization
Federal Compliance with Pollution Control Standards; Executive Orders 12088 and 12612.	There is no explicit permit or approval associated with these EOs; although the intent of the EOs--to comply with pollution control standards--will be followed.
Response to Environmental Damage; Executive Order 12580.	Applicable; see discussion under the "Comprehensive Environmental Response, Compensation, and Liability Act" in
Environmental Safeguards on Activities for Animal Damage Control on Federal Lands; Executive Order 12342.	Repeal of Executive Order 11643 which restricted the use of chemical toxicants on Federal lands, inapplicable because no chemical toxicants will be used during site characterization and their use is no longer restricted.
Clean Air Act.	Applicable; see Chapter 3 of ERCP.
Noise Control Act.	There are no explicit permits or approvals associated with this Act, nor are there any Federal, State, or local requirements for controlling noise at Yucca Mountain during site characterization. The intent of the Act, however, is applicable to site characterization, and good engineering practice will be used throughout the site characterization program to keep noise to a minimum.
Federal Water Pollution Control Act (the "Clean Water Act").	Applicable; see Chapter 3 of ERCP.
Rivers and Harbors Act.	Inapplicable because no navigable waters, or channels of these waters, will be affected by site characterization.
General Bridge Act.	Inapplicable because no bridges will be constructed over navigable waters, nor will existing bridges that span navigable waters be modified during site characterization.

TABLE B1 (continued) - APPLICABILITY OF FEDERAL AND FEDERALLY-DELEGATED ENVIRONMENTAL REGULATORY REQUIREMENTS TO SITE CHARACTERIZATION OF YUCCA MOUNTAIN

Authority	Applicability to Site Characterization
Safe Drinking Water Act.	Applicable; see Chapter 3 of ERCP.
Hazardous Materials Transportation Act.	Applicable; see Chapter 3 of ERCP.
Resource Conservation and Recovery Act.	Applicable; see Chapter 3 of ERCP.
Sikes Act.	Applicable, although no permits are required. The purpose of the Sikes Act is to develop conservation and rehabilitation programs involving the protection and enhancement of wildlife, fish, and game resources on certain Federal lands. The Department of the Interior is responsible for developing, with prior approval by the DOE, comprehensive plans for conservation and rehabilitation programs to be implemented on DOE lands (Section 670g of the Act). DOE consultations with the U.S. Fish and Wildlife Service and the Bureau of Land Management serve to comply with this Act. See discussions in Chapter 3 under the Endangered Species Act and the Federal Land Policy and Management Act.
Comprehensive Environmental Response, Compensation, and Liability Act (and EO 12286, 12288, and 12580)	There are no explicit permits or approvals associated with this Act (and the EO), but there are applicable notification requirements in the event of an accidental spill of hazardous materials during site characterization. Also, if certain amounts of hazardous substances are used, then information on those substances must be provided to local communities and the Nevada Division of Environmental Protection. Because very little hazardous material will be used or generated during site characterization, it is doubtful that the Act will become applicable. Nevertheless, DOE/NNWSI has developed a plan of action in the event of a spill of hazardous material.

TABLE B1 (continued) - APPLICABILITY OF FEDERAL AND FEDERALLY-DELEGATED ENVIRONMENTAL REGULATORY REQUIREMENTS TO SITE CHARACTERIZATION OF YUCCA MOUNTAIN

Authority	Applicability to Site Characterization
American Indian Religious Freedom Act.	Applicable; see Chapter 3 of ERCP.
Antiquities Act	Applicable; see Chapter 3 of ERCP.
National Historic Preservation Act; Archaeological Resources Protection Act; American Historic Sites, Buildings, and Antiquities Act; Historic Preservation Act.	Applicable; see Chapter 3 of ERCP for details on the broad area of historic preservation.
National Trails System Act.	Inapplicable because current plans will not require construction on or near designated historic trails.
Materials Act.	Applicable; see Chapter 3 of ERCP.
Endangered Species Act.	Applicable; see Chapter 3 of ERCP.
Toxic Substances Control Act.	Inapplicable because site characterization will not require the use of electrical equipment containing PCBs or the use of other substances controlled under TSCA.
Federal Insecticide, Fungicide, and Rodenticide Act.	Inapplicable because site Characterization of Yucca Mountain will not require the use of any insecticides, fungicides, or rodenticides that are not registered by the U.S. Environmental Protection Agency.
Migratory Bird Treaty Act. (Nevada Revised Statutes 503.620 adopts this Federal Law.)	There are no explicit permits or approvals associated with this Act, but the intent of the Act is applicable to site characterization. In the unlikely event that migratory birds, their nests, or their eggs are found at the site, the DOE will contact the U.S. Fish and Wildlife Service to discuss appropriate actions to be taken.

TABLE B1 (continued) - APPLICABILITY OF FEDERAL AND FEDERALLY-DELEGATED ENVIRONMENTAL REGULATORY REQUIREMENTS TO SITE CHARACTERIZATION OF YUCCA MOUNTAIN

Authority	Applicability to Site Characterization
Federalism; Executive Order 12612.	This EO requires all Federal agencies to comply with State law unless there is an expressed provision in Federal law that preempts the State law or when the exercise of State law conflicts with Federal authority. To comply with this EO, the DOE must comply with all applicable State and local environmental regulations (see Table B2 of this Appendix).
Bald and Golden Eagle Protection Act. (Nevada Revised Statutes 503.610 adopts this Federal Law.)	There are no explicit permits or approval associated with this Act, but the intent of the Act is applicable to site characterization. In the unlikely event that eagles, their nests, or their eggs are found at the site, the DOE will contact the U.S. Fish and Wildlife Service to discuss appropriate actions to be taken.
Wild Free-Roaming Horses and Wild Burros Act. (Nevada Revised Statutes 504.430-490 are largely an adoption of the "Wild Horse" sections of this Federal Law.)	There are no explicit permits or approvals associated with this Act, but the intent of the Act--to protect wild horses and burros--is applicable to site characterization.
National Wildlife Refuge System Administration Act.	Inapplicable because current plans do not require access to and use of lands within the National Wildlife Refuge System.
Federal Aviation Act.	Inapplicable because current plans do not require the use of structures at Yucca Mountain that will exceed a height of 200 feet above the ground; also, outside scope of ERCP.

TABLE B2 - STATE ENVIRONMENTAL REGULATIONS

Regulation	Applicability to Site Characterization
Water Appropriation Permit.	Applicable; see Chapter 3 of ERCP.
Approval of Plans for a Water-Distribution System and a Sewage-Disposal System, and Permits to operate each system.	Applicable; see Chapter 3 of ERCP.
Nevada Water Pollution Control Law.	Applicable; see Chapter 3 of ERCP.
Construction and Operating Permits for New Elevators, Dumbwaiters, and Moving Walks.	Inapplicable because the requirements do not apply to facilities such as the exploratory shafts.
Permit to Operate Boiler Pressure Vessel.	Inapplicable because design of exploratory shaft facility does not specify use of such boilers or pressure vessels.
Permit to Construct Campsite.	This permit is related to construction and is outside the scope of the ERCP.
Notification of the Opening and Closing of a Mine.	Inapplicable because the State of Nevada considers the construction of a mine to be for extracting economic minerals. Thus, the exploratory shaft is not a mine on the basis of the State's definition. This determination will be verified with the State of Nevada.
Permit to construct Tailings Dam and Permit to Store Fresh Water.	Inapplicable because a 10-foot-high tailings dam is not required, nor will 10-acre-feet of fresh water be stored behind a dam (as specified in the State regulations).
Approval of Plans for a Solid Waste Disposal System.	Inapplicable because current plans call for disposing of all solid waste at a landfill on the Nevada Test Site.

TABLE B2 (continued) - STATE ENVIRONMENTAL REGULATIONS

Regulation	Applicability to Site Characterization
Radioactive Materials License.	Inapplicable because the DOE is excluded from such a requirement under the terms of the Atomic Energy Act, and on the basis of explicit State regulations that preclude permit requirements on lands under the exclusive jurisdiction of a Federal agency (all lands at Yucca Mountain are controlled by the Federal government).
Nevada State Wildlife and Vegetation Regulations.	Applicable; see Chapter 3 of ERCP.

APPENDIX C

COMMENT ANALYSIS DOCUMENT

FOR THE JANUARY 1988

ENVIRONMENTAL REGULATORY COMPLIANCE PLAN

December 1988

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INTRODUCTION

This appendix contains responses to the State of Nevada's review of the Draft Environmental Regulatory Compliance Plan (ERCP) issued by the U.S. Department of Energy (DOE) in January 1988.

The following five Nevada agencies offered comments on the ERCP: (1) Nevada's Nuclear Waste Project Office, (2) the Nevada Division of Water Resources, (3) the Nevada Division of Historic Preservation and Archaeology, (4) the Nevada Division of Environmental Protection, and (5) the Nevada Division of Forestry.

All the comments received on the ERCP were either in, or attached to, a letter from Robert R. Loux, Executive Director of Nevada's Nuclear Waste Project Office, to Carl P. Gertz, Project Manager of the DOE's Yucca Mountain Project. The letter is dated March 11, 1988. The letter also contained comments on the DOE's Environmental Monitoring and Mitigation Plan (EMMP). EMMP comments are addressed in DOE's Revision 2 of the EMMP.

To the extent practicable, the State comments reproduced in this appendix are the exact comment made by the State reviewer. In some cases, however--particularly for those comments made in the cover letter from Mr. Loux to Mr. Gertz--the lengthy comments have been paraphrased for conciseness.

THE FOLLOWING COMMENTS ON THE JANUARY 1988 ERCP ARE IN THE COVER LETTER FROM ROBERT R. LOUX, EXECUTIVE DIRECTOR OF NEVADA'S NUCLEAR WASTE PROJECT OFFICE, TO CARL P. GERTZ, PROJECT MANAGER OF THE U.S. DEPARTMENT OF ENERGY'S YUCCA MOUNTAIN PROJECT. THE LETTER IS DATED MARCH 11, 1988. EACH COMMENT IS FOLLOWED BY DOE'S RESPONSE.

COMMENT 1:

The ERCP was prematurely issued because it admits that the plans for site characterization are incomplete.

RESPONSE:

The ERCP represents the DOE's understanding of the environmental regulatory requirements for site characterization and it describes how the Project will comply with these requirements. The ERCP is not a legislatively-mandated requirement, but rather a document that, in part, is designed to open communications with Federal, State, and local agencies in regard to environmental regulatory requirements. As such it is an integral part of the DOE's overall environmental program for Yucca Mountain. Because the ERCP represents the initial "official" consultation with regulatory agencies, it is not, in the opinion of the DOE, a premature document as the NWPO contends.

COMMENT 2:

When revised, the ERCP should discuss the status of compliance for the various requirements.

RESPONSE:

The purpose of the ERCP is not to provide a status report on regulatory compliance for the Yucca Mountain Project. The ERCP will therefore not contain a discussion of the status of regulatory compliance.

COMMENT 3:

Full reference citations and an appendix containing such things as the Programmatic Agreement and other regulatory documents should be included.

RESPONSE:

A list of references, rather than abbreviated citations, has been included in the revision. The Programmatic Agreement and other regulatory documents have not been included as appendices to the ERCP. First, such appendices would significantly increase the volume of material in the ERCP. Second, and more important, reference to these other regulatory documents in the text of the ERCP as is now done is adequate because most people reading the ERCP would probably not be interested in the appendices. If there is interest in these other documents by the State or the public, these documents are available for review from either the DOE in Las Vegas or the agency that granted the permit.

COMMENT 4:

Use a consistent summary of site characterization in all documents (ERCP, EMMP, etc.) and include a discussion of activities that are distant from Yucca Mountain.

RESPONSE:

The discussions of site characterization in the January 1988 ERCP and the January 1988 EMMP are consistent. The chief difference in these discussions is that the ERCP identifies the environmental requirements in Chapter 2 that are triggered by the activities being discussed. These requirements are then discussed more completely in Chapter 3 of the ERCP.

The discussion of site characterization in the ERCP and the EMMP is, and will continue to be, a summary of the descriptions in the Site Characterization Plan.

COMMENT 5:

The ERCP does not describe how YMP will comply with the non-exempt portions of NEPA.

RESPONSE:

Section 3.2.10 of the ERCP describes the general requirements of NEPA as they apply to site characterization. These requirements state that (in this case) the DOE adhere to broad and general goals for protection and study of the environment. The DOE believes that through issuance and public scrutiny of the environmental planning documents such as the ERCP and EMMP, and compliance with the DOE's NEPA regulations, these broad NEPA-goals have been, and will continue to be, satisfied.

COMMENT 6:

The State is encouraged that DOE plans to comply with several regulations that, in the past, DOE has not complied with.

RESPONSE:

Comment noted.

COMMENT 7:

The State is disappointed that the DOE has chosen not to comply with State regulations in view of Executive Order 12612 (Federalism).

RESPONSE:

Executive Order 12612, called "Federalism," states that an Executive department or agency can pre-empt State law only if there is an expressed provision in Federal law that pre-empts the State law or if "...there is some other firm and palpable evidence compelling the conclusion that the Congress intended pre-emption of State law, or when the exercise of State authority directly conflicts with the exercise of Federal authority under the Federal statute."

The DOE plans to comply with all applicable State and local environmental requirements to the extent that they are not inconsistent with DOE's responsibilities under the NWPA. The DOE views this policy to be consistent with the Executive Order. Chapter 3 of the ERCP reflects this philosophy.

THE FOLLOWING COMMENTS ON THE JANUARY 1988 ERCP ARE FROM CHRISTINE THIEL, NEVADA DIVISION OF WATER RESOURCES, DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES.

THE COMMENTS WERE ATTACHED TO A LETTER FROM ROBERT R. LOUX, EXECUTIVE DIRECTOR OF NEVADA'S NUCLEAR WASTE PROJECT OFFICE, TO CARL P. GERTZ, PROJECT MANAGER OF THE U.S. DEPARTMENT OF ENERGY'S YUCCA MOUNTAIN PROJECT. THE LETTER IS DATED MARCH 11, 1988. EACH COMMENT IS FOLLOWED BY DOE'S RESPONSE.

COMMENTS 1 & 2:

Both comments relate to suggested minor corrections in the section describing the water appropriation permit.

RESPONSE:

All suggested changes to Section 3.4.2 have been made.

THE FOLLOWING COMMENTS ON THE JANUARY 1988 ERCP ARE FROM ALICE BECKER, NEVADA DIVISION OF HISTORIC PRESERVATION AND ARCHAEOLOGY, DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES.

COMMENTS WERE ATTACHED TO A LETTER FROM ROBERT R. LOUX, EXECUTIVE DIRECTOR OF NEVADA'S NUCLEAR WASTE PROJECT OFFICE, TO CARL P. GERTZ, PROJECT MANAGER OF THE U.S. DEPARTMENT OF ENERGY'S YUCCA MOUNTAIN PROJECT. THE LETTER IS DATED MARCH 11, 1988. EACH COMMENT IS FOLLOWED BY DOE'S RESPONSE.

COMMENTS 1, 2, and 3:

The comments refer to suggested minor changes to several descriptions of archaeology in the ERCP.

RESPONSE:

All suggested changes to Section 3.2.11 have been made.

THE FOLLOWING COMMENTS ON THE JANUARY 1988 ERCP ARE FROM L. H. DODGION, NEVADA DIVISION OF ENVIRONMENTAL PROTECTION, DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES.

THE COMMENTS WERE ATTACHED TO A LETTER FROM ROBERT R. LOUX, EXECUTIVE DIRECTOR OF NEVADA'S NUCLEAR WASTE PROJECT OFFICE, TO CARL P. GERTZ, PROJECT MANAGER OF THE U.S. DEPARTMENT OF ENERGY'S YUCCA MOUNTAIN PROJECT. THE LETTER IS DATED MARCH 11, 1988. EACH COMMENT IS FOLLOWED BY DOE'S RESPONSE.

COMMENT 1:

DOE should not proceed with drilling for site characterization until the EPA issues its final regulations at 40 CFR 191 because these regulations could impact how the wells are abandoned.

RESPONSE:

Wells abandoned during and after site characterization will be plugged with material that would prevent any vertical migration of fluids. It is therefore not necessary to delay site characterization until these regulations are issued in final form.

COMMENT 2:

The maps accompanying the ERCP (reduced black and white maps) are insufficient to depict the exploration program.

RESPONSE:

Large, color maps were included in several copies of the ERCP. Because of excessive costs and the large number of ERCPS that would be copied and distributed, it was decided that these maps would be reduced and copied in black and white. These larger-scale color maps are available to all State agencies upon request.

COMMENT 3:

A map of the ground-water table and data on water quality should have been included in the ERCP.

RESPONSE:

The ERCP is not an application for permits; it is only an information and planning document. A map of the ground-water table will be included with any permit application if such a map is required by the regulatory agency administering the application.

COMMENT 4:

A list of acronyms would be helpful.

RESPONSE:

A list of acronyms has been included at the end of the ERCP.

COMMENT, p.2-6 of ERCP, para.3:

The DOE must keep the Division informed of any changes in the drilling program.

RESPONSE:

If changes in the drilling program are planned after the DOE has submitted permit applications or received permits, the appropriate regulatory agencies will be informed of these planned changes.

COMMENT, p.2-7 of ERCP, para.1:

Same comment as "Comment 1" above. See that comment and the response.

COMMENT, p.2-8 of ERCP, para.3:

The DOE must obtain UIC permits for any well injections.

RESPONSE:

Requirements of the UIC program are addressed in Section 3.3.5. The DOE will submit permit applications for all Project wells through which injections are planned.

COMMENT, p. 2-9 of ERCP, para.1:

The DOE may be required to obtain a discharge permit for infiltration ponds.

RESPONSE:

The infiltration ponds could have been cited in the ERCP as one of the examples of "water impoundments" under Section 3.4.3. Nevertheless the DOE realizes that these ponds are subject to regulatory review by the State and the DOE intends to submit an appropriate permit application. However, because the groundwater table lies 1,500 feet below the surface at Yucca Mountain, and because all ponds at Yucca Mountain are expected to hold aquifer water with few contaminants, the applicability of a discharge permit is uncertain.

COMMENT, p.2-11 of ERCP, para.1:

The use of radioactive sources in logging deep drillholes will require approval by the Department of Health.

RESPONSE:

The State of Nevada Regulations for Radiation Control specifically exempt the DOE and its contractors from State licensing requirements (Nevada State Board of Health, 1980).

COMMENT, p.2-18 of ERCP, para.3:

Hydrofracturing (described in Section 2.1.3) will require a UIC permit.

RESPONSE:

Hydrofracturing is an example of an activity that may require a UIC permit, and it is the DOE's intention to consult with State regulatory officials further on this matter.

COMMENT, p.2-30 of ERCP, para.2:

The leachate monitoring system should be designed to collect any leachate from the rock-storage area.

RESPONSE:

Leachate from the rock-storage area is not expected to contain significant quantities of pollutants to require a leachate collection system. The rock-storage area is described in Section 2.2.5.

COMMENT, p. 2-32 of ERCP, para.1:

The rock-storage pond and the mine waste-water pond may require Nevada discharge permits.

RESPONSE:

See response to previous comment concerning page 2-9 of the ERCP (4 comments above). The applicability of a Nevada discharge permit to these water ponds (described in Section 2.2.5) will presumably be based in part on the hydrology of the Yucca Mountain area, especially the depth to groundwater.

COMMENT, p. 2-44 of ERCP, para.3:

The rock-storage pond and the mine-waste water pond may be required to meet the requirements of a zero discharge permit; thus lining the ponds to "minimize" seepage may not be sufficient.

RESPONSE:

The applicability of a "zero discharge" permit will presumably be determined by the State based at least in part on the hydrology of the area (see response to preceding comment). The rock-storage area and the mine waste-water pond are described in Section 2.2.5.

COMMENT, p. 2-51 of ERCP, para.1:

Same comment as "Comment #1" above. See that comment and the response.

COMMENT, p. 3-79, para.3:

Nevada's UIC program is much more stringent than the EPA program and primacy may be granted in April 1988.

RESPONSE:

The discussion of the UIC program in Section 3.3.5 has been revised to reflect the State's recent primacy role in implementing and enforcing the UIC program.

COMMENT, p. 3-81 of ERCP, para.2:

In the UIC permit application, DOE should also include information on the longevity of the tracers, and any information available on the water quality of the injection zone.

RESPONSE:

The permit application form describes the information required of the applicant, although it is understood that additional information may be required at the discretion of the Director of the Department of Conservation and Natural Resources. The UIC program is discussed in Section 3.3.5.

COMMENT, p. 3-82 of ERCP, para.2:

The fee for a UIC Class V injection well is \$100 for each additional well in a "general" permit.

RESPONSE:

Comment noted.

COMMENT, p. 3-82 of ERCP, para.3:

Injection of tracers into wells is not subject to a "general" permit as described in Section 64 of Nevada's UIC regulations.

RESPONSE:

The text has been corrected.

COMMENT on Sec. 3.3.2.2 of ERCP:

The fee schedule for discharge permits referred to in the ERCP has been revised.

RESPONSE:

The text has been corrected.

COMMENT on Fig. 3-12 of ERCP:

The time required for public notice of intent to issue a discharge permit is 30 days, not 15 days.

RESPONSE:

The text has been corrected.

COMMENT on Sec. 3.4 of ERCP:

Federal agencies are not exempt from complying with State law.

RESPONSE:

The DOE's position on complying with state laws is presented in Section 3.4 of the ERCP.

COMMENT on Fig. 3-16:

The Nevada Department of Environmental Protection issues permits for sewage treatment and disposal, not the State Engineer.

RESPONSE:

The text has been corrected.

COMMENT on Sec. 3.4.3.3 of ERCP:

The permitting process for a Nevada Water Pollution Control permit is essentially the same as that described for an NPDES permit.

RESPONSE:

Comment noted and text revised.

COMMENT on Sec. 3.3.3 of ERCP:

- (a) There is an existing State Solid Waste Management Plan,
- (b) Planning for Subtitle D of RCRA is not going on; and
- (c) The entire DOE operation in Nevada (i.e. Nevada Test Site and the Yucca Mountain Project) would be considered as a single facility under RCRA rather than separate facilities.

RESPONSE:

- (a) Comment noted and text revised.
- (b) Comment noted and text revised.
- (c) The ERCP , as previously written, implied that NTS facilities would be utilized in the handling of YMP RCRA wastes. If this were the case then the YMP would in fact be a part of the NTS facility and operate under the NTS RCRA generator ID number. This section of the ERCP has been rewritten to clarify the independent handling of YMP RCRA wastes. The YMP, while partially located on NTS land, also has project facilities and activities planned outside the NTS boundaries on BLM administered land. In addition, the YMP is authorized by the Nuclear Waste Policy Act, as amended, and is managed by the Office of Civilian Waste Management which is funded separately from the NTS by a civilian program. Since the YMP is funded and managed under a separate authority and project facilities and activities lie outside the NTS boundaries, the YMP proposes to apply for a separate facility RCRA Generator I.D. Number from the NDEP. The YMP would then manage, handle, and arrange for the transportation and disposal of its RCRA wastes using authorized carriers and Treatment, Storage, and Disposal Facilities. The YMP will consult the NDEP and EPA Region IX to discuss further the facility status of the YMP.

COMMENT p. 3-50(a) of ERCP:

Yucca Mountain should be classified as "unclassified" rather than "attainment" because of a lack of ambient air-quality data.

RESPONSE:

Text has been revised.

COMMENT p. 3-50 (b) of ERCP:

No mention is made of crushing and screening plants or asphalt-concrete plants which may be required and will need permits..

RESPONSE:

A concrete-batch plant is mentioned in the discussion of the Clean Air Act (Section 3.3.1). A crushing and screening plant is currently not expected to be needed for site characterization. If at some future date it is decided that such a plant is needed, a permit for its construction and operation will be obtained.

COMMENT p. 3-51 of ERCP:

The Nevada Administrative Code, not the Air Quality Officer, requires permits.

RESPONSE:

The text has been revised.

COMMENT p. 3-52 of ERCP:

Issuance of an Operating Permit also requires the demonstration of compliance with the NAC and permit conditions.

RESPONSE:

Comment noted.

COMMENT p. 3-53 of ERCP:

The NAC, not the Air Quality Officer, requires evaluations of adverse impacts.

RESPONSE:

Comment noted.

COMMENT p. 3-54 of ERCP:

An Operating Permit is required 180 days after start up.

RESPONSE:

Comment noted.

COMMENT p. 3-55 of ERCP:

Notification of exceedance is required within 24 hours, with a written follow-up to the State within 15 days of the event.

RESPONSE:

Comment noted.

COMMENT p. 3-56 of ERCP:

Figure 3-10 contains several inconsistencies.

RESPONSE:

The figure has been modified.

COMMENT p. 3-58 of ERCP:

Because of public interest in the Yucca Mountain facility, a public hearing will probably be scheduled.

RESPONSE:

Comment noted and Section 3.3.1.3 has been revised.

THE FOLLOWING COMMENTS ON THE JANUARY 1988 ERCP ARE FROM LODY SMITH, NEVADA DIVISION OF FORESTRY, DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES.

THE COMMENTS WERE ATTACHED TO A LETTER FROM ROBERT R. LOUX, EXECUTIVE DIRECTOR OF NEVADA'S NUCLEAR WASTE PROJECT OFFICE, TO CARL P. GERTZ, PROJECT MANAGER OF THE U.S. DEPARTMENT OF ENERGY'S YUCCA MOUNTAIN PROJECT. THE LETTER IS DATED MARCH 11, 1988. EACH COMMENT IS FOLLOWED BY DOE'S RESPONSE.

COMMENT p. 3-97, Para. 2, Sec. 3.4.5.1:

Citation should be NRS 527.100 and not 527.500. Also, sentence should read "...on state and "FEDERAL" land..."

RESPONSE:

Section 3.4.5 has been revised.

COMMENT p. 3-97, Para. 1, Sec. 3.4.5.2:

Written permission to remove cacti/yucca on BLM land should be obtained from the BLM and not the State Forester.

RESPONSE:

NRS 527.050 states that permission from the Nevada State Forester to destroy cacti or yucca is required for both State and Federal land. The text has not been revised.

COMMENT p. 3-97, Para. 2, Sec. 3.4.5.2:

Citation should be NRS 527.270 and not 527.260. Also, there are currently 19 endangered plant species on the State list, not 18. The 19th species, however, does not occur near Yucca Mountain.

RESPONSE:

Section 3.4.5 has been revised.

THE FOLLOWING ADDITIONAL COMMENTS ON THE JANUARY 1988 ERCP ARE IN A LETTER FROM ROBERT R. LOUX, EXECUTIVE DIRECTOR OF NEVADA'S NUCLEAR WASTE PROJECT OFFICE, TO CARL P. GERTZ, PROJECT MANAGER OF THE U.S. DEPARTMENT OF ENERGY'S YUCCA MOUNTAIN PROJECT. THE LETTER IS DATED MARCH 11, 1988. EACH COMMENT IS FOLLOWED BY DOE'S RESPONSE.

GENERAL COMMENT 1:

A detailed and definitive review of the draft ERCP cannot be made because of a lack of study plans, incomplete coverage of applicable environmental requirements, absence of specific compliance strategies, and ambiguity concerning how the program will be organized and managed.

RESPONSE:

The DOE did not expect the Nuclear Waste Project Office to conduct a "detailed and definitive" review of the draft ERCP, since the ERCP is not a required document. It represents an initial effort and a commitment by the DOE to keep the State and the regulatory agencies informed of our thoughts and plans for environmental regulatory compliance.

It is true that the plans for site characterization during the next 6-7 years are not known with 100 percent certainty, but that is the nature of any long-term exploration program. The DOE expects much the same process for site characterization as for a mineral-exploration company operating in Nevada. Predicting the precise type and location of exploration that will occur on a particular property several years in the future is not possible. Yet mineral-exploration companies regularly apply for and receive environmental permits from the State. As a company's exploration plans change, the company will request modifications to the issued permits or, if appropriate, applies for new permits. Similarly, if DOE's plans change, existing permits will be modified in consultation with the regulatory agencies, or applications for new permits will be submitted.

SPECIFIC COMMENT #1:

It should be explained why DOE Orders 4320.1A (Site Development and Facility Utilization) and 6430.1 (General Design Criteria) are not included on Table 1-1, page 1-9.

RESPONSE:

DOE Order 6430.1 was superseded by the issuance of draft DOE Order 6430.1A, "General Design Criteria," on December 25, 1987. The overall intent of this order is applicable to the site characterization program at Yucca Mountain. Thus, environmental regulatory requirements presented in Section 0106 of this Order are addressed in Chapter 3 of the ERCP. It is beyond the scope of the ERCP, however, to assess design-related engineering requirements. These requirements are presented and assessed in planning documents such as DOE's "System Requirements" document and the "Exploratory Shaft Facility Design Requirements" document.

DOE Order 4320.1A, "Site Development and Facility Utilization," does not apply to all DOE sites. At this time, it would be premature to conclude that a repository will be built at Yucca Mountain. The DOE Orders currently listed in Section 3.5 are clearly applicable to the site characterization phase of the program. The determination of site suitability is the intent of site characterization. At the conclusion of site characterization, if the site is suitable, the DOE may recommend construction of a repository. DOE Order 4320.1A would then be applicable.

SPECIFIC COMMENT #2:

The location of studies that are remote from Yucca Mountain such as in Death Valley National Monument should also be included in the ERCP.

RESPONSE:

Studies in Death Valley have not been fully identified, nor are they expected to be necessary at this time. If studies are required in Death Valley, appropriate permits will be obtained.

SPECIFIC COMMENT #3:

To avoid anyone viewing the ERCP as a "...component of the regulatory decision-making process..." the ERCP should stress the incompleteness of the plans for site characterization.

RESPONSE:

The ERCP should be viewed as a document that lists and describes the environmental regulatory requirements that may be applicable to site characterization, and a plan to comply with these requirements.

SPECIFIC COMMENT #4:

The flow diagrams in the ERCP are useful but they would be enhanced in future versions of the ERCP by including a relative time-scale, the date of preparation, and a point on the scale indicating the status of compliance.

RESPONSE:

As described in a previous response, the status of compliance is not the intent of the ERCP.

SPECIFIC COMMENT #5 and #6:

The Programmatic Agreement, and perhaps other materials that document compliance, should be included as appendices to the ERCP. This would help interested parties keep abreast of the compliance process. Also, DOE Compliance Guides should have been referenced.

RESPONSE:

Because such appendices would significantly increase the volume of material associated with the ERCP, their inclusion is not practicable. These documents, however, are available for review by anyone.

The DOE Compliance Guides were in fact used but not cited. The ERCP now includes full citations to those guides in Chapter 6 "References."

SPECIFIC COMMENT #7:

To cite the Yucca Mountain EA as the basis for reaching conclusions constitutes questionable judgment because the EA has not yet passed a test of legal credibility. References used in the ERCP should be made only to legally sound documents.

RESPONSE:

It is the DOE's position that the Yucca Mountain EA is a credible and legally sound document.

SPECIFIC COMMENT #8:

The section on FLPMA (3.2.7) should cite the ROW application submitted by the DOE to the BLM.

RESPONSE:

Section 3.2.7 has been re-written.

SPECIFIC COMMENT #9:

It still remains to be seen how the DOE plans to comply with those sections of NEPA described in the ERCP (Sec. 3.2.10) that apply to site characterization. We view environmental review in accord with NEPA as the cornerstone of environmental protection at Yucca mountain.

RESPONSE:

Section 3.2.10 of the ERCP describes the general requirements of NEPA as it applies to site characterization. These requirements state that (in this case) the DOE adhere to broad and general goals for protection and study of the environment. The DOE believes that through existing DOE Orders and issuance and public scrutiny of many environmental reports, these broad NEPA-goals have been, and will continue to be, met.

SPECIFIC COMMENT #10:

It is encouraging to note that DOE intends to comply with its own regulations in floodplains (10 CFR 1022).

RESPONSE:

Comment noted.

SPECIFIC COMMENT #11:

It is encouraging to note that DOE intends to comply with air-quality regulations in regard to surface disturbances.

RESPONSE:

Comment noted.

SPECIFIC COMMENT #12:

The DOE should hasten completion of its study plans so that waste discharges can be characterized.

RESPONSE:

Study plans are being developed as quickly as possible.

SPECIFIC COMMENT #13:

The nature of hazardous wastes to be generated should be described in the ERCP. Also, the ERCP should contain a discussion of solid waste and its disposal.

RESPONSE:

The specific types and chemistry of hazardous wastes that may be generated at the site are not known. However, Section 3.3.3.1 of the ERCP states that hazardous wastes may come from routine cleaning and maintenance, laboratory studies, and construction. Solid waste disposal under RCRA is discussed briefly in Section 3.3.3. Refuse (garbage), as stated in various sections of Chapter 2 may be disposed of at a landfill on the NTS.

SPECIFIC COMMENT #14:

The type of materials injected into wells during site characterization should be described in the ERCP.

RESPONSE:

The types of injections envisioned have not been finalized. Because the ERCP is not an application for a permit, it is not imperative that such information be included in the ERCP. Such information is required only on the application form for a UIC permit to be submitted to the Division of Environmental Protection.

The tracers now being "considered" for use are listed in Section 2.1.3 under the subheading "Water table monitoring and saturated zone testing."

SPECIFIC COMMENT #15:

The DOE should carefully review EO 12612 in regard to compliance with State and local laws, and then review the NAC and the NRS for additional laws that would be applicable to site characterization.

RESPONSE:

See response to Comment #7, page C-5.

SPECIFIC COMMENT #16:

The prematurity of the ERCP is nowhere better manifested than in Section 4.0 and its lack of substance concerning how the ERCP will be carried out. Figure 4.1 is inconsistent with other information provided by DOE.

RESPONSE:

Chapter 4.0 clearly explains the DOE compliance planning efforts. Responsibilities for various parts of the program are explained. A description of how compliance documents are prepared and reviewed is provided. Quality Assurance controls and procedures for revising the ERCP are explained. Finally, the compliance tracking system, evidence file, and audit program are summarized. As explained in the response to Comment 1, the ERCP is not premature because it represents the initial consultation with regulatory agencies. Figure 4-1 is intended to illustrate the organization of those responsible for preparing compliance documents. The compliance coordinator statements have been clarified to clearly explain that the Project Control and Operations Division is responsible for managing the activities necessary to prepare permit documents for site characterization. Through the use of responsible management, quality assurance, compliance tracking and program auditing functions, the DOE has developed a judicious environmental regulatory compliance program that will ensure an integrated scheme for achieving compliance.

SPECIFIC COMMENT #17:

Why has the proposed work in Death Valley only been mentioned in the Appendix and not discussed in the body of the ERCP?

RESPONSE:

Studies in Death Valley have not been fully identified, nor are they expected to be necessary at this time. If studies are required in Death Valley, appropriate permits will be obtained.

LIST OF ACRONYMS

ACHP	-	Advisory Council on Historic Preservation
AEA	-	Atomic Energy Act
AIRFA	-	American Indian Religious Freedom Act
AQO	-	Air Quality Officer
ARPA	-	Archaeological Resources Protection Act
BLM	-	Bureau of Land Management
CAA	-	Clean Air Act
CEQ	-	Council on Environmental Quality
CERCLA	-	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	-	Code of Federal Regulations
CPDB	-	Conceptual Perimeter Drift Boundary
DOE	-	Department of Energy (U.S.)
DOT	-	Department of Transportation (U.S.)
DTRC	-	Dual-Tube Reverse Circulation
EA	-	Environmental Assessment
EFAP	-	Environmental Field Activity Plan
EIS	-	Environmental Impact Statement
EMMP	-	Environmental Monitoring and Mitigation Plan
E.O.	-	Executive Order (may also appear as "EO")
EPA	-	Environmental Protection Agency (U.S.)
EPASS	-	Environmental Pathway Analysis Scoping Study
EPO	-	Environmental Program Overview
ERCPC	-	Environmental Regulatory Compliance Plan
ES	-	Exploratory Shaft (designated #1 or #2)
ESA	-	Endangered Species Act
ES&H	-	Environment, Safety, and Health
ESF	-	Exploratory Shaft Facility
FLPMA	-	Federal Land Policy and Management Act
FPPA	-	Farmland Protection Policy act
FWPCA	-	Federal Water Pollution Control Act
FWS	-	Fish and Wildlife Service (U.S.)
HMTA	-	Hazardous Materials Transportation Act
HQ	-	Headquarters (DOE)
HSWA	-	Hazardous and Solid Waste Amendments (to RCRA)
IDAS	-	Integration Data Acquisition System

MT - Magnetotelluric (surveys)
 NAC - Nevada Administrative Code
 NAFR - Nellis Air Force Range
 NDCNR - Nevada Department of Conservation and Natural Resources
 NDEP - Nevada Division of Environmental Protection
 NDOW - Nevada Department of Wildlife
 NEPA - National Environmental Protection Act
 NHPA - National Historic Preservation act
 NNWSI - Nevada Nuclear Waste Storage Investigations project
 (now referred to as the Yucca Mountain Project).
 NPDES - National Pollutant Discharge Elimination System
 NRS - Nevada Revised Statutes
 NSE - Nevada State Engineer
 NTS - Nevada Test Site
 NWPA - Nuclear Waste Policy Act
 NWCAA - Nuclear Waste Policy Amendments Act
 NWPO - Nuclear Waste Policy Office (a State of Nevada Office)
 OCC - Office of Chief Council (DOE Headquarters)
 OCRWM - Office of Civilian Radioactive Waste Management
 PA - Programmatic Agreement
 P.L. - Public Law
 POCD - Project Office Project Control
 PSCMP - Preliminary Site Characterization Radiological
 Monitoring Plan.
 PSD - Prevention of Significant Deterioration
 QA - Quality Assurance
 QAPP - Quality Assurance Program Plan
 QP - Quality Procedures
 RCG - Radiological Compliance Guide
 RCRA - Resource Conservation and Recovery Act
 RMP - Radiological Monitoring Plan
 SARA - Superfund Amendments and Reauthorization Act
 SCS - Soil Conservation Service (U.S.)
 SCP - Site Characterization Plan
 SDWA - Safe Drinking Water Act
 SHO - State Health Officer
 SHPO - State Historic Preservation Officer
 SIP - State Implementation Plan
 SMMF - Socioeconomic Monitoring and Mitigation Plan
 TPO - Technical Project Officer

UIC - Underground Injection Control
USC - United States Code
UST - Underground Storage Tank

VSP - Vertical Seismic Profiling

WQO - Water Quality Officer

YMP - Yucca Mountain Project
YMPO - Yucca Mountain Project Office

MAPS 1-4

YUCCA MOUNTAIN PROJECT

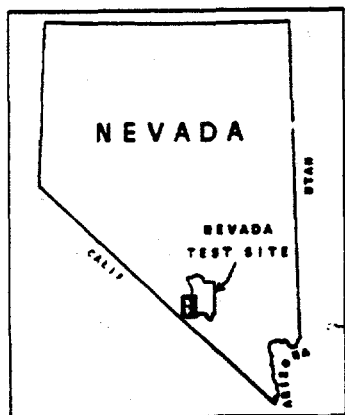
(PRE-1977)

MAP 1



LEGEND

- ~ MEDIUM DUTY ROADS
- ~ LIGHT DUTY ROADS
- ~ UNIMPROVED ROADS
- ~ TRAILS
- ~ RAILROADS
- CONCEPTUAL PERIMETER DRIFT BOUNDARY



SOURCES

1956 1:24,000 USGS TOPOGRAPHIC MAPS
1976 1:24,000 USGS ORTHOPHOTO MAPS
50 M CONTOURS FROM USGS 1:100,000
BEATTY, NV/CA TOPOGRAPHIC QUADRANGLE
GRID TICKS BASED ON NEVADA STATE
COORDINATE SYSTEM, CENTRAL ZONE
MAP COMPILED IN OCTOBER 1980

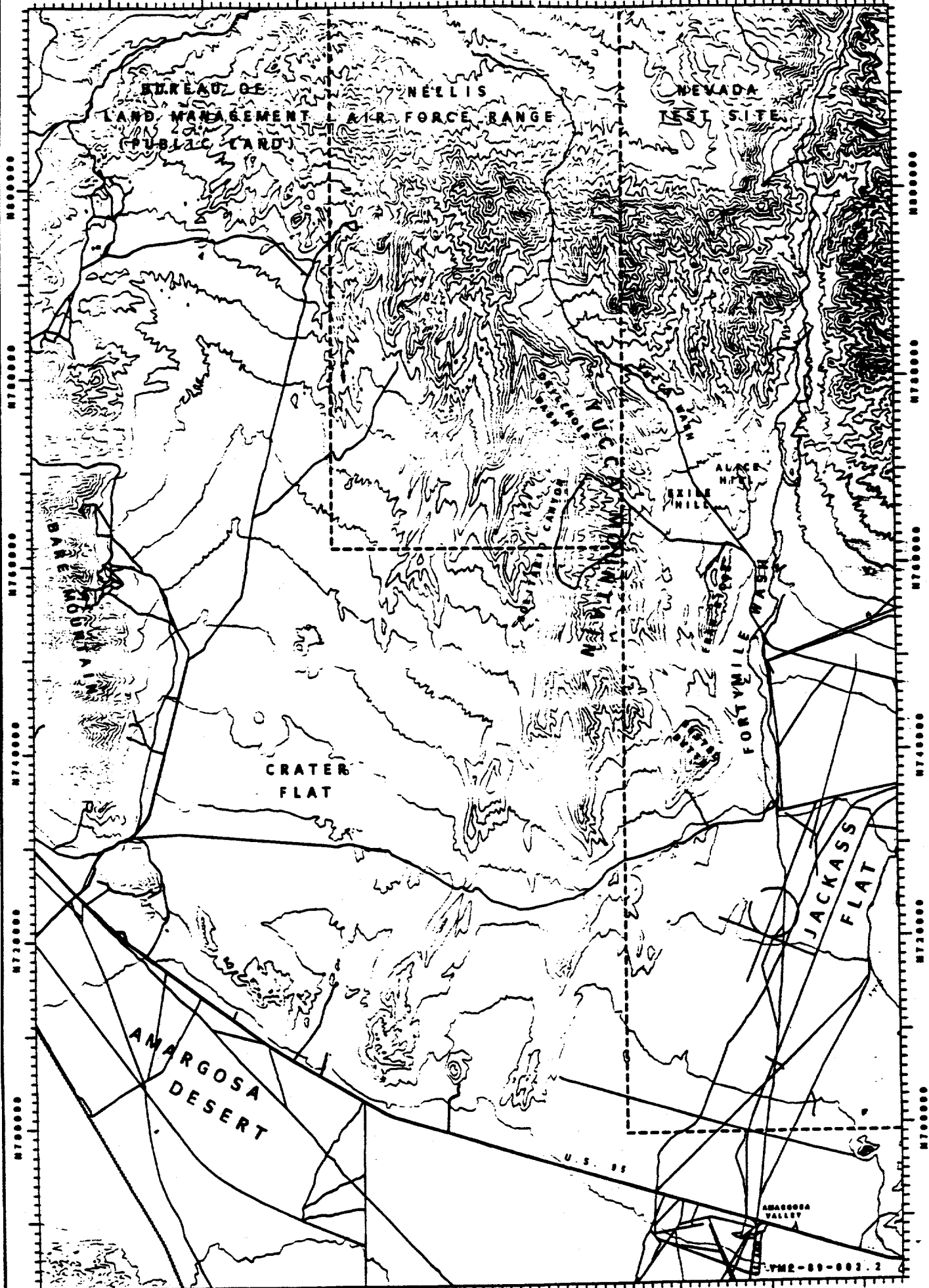
 YMP-89-002.3

E120000

E140000

E160000

E180000



NO. 1000

1000

YUCCA MOUNTAIN PROJECT EXISTING ACTIVITIES

MAP 2

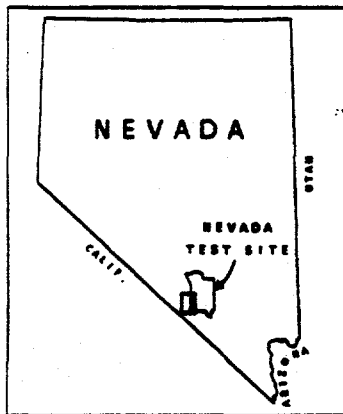


LEGEND

- DRILLPADS
- ▲ TRENCHES, TEST PITS, PAVEMENTS
- DRILL HOLES NOT REQUIRING PADS
- +
- × MONITORING STATIONS
- ≡ OTHER

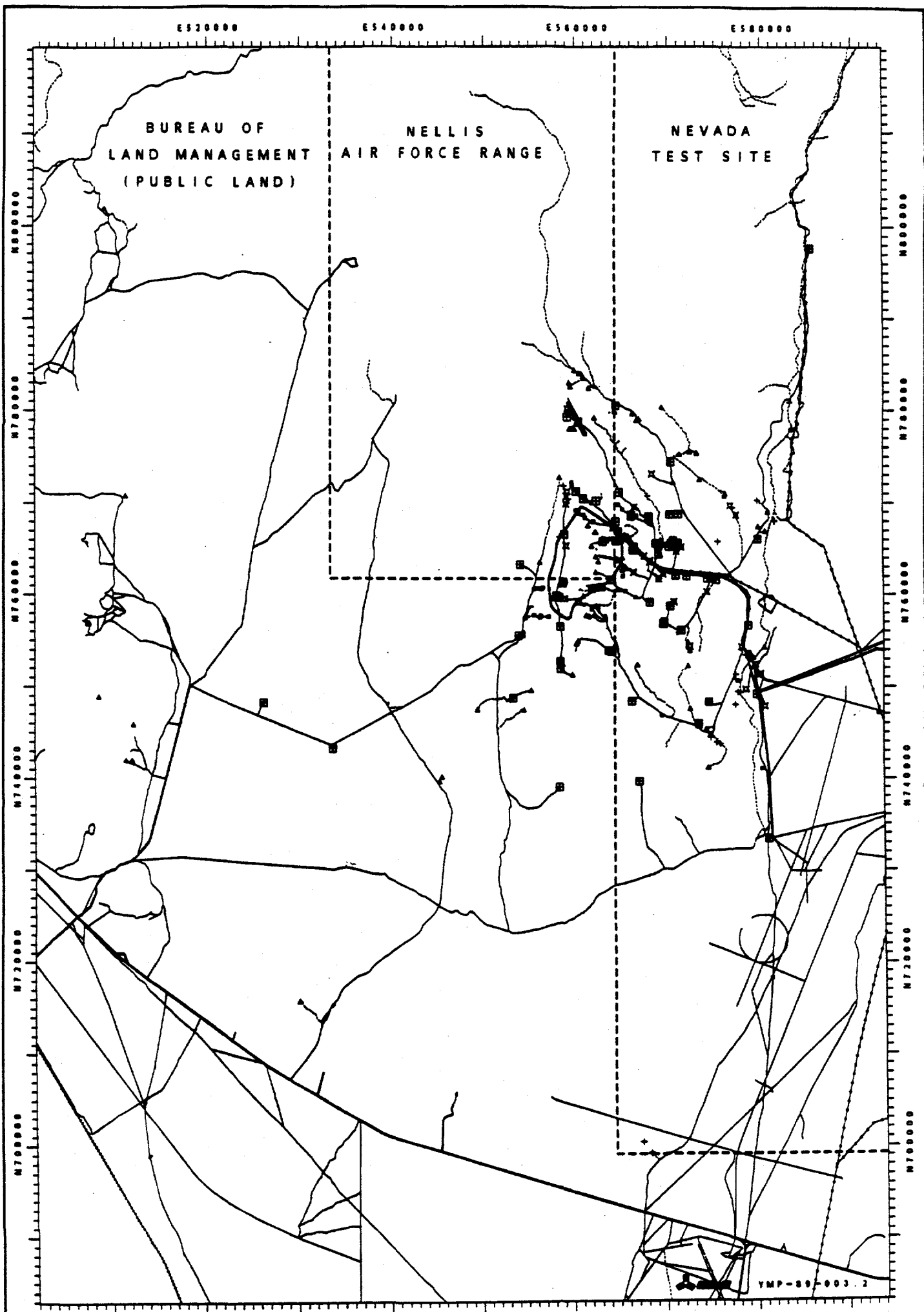
- ~ MEDIUM DUTY ROADS
- ~ LIGHT DUTY ROADS
- ~ UNIMPROVED ROADS
- ~ TRAILS
- ~ RAILROADS
- ~ POWERLINES
- ~ WATER PIPE LINE

- CONCEPTUAL PERIMETER DRIFT BOUNDARY



SOURCES:

1956 1:24,000 USGS TOPOGRAPHIC MAPS
1976 1:24,000 USGS ORTHOPHOTO MAPS
1983 1:100,000 USGS TOPOGRAPHIC MAP
7/1986 AND 9/1987 1:24,000 AERIAL PHOTOGRAPHY
GRID TICKS BASED ON NEVADA STATE
COORDINATE SYSTEM, CENTRAL ZONE
MAP COMPILED IN OCTOBER 1986

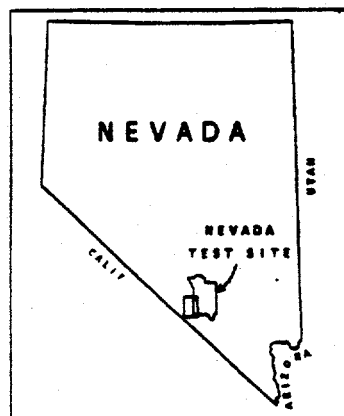


YUCCA MOUNTAIN PROJECT PROPOSED ACTIVITIES (SHOWN IN RED) MAP 3



LEGEND

- DRILL PADS
- TRENCHES AND TEST PITS
- DRILL HOLES NOT REQUIRING PADS
- MONITORING STATIONS
- ~ MEDIUM DUTY ROADS
- ~ LIGHT DUTY ROADS
- ~ UNIMPROVED ROADS
- ~ UNIMPROVED ROADS (PROPOSED)
- ~ TRAILS
- ~ TRAILS (PROPOSED)
- ~ SHALLOW SEISMIC REFLECTION LINES (PROPOSED)
- ~ RAILROADS
- ~ POWERLINES
- ~ WATER PIPE LINES
- ◊ CONCEPTUAL PERIMETER DRIFT BOUNDARY



SOURCES:

1956 1:24,000 USGS TOPOGRAPHIC MAPS
 1976 1:24,000 USGS ORTHOPHOTO MAPS
 1983 1:100,000 USGS TOPOGRAPHIC MAPS
 7/1986 AND 9/1987 1:24,000 AERIAL PHOTOGRAPHY
 PROPOSED ACTIVITY LOCATIONS FROM DRAFT SITE
 CHARACTERIZATION PLAN - AUGUST 1987
 GRID TICKS BASED ON NEVADA STATE
 COORDINATE SYSTEM, CENTRAL ZONE
 MAP COMPILED IN OCTOBER 1988

E520000

E540000

E560000

E580000

BUREAU OF
LAND MANAGEMENT
(PUBLIC LAND)

NELLIS
AIR FORCE RANGE

NEVADA
TEST SITE

N780000

N780000

N760000

N760000

N740000

N740000

N720000

N720000

N700000

N700000

N700000

N700000

YMP-89-004.2

EXPANDED VIEW OF PROPOSED ACTIVITIES

MAP 4

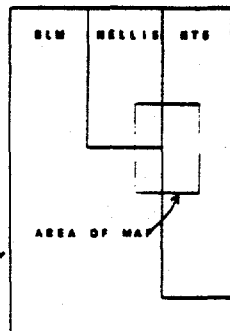


LEGEND

- ▣ DRILL PADS
- ▲ TRENCHES AND TEST PITS
- DRILL HOLES NOT REQUIRING PADS
- + MONITORING STATIONS
- ? SOUTHERN TRACER COMPLEX

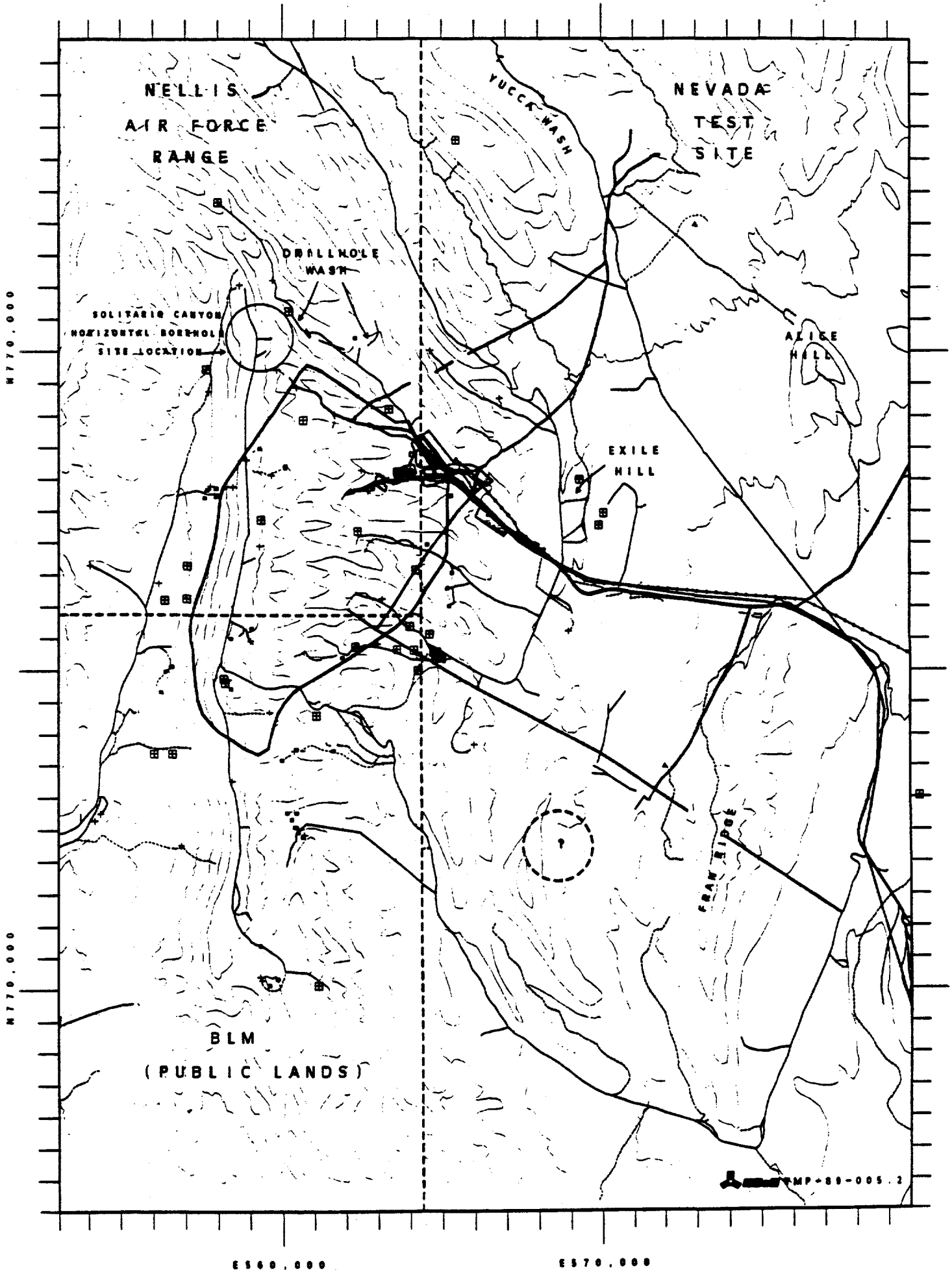
- ~ LIGHT DUTY ROADS
- ~ UNIMPROVED ROADS
- ~ UNIMPROVED ROADS (PROPOSED)
- ~ TRAILS
- ~ TRAILS (PROPOSED)
- ~ SHALLOW SEISMIC REFLECTION LINES (PROPOSED)
- ~ POWERLINES
- ~ WATER PIPE LINES

- EXPLORATORY SHAFT FACILITY (ESF)
- CONCEPTUAL PERIMETER DRIFT BOUNDARY



SOURCES:

1956 1:24,000 USGS TOPOGRAPHIC MAPS
1976 1:24,000 USGS ORTHOPHOTO MAPS
1983 1:100,000 USGS TOPOGRAPHIC MAPS
7/1986 AND 9/1987 1:24,000 AERIAL PHOTOGRAPHY
PROPOSED ACTIVITY LOCATIONS FROM DRAFT SITE
CHARACTERIZATION PLAN - AUGUST 1987
GRID TICKS BASED ON NEVADA STATE
COORDINATE SYSTEM, CENTRAL ZONE
MAP COMPILED IN OCTOBER 1988



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