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ENVIRONMENTAL REGULATORY COMPLIANCE PLAN

FOR
SITE CHARACTERIZATION
OF THE
YUCCA MOUNTAIN SITE
JANUARY 1988

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Chapter 1

INTRODUCTION

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1.0 INTRODUCTION

1.1 HISTORY

The United States plans to begin operating the first geologic repository for the permanent disposal of high-level radioactive waste early in the next century. Public Law 97-425, the Nuclear Waste Policy Act of 1982 (hereinafter referred to as the Act), specifies the process for selecting a repository site, and constructing, operating, closing, and decommissioning the repository.

In February 1983, the U.S. Department of Energy (DOE) identified Yucca Mountain as one of nine potentially acceptable sites for a repository. To determine its suitability, the Yucca Mountain site, along with eight other potentially acceptable sites, was evaluated in accordance with the DOE's General Guidelines for the Recommendation of Sites for the Nuclear Waste Repositories (10 CFR Part 960). These evaluations were reported in nine draft Environmental Assessments (EAs), prepared pursuant to the Act (Section 112). The draft EAs were issued for public review and comment in December 1984. Of the nine sites evaluated, five were nominated for further

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study. Final EAs for the five nominated sites were published in May 1986.¹ 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 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 DOE to characterize the Yucca Mountain 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 safely support construction and operation of a geologic repository.

Section 113(b)(3) of the Act requires the DOE to prepare a Site Characterization Plan (SCP) for each candidate site prior to construction of the Exploratory Shafts. The SCP will be reviewed by the Nuclear Regulatory

¹U.S. Department of Energy, Environmental Assessment, Deaf Smith County Site, DOE/RW-0069, Washington, D.C., 1986.

U.S. Department of Energy, Environmental Assessment, Reference Repository Location, Hanford Site, DOE/RW-0070, Washington, D.C., 1986.

U.S. Department of Energy, Environmental Assessment, Yucca Mountain Site, Nevada Research and Development Area, Nevada, DOE/RW-0073, Washington, D.C., 1986.

U.S. Department of Energy, Environmental Assessment, Davis Canyon Site, DOE/RW-0071, Washington, D.C., 1986.

U.S. Department of Energy, Environmental Assessment, Richton Dome Site, Mississippi, DOE/RW-0072, Washington, D.C., 1986.

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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 Act.

1.2 PURPOSE

The DOE is committed to conduct its operations in an environmentally safe and sound manner, and will comply with the letter and the spirit of applicable environmental statutes and regulations. These objectives are described in DOE Order N5400.1 (Environmental Policy Statement). This document - the NNWSI Project's Environmental Regulatory Compliance Plan (ERCP) - is one means of implementing the policy set forth in DOE Order N 5400.1. The ERCP describes the plan by which the NNWSI Project Office will comply with applicable environmental statutes and regulations. The ERCP also discusses how DOE will address State and local environmental statutes and regulations.

To achieve the goals of DOE Order N 5400.1 the ERCP will be developed in phases. This version of the ERCP is the first phase in this development. It represents the NNWSI Project's understanding of environmental regulatory requirements for site characterization of Yucca Mountain. After consultation

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with appropriate Federal and State agencies, the ERCP will be updated to reflect the results of these consultations.

In addition to the NNWSI Project's ERCP, other environmental activities have been, or will be, undertaken to implement DOE Order N 5400.1, including:

- (1) The NNWSI Project's Environmental Monitoring and Mitigation Plan that addresses potentially significant adverse impacts that may be caused by site characterization, and describes a plan to monitor these potential impacts and mitigate their effects if they actually occur;
- (2) Preparation of an Environmental Impact Statement in accordance with Section 114(f) of the Act;
- (3) Identification of programmatic requirements under Key Issue 3 of the DOE Mission Plan;
- (4) Development of information pursuant to DOE's General Guidelines for the Recommendation of Sites for the Nuclear Waste Repositories (10 CFR Part 960) for making higher level findings for qualifying and disqualifying conditions; and
- (5) Preparation of studies to support assessments and findings under
 - (a) the NRC's regulations for Disposal of High-Level Radioactive

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Waste in Geologic Repositories (10 CFR part 60), and (b) the EPA's Environmental Standards for High-Level and Transuranic Waste (40 CFR Part 191).

To further the planning effort in environmental regulatory compliance, the Office of Geologic Repositories within the Office of Civilian Radioactive Waste Management (OCRWM) has established an Environmental Regulatory Compliance Working Group (ERCWG) to support the Environmental Coordinating Group (ECG). The ERCWG consists of DOE personnel from Headquarters and the Project Office in Nevada with participation at the ERCWG meetings by representatives from the State of Nevada. The ERCWG provides coordination and communication among the Project Office, the OCRWM, and the State of Nevada on matters of environmental regulatory compliance.

1.3 SCOPE

The NNWSI Project's ERCP contains the following information:

1. Federal environmental laws, regulations, Executive Orders, and DOE Orders for which compliance is believed to be required for characterization of the Yucca Mountain site;
2. State and local environmental laws and regulations for which Federal law mandates compliance;

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3. A description of related State and local laws for which Congress has not waived sovereign immunity.
4. A description of field activities planned for the site characterization phase that may trigger applicable Federal, State, and local laws, and regulations and references to more detailed discussions of field activities;
5. Federal, State, and local agencies that should be consulted to assure 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, not inconsistent with DOE's responsibilities under the Act;
8. Description of an environmental tracking system and an evidence file for environmental compliance;
9. Identification of the organizations within the NNWSI Project that are responsible for obtaining permits/approvals in a timely manner;

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10. Description of the procedures by which the NNWSI Project 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 NNWSI Project's ability to conduct site characterization at the Yucca Mountain site;

DOE Orders that relate to environmental protection during site characterization are listed in Table 1-1. The ERCP does not contain a separate discussion of compliance with these Orders because by complying with the Federal and State laws and regulations discussed in the ERCP, the DOE will be in compliance with these Orders. The parts of these Orders addressing radiological health and safety, occupational health and safety, fire protection, building and safety codes, contractor licensing and bonding, and other registration requirements, are addressed in the Office of Civilian Radioactive Waste Management's Safety Plan (DOE/RW-0119) and the health and safety plans for the Yucca Mountain site.

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

The current version of the Yucca Mountain ERCP addresses in detail Federal laws, regulations, Executive Orders, and State laws stemming from Federal flow-down authority. Other potentially applicable State and local requirements are identified.

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1.4 REVISIONS OF ERCP

The NNWSI Project expects that the ERCP will occasionally be revised to reflect changes in site characterization plans and changes in applicable Federal, State, or local laws and regulations. Moreover, the ERCP will be revised to reflect comments on site-specific study plans.

After consultations with appropriate Federal, State, and local agencies, the ERCP will be revised, if needed, based on the results of these consultations. The procedures for making these revisions are discussed in Section 4.4.

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

<u>DOE ORDERS</u>		
Number	Date	Subject
1. DOE 5000.3	11-07-84	Unusual Occurrence Reporting System
2. DOE 5400.xx	To Be Issued Spring 1988	Radiation Protection to Public & Environment
3. DOE 5400.1	To Be Issued Spring 1988	General Environmental Protection Program Requirements
4. DOE N 5400.1	01-08-87	Environmental Policy Statement
5. DOE 5440.1C	04-09-85	Implementation of National Environmental Policy Act
6. DOE 5480.3	07-09-85	Safety Requirements for the Packaging and Transportation of Hazardous Materials, Hazardous Substances and Hazardous Wastes
7. DOE 5480.4	05-15-84	Environmental Protection, Safety, and Health Protection Standards
8. DOE 5480.14	04-26-85	Comprehensive Environmental Response, Compensation, and Liability Act Program
9. DOE 5481.1B	09-23-86	Safety Analyses and Review System
10. DOE 5482.1A	08-13-81	Environmental, Safety, and Health Appraisal Program
11. DOE 5484.1	02-24-81	Environmental Protection, Safety, and Health Protection Information
12. DOE 5820.2	02-06-84	Radioactive Waste Management

Chapter 2

SITE CHARACTERIZATION PROGRAM SUMMARY

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2. SITE CHARACTERIZATION PROGRAM SUMMARY

2.1 INTRODUCTION

This chapter describes the near-term site characterization activities that could trigger environmental regulatory requirements during site characterization at and near Yucca Mountain. The information presented is derived from two sources: (1) Chapter 4 of the Final Environmental Assessment (EA) for Yucca Mountain (referenced cited in Chapter 1) and (2) the consultation draft of the Site Characterization Plan (SCP) for Yucca Mountain. The reader should keep in mind that some of the information presented here, such as the proposed location and number of drillholes, is preliminary and subject to change upon publication of the SCP and subsequent documents (see Section 1.4). The SCP includes several references to the possibility that far-field testing eventually might be needed in California should such testing be indicated by the results of the planned site characterization activities. No such testing will proceed at this time.

The location of the Yucca Mountain area is shown on Figure 2-1. A large map at the end of the document (Map 1) shows the topographic setting of the site. The location of planned site characterization activities, as well as the existing drillsites, trenches, and roads in the vicinity of Yucca Mountain, are shown on two large maps at the end of the document (Maps 2 and

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Figure 2-1. Location of the Yucca Mountain area.

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3). Contingencies also include some minor activities in Amargosa Valley. Map 4, also at the end of the document, is an expanded view of the existing sites and planned activities at and near the exploratory shaft facility. These maps should be referred to when reading this chapter. The scale of Maps 2, 3, and 4 prevents placing the NNWSI identifier (usually a letter and number) next to each planned and existing site. Because some of these sites have been referred to in this chapter by the letter/number identifier, several tables have been included in Appendix A in which all existing and planned sites are identified by the NNWSI letter/ number system. The location of each site is listed in Appendix A by Nevada coordinates, and this coordinate system is shown on the maps at the end of the document.

Access to and use of lands managed by the Bureau of Land Management (BLM) at and near Yucca Mountain are currently in negotiation between the DOE and BLM. Under the terms of any land-access agreement, the BLM will require the DOE to protect environmental values such as wildlife and archaeological sites, mitigate any adverse impacts to these environmental values, and restore and reclaim to a reasonable extent those areas disturbed by site characterization. Because a land-use agreement has not yet been implemented, the BLM's stipulations for use of this land are not yet known (see Section 3.2.7).

Some activities, including seismic surveying, trenching, and drilling will be conducted outside the area covered by the BLM/DOE land-use agreement referred to in the preceding paragraph. Before any of these studies begin, however, the DOE will consult with the agency responsible for managing the

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affected land and will comply with all environmental regulations that are applicable to these activities.

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.

2.2 FIELD ACTIVITIES

Field studies include all surface-based site characterization activities needed to evaluate the suitability of the Yucca Mountain site for the location of a repository (the exploratory shafts and associated surface facilities are discussed in Section 2.3). This section includes information on site preparation for these activities; access road construction and improvement; exploratory drilling and testing; transportation, storage, and disposal of waste; geophysical surveys; and geological mapping.

The proposed field studies described in this section will include good engineering practice to minimize environmental impacts caused by these studies. These practices will include the following:

1. Stockpiling topsoil at selected field sites that is removed during site preparation. Depending on the results of reclamation studies that are

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now being developed, the topsoil will be available for reclamation of disturbed areas.

2. Minimizing the slope angle on the sides of the rock-storage pile, and at other sites where rock debris and mud will be piled, to minimize erosion and encourage stability.
3. Reducing dust by spraying disturbed areas with water or other dust-binding fluids.

In addition to the proposed field studies, several types of data-gathering activities were begun prior to the start of site characterization. Monitoring equipment for these studies has already been installed at and near Yucca Mountain, and this equipment will continue to be operated during site characterization. Some of the ongoing studies consist only of field observations. The ongoing data-gathering activities include (1) monitoring the hydrologic processes of the unsaturated-zone, (2) monitoring the potentiometric (water-table) level, (3) monitoring natural-infiltration rates in 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-network monitoring at stations centered on Yucca Mountain; this network is occasionally augmented with temporary seismic stations, (10) biennial geodetic surveys of geodetic benchmarks, (11) soil and dust-trap sampling for studying paleoenvironmental conditions in the Yucca Mountain region, (12) sampling and mapping trenches and pits for tectonic and paleoclimate studies, (13) geologic and geomorphic mapping, (14)

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meteorological and precipitation monitoring, and (15) geologic, geochemical, and geochemical tests. Map 2, at the end of the document, shows the location of several of these existing sites.

2.2.1 SITE PREPARATION

Site preparation will be required for drilling (includes drilling for geologic, hydrologic, and some geophysical studies), studies related to trenches, and for surface-infiltration tests. The total estimated surface area to be disturbed from these activities during site characterization is 285 hectares (about 700 acres). Because site preparation will disturb more than 8 hectares (20 acres) per year, an air quality Registration Certificate and Operating Permit will be required from the Nevada Division of Environmental Protection (see Section 3.3.1 for details). The subsections below describe the site preparation that will be done for each major activity.

Drilling. The NNWSI Project is in the process of defining a comprehensive drilling program. Because the details of this drilling program may change, the descriptions that follow may require modifications in the future (see Section 1.4).

Current plans call for approximately 345 to 430 holes to be drilled at and near Yucca Mountain during site characterization, of which 45 to 80 are considered deep holes (a few hundred to more than a thousand meters deep) that will require surface preparation. The possibility of locating some of

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the deep drillholes on the same drill pad would reduce further the amount of surface preparation and subsequent disturbance of the land that would otherwise occur if each deep drillhole had its own pad. The total number of drillholes now planned (345 to 430 holes) represents a range of possible holes, because at this stage of planning some holes are tentative and their development depends on the results of other drilling and testing programs.

The 45 to 80 deep drillholes will range in depth from a hundred meters to more than a thousand meters and will be up to 45 cm (17.5 in) in diameter near the surface. Each deep-hole site will require construction of a raised and leveled dirt drill pad, a parking area and equipment yard, and a mud-and-cuttings pit. Approximately 1 ha (2.5 acres) will be disturbed for each deep-hole site for a total disturbed area of 80 ha (200 acres) (assumes that 80 deep holes would be drilled). Fill dirt will be excavated from adjacent or near-by areas for use in grading and leveling each deep-hole site. If the fill is to be acquired from borrow areas on public lands (it has not yet been determined where sand and gravel for the leveling of drill sites will be acquired), the DOE will obtain a Free-Use Permit from the Bureau of Land Management, as described in Section 3.2.6.

Little if any surface preparation will be required for the several hundred remaining shallow drillholes, or drillholes used for geophysical surveys; all these holes will typically be no more than 15 m (50 ft) deep, but some may be as much as 46 m (150 ft) deep. The small volume of material removed during preparation of these holes will be piled next to each drill site.

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Trenching. Up to twenty trenches will be dug by bulldozers or articulated shovels during site characterization. The tentative locations of some trenches are shown on Map 3 at the end of the document; the actual locations of these and other trenches will depend largely on the results of field reconnaissance. The size of the trenches is expected to range from 1.2 to 3 m (4 to 10 ft) deep, 1.8 to 3.7 m (6 to 12 ft) wide, and up to 152 m (500 ft) long. Several small trenches, referred to as soil pits, are planned in conjunction with the paleoclimatic studies. Material excavated during construction of the trenches will be stored at the surface next to each trench. The trenches will be filled with this excavated material when studies have been completed.

Pavements. Pavements are bedrock surfaces that have little or no regolith covering and that are further cleared of cover for study of fracture patterns. Each pavement may range up to 740 m^2 ($8,000 \text{ ft}^2$) and will be prepared by spraying water or air under moderately high pressure to further clean the surface. Displaced material will collect in areas adjacent to the cleared area. The water, if used, will be hauled to each pavement site by truck. The amount of water used for clearing of pavements will vary with the degree to which each pavement surface is covered with material. The specific number and locations of pavements are unknown at this time and are heavily dependent on field reconnaissance.

Infiltration Studies. These studies consist of both natural- and artificial-infiltration techniques. The natural-infiltration studies will require drilling 24 holes to depths of about 15 m (50 ft) (these are in addition to the 74 holes that already exist at the site). The holes will be

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instrumented to monitor natural infiltration from precipitation. At about 50 of the sites where these holes will, or have already been drilled, small ponds will be developed to induce infiltration artificially. Each pond will have a low berm enclosing an area of about 23 m^2 (250 ft^2). An organic dye will be added to the ponded water so that infiltration can be monitored. After the ponding studies are completed, several sites will be excavated and flow pathways will be mapped. Approximately $1,160 \text{ m}^2$ ($12,500 \text{ ft}^2$) of land will be disturbed for the ponding studies.

In addition to the ponding studies, site preparation will be required for 25 small-plot and 12 large-plot rainfall simulation tests. At each small-plot site, 4 monitoring holes will be drilled to a depth of 1.5 m (5 ft) and instrumented. Each test site will be approximately 1 m^2 (9 ft^2). At each large-plot site, 10 monitoring holes will be drilled to a depth of 9 to 15 m (30 to 50 ft) and instrumented. Each test area will disturb an area of 37 m^2 (400 ft^2). Each of the holes is drilled without a drill pad, using a portable all-terrain drill rig that minimizes surface disturbance. The infiltration studies are described further in Section 2.2.3.

2.2.2 ACCESS ROAD CONSTRUCTION AND IMPROVEMENT

Many of the drillhole sites, trench and pavement sites, and infiltration sites will require the construction of dirt or gravel access roads. The roads will have an average width of 15 m (50 ft) and will be up to 8 m (5 mi) long and will be constructed as extensions from the nearest existing road.

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In some cases, 5 m (15 ft) wide, one lane dirt tracks or smaller access trails will be sufficient. Each road will be bladed smooth if necessary and, if needed, sprayed with water to aid in soil compaction and dust suppression. It is currently estimated that the total length of all access roads will be about 63 km (100 mi).

2.2.3 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 all solid waste generated at each drill site to be hauled to and disposed of at a landfill on the Nevada Test Site (NTS). Hazardous wastes, if any, will be stored temporarily at each drill site, then transported to Mercury, Nevada, and eventually disposed of at a licensed waste site in California (see Section 3.3.3). Water to be used for drilling, dust suppression and compaction, and human consumption will be trucked daily to each site. A mud-and-cuttings pit about a meter deep and covering about 0.1 ha (.25 acre) will be constructed at each deep drillhole site. Fluids and other materials from the drilling operations, such as air-foam, bentonitic drilling muds, and rock cuttings, will be discharged into the pits. Some drillholes will be drilled without fluids to minimize the potential for introducing additional liquids to the unsaturated zone.

Each deep drillhole will be logged to evaluate the hole conditions during drilling operations. Data logs will be acquired using special,

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recoverable instruments that are lowered into the hole on a wireline cable. In some cases, radioactive sources that emit alpha or gamma radiation are fixed in the instrument. These radioactive sources include cesium-137, americium-241, and beryllium. In other cases tracers and organic dyes (e.g., 3-trifluoromethylbenzoate and lithium bromide) may be used. Informal consultations with staff of the U.S. Environmental Protection Agency indicate that injection of tracers through wells for the purpose of testing the characteristics of the aquifer will probably require compliance with the Underground Injection Control program of the Safe Drinking Water Act. This regulatory program is discussed in Section 3.2.13.

The exploratory drilling and testing program will include (1) deep and shallow unsaturated-zone exploration and monitoring, (2) monitoring infiltration rates, flow velocities, and flow pathways in the unsaturated zone, (3) saturated-zone monitoring and testing, (4) water infiltration and recharge studies in Fortymile Wash, (5) in situ stress testing, (6) geological and geophysical borehole studies, (7) investigations of magnetic anomalies, (8) groundwater recharge and discharge investigations, (9) site-specific subsurface investigations of the repository block, (10) paleoclimatic studies, (11) surface repository coring, and (12) vertical seismic profiling. The locations of these proposed boreholes are shown on the large maps at the end of the document. At many of these sites, such as those for infiltration monitoring, numerous holes may be drilled at the same site, as explained in the following sections. This accounts for the difference in the small number of drill sites compared to the 345 to 430 drillholes that are planned during site characterization.

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Unsaturated zone exploration and monitoring. Several holes (designated UZ-1, UZ-4, UZ-5, UZ-6, UZ-6s, UZ-7, UZ-13) have already been drilled to measure and monitor moisture conditions in the deep unsaturated zone (see Appendix A for locations). The depths of these holes range from 122 to 550 m (400 to 1,800 ft). Hole UZ-1 is 380 m (1,250 ft) deep and has been fully instrumented to monitor certain hydrologic processes. This monitoring requires periodic visits to the hole for various reasons, including operation of a diesel generator. The other six existing holes will be instrumented and monitored in the near future. Hole UZ-8, which was only partially drilled, will be reentered, drilled to the planned depth, tested, and instrumented.

Additional boreholes will be drilled in the unsaturated zone, tested, instrumented, and monitored to investigate the movement of moisture. Unconventional dry-drilling methods are preferred for these holes because of the importance of keeping the unsaturated zone free of fluids. These methods include reverse-circulation drilling using air, and percussion drilling using air and a downhole hammer. If these methods are not successful, alternatives will be assessed, including wet drilling.

Deep hole UZ-10 will be located near existing holes UZ-13 and G-3. Deep holes UZ-2 and UZ-3 will be located on the same pad near existing holes UZ-6 and UZ-6s on Yucca Crest. Deep holes UZ-9, UZ-9a, and UZ-9b will be drilled in a closely-spaced pattern on the eastern flank of Yucca Mountain. Deep hole UZ-14 will be drilled north of Yucca Mountain, near existing deep hole UZ-1. These holes will be drilled using a combination of drilling methods in a program that has the following objectives: (1) drill dry; (2) produce an open hole to a depth of 460 to 550 m (1,500 to 1,800 ft), depending on the

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water table depth; (3) provide a smooth-walled hole at a diameter suitable for testing during drilling operations; and (4) provide spot-core samples at regular intervals.

After the drilling and pressure tests have been completed, some deep holes will be instrumented and filled using such materials as silica sand, silica flour, and bentonite pellets to isolate selected stratigraphic intervals. Each interval will be instrumented using a combination of sensors that will measure such things as temperature and gases. The sensors will be monitored for several years at each hole using an integrated data-acquisition system powered by portable generators.

In addition to the existing shallow holes (UZ-4, UZ-5, UZ-7, UZ-8, and UZ-13), several other shallow holes are planned. Holes UZ-11 and UZ-12 will be located together west of Yucca Mountain at the base of the Solitario Canyon fault scarp. Like the deep holes, these holes will be instrumented, filled, and monitored for several years to investigate moisture movement in the unsaturated zone.

Saturated-zone drilling and water-table testing. Several holes have been drilled into the upper 30 to 60 m (100 to 200 ft) of the water table to measure and monitor the elevation of the water table. Long-term periodic monitoring of these holes will be conducted by automatic and manual systems to record fluctuations of water level and pressure as a function of time. Present plans are to acquire water samples from some or all of these holes for analysis of water chemistry. Because these holes were drilled with air foam, the existing groundwater conditions were probably disturbed during

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drilling and special sampling methods are therefore needed to obtain representative water samples. To obtain these samples, the in-place tubing at each hole will be withdrawn, and a downhole pump will be installed at the end of a clean tubing string. This pump will have a lift capacity of 57 liters (15 gallons) per minute. The hole will be pumped for up to a week, or longer if necessary, until the water composition stabilizes. The pumped water will be discharged to surface drainages. This discharge is not expected to interfere with other hydrologic investigations. The regulatory requirements associated with these discharges are discussed in Section 3.4.3.

Several additional water table holes are planned (see large maps at end of document). Two holes will be drilled west of Yucca Mountain along the Solitario Canyon fault (WT-8 and 9), one hole will be drilled northeast of Crater Flat near Yucca Mountain (WT-21), two holes are planned near Drill Hole Wash north of Yucca Mountain and west of the NTS boundary (WT-23 and 24), and two holes are planned south and east of Yucca Mountain on the NTS (WT-19 and 20). Depending on the results of other testing in the unsaturated zone, these holes are now planned to be drilled using a rotary-drilling method with conventional circulation and air foam. The depth of each hole will be 30 to 60 m (100 to 200 ft) below the static water table.

Geophysical logs will be used to help determine the depth of the water table. The holes will be completed by installing a length of tubing with a well screen at the bottom of the hole. Access to some of these wells will be required for ongoing monitoring and possible water sampling and flow testing.

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A series of pump and tracer tests are planned at several existing wells. A downhole pump with a lift capacity of 1,890 liters (500 gallons) per minute will be installed below the water table in one of the holes, and monitoring systems will be installed in the others. A series of single-well and multi-well pumping tests, as well as pumping tests using tracers, are also planned. Water produced during pump tests will be discharged to surface drainages; a pipeline may be built to convey the discharge away from the site of the tests if there is the potential for discharged water to interfere with test results. The regulatory requirements associated with these tests may include compliance with the Federal and State Underground Injection Control programs (see Sections 3.2.13 and 3.3.5), the Nevada Water Pollution Control Law (see Section 3.4.3), and Nevada law regarding the appropriation of public water (see Section 3.4.2).

The objectives of the testing program at the UE25c complex of wells are to determine hydraulic conductivity parameters and if the objectives of tracer testing can be met through the use of single-well tests. Depending on the outcome of these tests, additional single-well hydrologic tests may be conducted in existing and planned water-table holes. These tests will use tracers and a pumping rate of 57 to 1,890 liters (15 to 500 gallons) per minute, with disposal of the water at the surface. If multi-well testing is necessary, a second multiple-well complex may be drilled. The second complex would probably be located near Busted Butte on the NTS or on BLM administered land near the site.

In addition to the testing described above, a multi-well pump test will be conducted across the Solitario Canyon fault to investigate the

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conductivity of the fault zone. A hole (USW H-7) is planned for Yucca Crest, about 910 m (3,000 ft) east of existing hole H-6. The depth of hole H-7 will be at least 910 m (3,000 ft), and it will be drilled using conventional rotary circulation and air foam. Holes WT-8 and WT-9 described previously, will also be used to monitor changes in water table elevation resulting from this pump test. A downhole pump with a lift capacity of 1,890 liters (500 gallons) per minute may be installed in each well. Holes H-6 and H-7 may be used as pumping and observations wells. The water discharged at the surface from the tests will be tagged with a tracer to distinguish it from other waters at the site. If necessary, a pipeline will be built to convey the discharge down Solitario Canyon toward Crater Flat.

Water infiltration and recharge studies. Numerous shallow holes [15 m (50 ft) deep] will be drilled in different hydrogeologic settings to monitor natural infiltration (see maps at end of document). In addition to the 74 holes that already exist for these studies, an additional 24 shallow holes are planned. Each infiltration-monitoring hole will be drilled using a portable all-terrain drill rig; drill pads will not be necessary. Approximately 23 of the planned infiltration-monitoring holes, and 25 of the existing holes, will also be used for artificial-infiltration ponding studies, described below.

Small ponds will be created to induce infiltration at approximately 50 locations where shallow holes have been drilled for monitoring natural infiltration. Each pond will be constructed using mechanized equipment and will consist of a low berm enclosing an area of about 23 m^2 (250 ft^2). During infiltration testing, a static water level will be maintained in each pond

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for a prescribed period of time. The amount of water to be used will vary from site to site, but will probably not exceed 75,700 liters (20,000 gallons) at any site.

Twelve large-plot rainfall-simulation tests and 25 small-plot rainfall-simulation tests are also planned. 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 near sites of natural-infiltration studies to minimize cost and disturbance. The water used for these tests will be delivered to each site by truck.

At each of the 25 small-plot rainfall-simulation sites about four monitoring holes will be drilled to a depth of about 1.5-m (5-ft) and instrumented. A water distribution system similar to an irrigation system will be installed, and rainfall will be simulated. Present plans call for four tests at each of the 25 sites; each test will distribute 454 liters (120 gallons) of water over an area of 1 m^2 (9 ft^2).

At each of the 12 large-plot rainfall-simulation sites 10, monitoring holes will be drilled to a depth of 9 to 15 m (30 to 50 ft deep) and instrumented. Present plans call for five tests at each of the 12 sites; each test will distribute 11,360 liters (3,000 gallons) of water over an area of 37 m^2 (400 ft^2).

Three holes, each 180 to 240 m (600 to 800 ft) deep, will be drilled in Fortymile Wash to study artificial infiltration, and to monitor aquifer

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recharge during precipitation. The holes will be drilled using air as a circulation medium. Spot core will be recovered using conventional or wireline coring systems. The total depth of each hole will be close to, but not intersecting, the water table. After each flood in the wash, the holes will be monitored periodically by using wireline geophysical tools. In addition, a low berm will be constructed around the collar of each hole, enclosing a small pond. Artificial infiltration from the pond 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.

Water samples will be collected from all available sources of groundwater and surface water at and near the site. Some sampling programs will be conducted in commercial drill holes and wells in the region. Discharge from the hydrologic system will be studied by means of surface sampling and shallow drilling to depths of generally less than 30 m (100 ft). About 50 to 100 such holes will be drilled using a truck-mounted portable rig.

In situ stress testing. In situ stress will be measured by the hydrofracturing method in at least two wells to be located more than 8km (5mi) from the site. Hydrofracturing requires isolating a selected 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. If required, more than 20 additional locations have been identified in southwestern Nevada, including sites at the Nevada

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Test Site, the Amargosa Desert, Bare Mountain, and Crater Flat. These additional locations may be tested depending on the nature of the data from the initial study near Yucca Mountain.

Holes used for hydrofracturing will be drilled to a depth of at least 305 m (1,000 ft) using conventional rotary-drilling methods with air foam or drilling mud as a circulating medium. The actual depth of each hole will depend on the availability and analysis of several hundred feet of competent, relatively unfractured bedrock. A small drill pad will be required at each location. Several hydrofracturing stress measurements will be performed until consistent measurements have been obtained from at least three different depths. A borehole television or an acoustic borehole televiewer will be used to locate natural and induced fractures.

Geological and geophysical borehole studies. All holes drilled during site characterization will be logged geophysically and, on occasion, by core samples during the course of drilling. 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. Many of these studies will use radioactive sources contained in sealed instruments. Furthermore, chemical tracers and organic dyes may be used as free substances injected into boreholes for some tests. The regulatory requirements associated with the use of tracers during site characterization is discussed in Sections 3.2.13 and 3.3.5.

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

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(see large maps at end of document). An additional deep corehole is planned south of Yucca Mountain on the NTS (G-7). These holes will require construction of drill pads and access roads. The holes will be fully cored using H-series or larger wireline coring equipment, which yields a core with a diameter of 6.35-cm (2.5-in). 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. It can be expected that a few million gallons may be used for the three holes. This water will be trucked to the site at least twice daily.

Four exploratory holes are planned to investigate magnetic anomalies in southern Crater Flat and in the Amargosa Desert. The holes 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 or disregard 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.

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Several perennial lake systems in the Great Basin will be studied. The study areas have not yet been determined, although as many as 41 shallow test pits and trenches have been proposed as part of these studies. Vehicle access to each study area will be required to transport drilling and sampling equipment. The purpose of the studies is to characterize by the analysis of lake sediments the recent (500,000-year) variations in lake size, hydraulics, temperature, and chemical composition.

Several shallow holes may 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 various mineral deposits in the fault zones. A drill pad and a short access road would be constructed on the western slope of Exile Hill. A series of shallow 15-m (50-ft) deep coreholes will be drilled to the fault using a truck-mounted rig. Based on the results, one or more deeper coreholes will be drilled at a steep angle to depths of 60 to 150 m (200 to 500 ft) to intersect the fault zone. Air foam and drilling mud will be used as circulation media.

A geostatistical-based drilling program is planned to acquire subsurface information on the repository block. Three-dimensional models of the Yucca Mountain site indicate that representative sampling of the repository block should be systematic in both horizontal and vertical dimensions.

Approximately 35 to 40 continuously-cored holes may be drilled on a semi-regular grid pattern. Drilling will be in three phases to evaluate the data before proceeding further. The first phase will include drilling 12 continuously-cored holes. The second phase, if undertaken, will require an additional 12 continuously-cored holes located between the first-phase holes.

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The third phase is more speculative, with options including nine or more holes.

2.2.4 TRANSPORTATION, STORAGE, AND DISPOSAL OF SOLID WASTE

Rock cuttings, drilling fluids, and other construction-related wastes will be disposed of in the mud-and-cuttings pit at each drill site. Solid waste and trash will be hauled to a landfill on the Nevada Test Site. If any of these wastes contain hazardous components as defined in the Resource Conservation and Recovery Act (RCRA), they will be stored at the site for eventual transport to a RCRA waste disposal site (see discussion in Section 3.3.3 for more information about RCRA). Sanitary wastes will be collected at portable facilities and removed to an appropriate disposal site.

2.2.5 GEOPHYSICAL SURVEYS

The geophysical studies being considered for Yucca Mountain include seismic reflection and refraction, gravity, magnetic, and electrical. 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

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large array centered on Yucca Mountain. The stations consist of one or more seismometers with a solar-powered data-logging and telemetry system. The instruments and electronics are installed in a small concrete vault at each site. The seismometers are operated continuously and data are recorded automatically. The stations were installed in 1978-79 by the USGS, with permission from the National Park Service, the Bureau of Land Management, and the U.S. Forest Service. No new roads were constructed for access to any of the sites. Each site is visited every three to six months for inspection and maintenance. The regional monitoring network is occasionally augmented by portable seismometers for monitoring ground motion at the surface and in existing drillholes from underground nuclear explosions.

Shallow seismic-reflection surveys will be performed using portable small-scale vibrator sources; 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. Up to ten survey lines are planned: two in Crater Flat, one in Rock Valley on the NTS, and seven in the immediate vicinity of Yucca Mountain (see large maps at end of document). All lines will use 9.1-m (30-ft) vibrator source points, with 12 geophones per group. The penetration of the seismic waves can be a few thousand feet depending on seismic propagation conditions.

A seismic-refraction survey will be conducted across Yucca Wash using portable seismographs and repetitive hammer (sledgehammer) sources. Site preparation is not required, but the survey may not be limited to existing

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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 conducted along existing roads and highways using conventional field equipment consisting of geophone cables, recording trucks, and truck-mounted vibrator sources (see large maps at end of document). Acquisition parameters tentatively identified include 9.6-km (6-mi) geophone spreads, 24 geophones per group, 50-m (164-ft) group intervals, 240 groups per spread 100-m (328-ft) vibrator interval, and 54,430 kg (120,000 lb) minimum peak vibrator force. This proposed survey will be evaluated further after prototype testing and peer review.

Deep, regional seismic-refraction studies will be performed along existing highways and roads and in rugged terrain with the use of helicopters. The receivers will be discrete, portable, battery-powered event recorders that do not require excavations 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 shot hole will be drilled to a diameter of about 25 cm (10 in) 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 filled with gravel that will be trucked to the site. Two or more such shot holes will be prepared together for larger shots of 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 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.

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Contingencies include an east-west profile centered on Yucca Mountain and two or three cross profiles. These seismic lines may extend through Amargosa Valley.

Several regional magnetotelluric (MT) surveys will be conducted (see large maps at end of document). These surveys measure conductivity of the earth 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 avoid interference from wind. Off-road vehicle access is not required for MT surveys.

Proposed MT lines would follow NV Route 29 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. If necessary, these lines may extend through Amargosa Valley.

Detailed geophysical surveys will be conducted in the vicinity of Yucca Mountain where aeromagnetic and other regional surveys indicate the possible existence of anomalous structures (see large maps at end of document). 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 that will be

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transported to the sites by off-road vehicles. Detailed geophysical surveys are presently planned for a total area of less than 26 km^2 (10 mi^2). Station spacing will range between 60 and 305 m (200 and 1,000 ft) but could vary according to the type of survey and the results. Other types of surveys (including seismic, electrical, and electromagnetic, either airborne or ground-based) are not presently planned but may be required to evaluate the site's mineral-resource potential, or to determine the engineering properties of soil and bedrock.

Vertical seismic profiling (VSP) is a seismic exploration method similar to seismic reflection surveys whereby geophones are placed in boreholes or underground excavations to improve the quality of the acquired seismic image. Methods of interpretation 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 vibrator trucks that will travel on and adjacent to existing roads and dirt tracks.

2.2.6 GEOLOGICAL MAPPING

Geologic mapping is continuing in the vicinity of Yucca Mountain as part of the geologic, tectonic, and volcanic studies. These studies include (1) surficial-deposits mapping; (2) geomorphic mapping; (3) surface-outcrop sampling; (4) surface-stratigraphic studies; (5) trenching studies; (6)

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pavement studies; (7) streamflow, debris flow, and erosion studies; and (8) geodetic surveys. Some off-road vehicle travel will be necessary for collection of samples for laboratory analysis.

Surficial-deposits mapping. Mapping of surface desposits (not bedrock) at a scale of 1:12,000 will be completed in a conterminous area of 20,230 ha (50,000 acres) surrounding the site. Existing roads will be used where practicable for access. Surficial mapping is similar to geologic mapping and will be performed by soil scientists. Soil pits up to 1.5 m (5 ft) deep will be excavated to aid in surface mapping.

Seasonal soil characteristics will be determined during these studies. Activities will include dust-trap sampling, testing and sampling of soils, and periodic measurement of carbon dioxide and soil gases. [Dust traps are passive devices consisting of a simple mechanical trap mounted on a fence post]. Soil studies are part of the climate-modeling effort to evaluate the effects that a changing climate may have on the hydrologic characteristics of the site.

Geomorphic mapping. Field mapping of geomorphic features will be conducted in a broad area of Yucca Mountain, Fortymile Wash, and Crater Flat. This activity requires access by foot from existing roads.

Surface-outcrop sampling. Rock samples are occasionally acquired from surface outcrops for laboratory analysis of the rock's thermal and mechanical properties. Samples are needed for ongoing low-strain-rate testing and other tests to assess the behavior of the repository host rock to the heat load

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that will be generated by the emplaced waste. Rock samples are also acquired for laboratory analysis of geochemical interactions among the tuff, groundwater, radionuclides, and microorganisms.

Surface-stratigraphic studies. These studies consist of detailed mapping of exposed bedrock. No excavations or road construction are required, and off-road vehicle travel will be minimal.

Trenching studies. Several trenches at and near Yucca Mountain, as well as trenches near Beatty, Cedar Mountain, Fairview Peak, Dixie Valley, and Rock Valley, have been excavated for geologic, tectonic, and paleoclimatic studies. On occasion, it may be necessary to widen, deepen, or lengthen existing trenches to collect additional data and to prevent trench degradation.

The study of regional paleolimnology, aeolian deposits, and terrestrial paleoecology will involve shallow test pits and trenches in the vicinity of Yucca Mountain, as well as the collection of small amounts of debris from packrat middens in the vicinity of Yucca Mountain. Trenching requirements will be coordinated with other trenching efforts to minimize surface disturbance.

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

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Streamflow, debris flow, and erosion studies. Gauges have been installed at and near Yucca Mountain to study streamflow, debris flow, and erosion processes. Additional gauging stations are proposed for the Yucca Mountain area (see maps at the end of the document).

Streamflow monitoring will be conducted to better understand the characteristics of runoff during precipitation. Scour chains will be installed to monitor the amount of erosion that occurs in washes at times of heavy runoff. During and after heavy precipitation, debris flows, if they occur, will be mapped and described. Monitoring will also be conducted to characterize present rates of erosion.

Geodetic Surveys. Geodetic benchmarks have been installed on and around Yucca Mountain to monitor vertical crustal movements in the vicinity of the site. A 70-km (43-mi) level line extends from Crater Flat to the west of Yucca Mountain land to Rock Valley on the east side. A quadrilateral network has been installed across several faults in the immediate vicinity of the site. Surveys of the benchmarks are conducted every two years.

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2.3 EXPLORATORY SHAFT CONSTRUCTION

The Exploratory Shaft Facility (ESF) will consist of surface facilities, and two vertical shafts and underground facilities where a variety of subsurface tests will be conducted (Figure 2-2). The underground tests are essential to evaluate the suitability of the Yucca Mountain site for the location of a repository. This section includes information on the design of the ESF; site preparation; construction and improvement of access roads; installation of 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 to be used during site preparation, and construction and operation of the ESF, include the following:

1. Install a leachate-monitoring system at the rock-storage pile and at the mine waste-water pond.
2. Locate borrow area(s) where impacts to the environment will be minimized.
3. Separate the surface facilities sufficiently apart to reduce the potential for fires.
4. Water roads and exposed surfaces to control dust.

The two exploratory shafts are designated ES-1 (the main test shaft) and ES-2. ES-1 will have an inside finished diameter of 3.7 m (12 ft) and a depth of 436 m (1,430 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 of 335 m (1,100 ft). ES-2 will be excavated with little or no subsurface testing; it

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Figure 2-2. Relationship of Yucca Mountain site to exploratory shaft facility.

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will be used chiefly for ventilation, materials handling, and emergency egress. The two shafts will be connected at the 320-m (1,055-ft) level. The shaft 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 in a rock-storage pile at the site (Figure 2-3). Fluids will be disposed of in the mine waste-water pond (Figure 2-3). See Section 3.3.3 for a discussion of the regulatory requirements associated with disposal of solid and liquid mining-wastes.

The surface facilities will include hoist houses, warehouses, repair shops, trailers, parking areas, water- and electrical-distribution systems (includes an electrical substation), a sewage system, a communication system, areas for storing explosives, a borrow area, a rock storage pile, a mine waste-water pond, 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 workers to and from Yucca Mountain during site characterization will be chiefly along U.S. Highway 95. Estimates of the number of workers that will be employed during site characterization are included in the Environmental Assessment for the Yucca Mountain Site (DOE, 1986, DOE/RW-0073). Due to some changes in site characterization plans, however, these estimates may change. Nevertheless, because most onsite workers at Yucca Mountain will already work for the DOE or its contractors in southern Nevada, a substantial increase in traffic congestion along U.S. Highway 95 is not expected.

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LEGEND:

- - - WATER LINE.
- - - SEWER & WASTE LINE.
- - - WATER LINE.
- [Symbol] TOP OF CUT OR FILL.
- [Symbol] BOTTOM OF CUT OR FILL.

SCALE: 1" = 80'

Figure 2-3... ESF OVERALL SITE PLAN

LEGEND:

WATER LINE.
SEWER & MANHOLE WASTE

SEVEN (7) INCHES THICK
WATER LINES.
TOP OF CUT OR FILL

— BOTTOM OF CUT ON FILE

✓

✓

Figure 2-3.: **ESF OVERALL SITE PLAN**

SCALE 1' = 200'

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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. Transport of hazardous materials to the site will comply with all applicable regulations of the U.S. Department of Transportation (see Section 3.2.8 for more information about these regulations).

2.3.1 CONSTRUCTION ACTIVITIES AND SCHEDULE

2.3.1.1 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 shafts will be above the 100-year floodplain of wash. Figure 2-3 shows the site layout, and Figure 2-4 is 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, and the surface of the site must be prepared (road construction is described in Section 2.3.1.2).

Approximately 8 ha (21 acres) will be disturbed at the site of the ESF for surface facilities and for road construction. The site must first be cleared of vegetation, graded, and then stabilized with about 15 cm (6 in) of gravel. Because site preparation for the ESF (as well as for field

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

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activities already described) will disturb more than 20 acres, an air quality Registration Certificate and Operating Permit will be required from the Nevada Division of Environmental Protection (see Section 3.3.1 for more details).

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

The pads 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 to Coyote Wash. The location of Coyote Wash is shown on Figure 2-2. Cut and fill material will be needed to provide level pads for the two shafts, as well as level areas for surface structures and for parking and storage areas. The total volume of cut-and-fill material required will be approximately $51,230 \text{ m}^3$ ($67,000 \text{ yd}^3$). Topsoil removed during site preparation will be stockpiled for potential future use (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.

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

2.3.1.2 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 engineering standards as the existing road. Construction of the road will disturb a path up to a 50-m (160 ft) wide in some places due to modification of the dry washes along the route to protect the road during flash floods. Additional roads will also be constructed to the pad of the exploratory shafts, the explosives storage area, and the water storage tank. In addition, a road dedicated to hauling rock debris to and from the exploratory shafts and rock-storage areas will be constructed (Figure 2-3).

2.3.1.3 Utility services

The utility and communication systems will provide electrical power, water, sewage, and communications to support the surface and subsurface operations at the ESF. The length of time needed to install these services at the ESF is shown in Figure 2-5.

Figure 2-5. Duration of Site Preparation Activities at the ESF.

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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 the NTS boundary (Figure 2-6). The substation will be equipped with transformers to supply power to the hoists, air compressors, ventilation fans, and to the balance of the site.

A power line will be added to the existing power poles to provide electricity to the water-supply booster-pump station from the site substation. Night lighting will be by pole-mounted area floodlights. Standby electrical supply will be provided by two diesel generators. 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).

Water will be supplied 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). Well J-13 is located approximately 5 km (3 mi) east of the ESF site. The pipeline, which has already been constructed in the bed of an old access road that leads westward to the NTS boundary, is adjacent to a 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

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Figure 2-6. Location of facilities required during construction of the exploratory shaft facility.

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(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 all water needs at the ESF, including fire protection.

The water supply system will be designed to accommodate reasonable design changes in the surface and underground facilities. Present water-use estimates for activities at the ESF vary from 88 to 127.4 acre-feet (Nevada Consultation draft SCP, January 1988). As a matter of comity, an application for a Water Appropriation Permit will be prepared by the DOE and submitted to the Nevada State Engineer (see Section 3.4.2 for details). Because the water-distribution system will serve more than 25 people for more than 60 days per year, it is considered to be a public-water supply as defined in the Safe Drinking Water Act; the quality of the water must therefore comply with Federal Standards for drinking water (see Section 3.3.4 for more detail).

The DOE will submit engineering plans for the water-distribution system to the Nevada Division of Health for approval and will then apply for an operating permit (see Section 3.3.4 for details).

Sanitary waste will be collected and disposed of in a sewage system east of the site. The system will be 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. Although uncertainty still exists regarding the type of sewage-disposal system to be installed, a discharge of more than 5,000 gallons per day is likely, and this may require compliance with the Clean Water Act (see Section 3.3.2). The DOE will also submit design plans for the sewage-disposal

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facility 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).

2.3.1.4 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 (Figure 2-6).

Temporary buildings will be assembled or moved to the ESF as they are needed during the construction and operation 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, 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.

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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 (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 underground 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 and waste-water piping from the shaft collar to the mine waste-water pond. Major support facilities will include a concrete-batch plant, a rock storage area, a mine waste-water storage pond, and areas for various supplies and equipment.

The design of the ventilation system will be based on the design of the ESF. Ventilation, exhaust, and distribution facilities will supply and remove conditioned air to and from underground working areas to maintain adequate health and safety of personnel. Systems will be installed to

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monitor radon, methane, oxygen, carbon dioxide, temperature, humidity, and air speed in the underground workings.

A concrete-batch plant will be assembled at the ESF to store and mix materials for concrete and grout needed for 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 (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, to be located east of the exploratory shafts (Figure 2-3), will be bermed and lined to minimize seepage of fluids into the ground or to surface drainages. Fluids that will be used during construction of the shafts will include air-water mist, bentonitic mud with water-control agents, polymer foam, and other waste fluids that will be pumped from the underground facility to the mine waste-water pond. The design life of the pond will be a minimum of 25 yr, and it 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 any regulatory requirements associated with this pond (see Sections 3.3.2 and 3.4.3 for additional information).

The rock-storage area will be located east of the exploratory shaft (Figure 2-3). The rock debris removed during construction of the shafts, the

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testing rooms, and the exploratory drifts will be transported to the surface and hauled by truck to the rock-storage area. The rock-storage area will accommodate approximately $127,000 \text{ m}^3$ ($166,000 \text{ yd}^3$) of rock debris; this is the volume (swollen) of rock debris currently planned to be disposed of in the rock-storage area. This volume will be accommodated in an area of approximately 3.4 ha (8.5 acres), with 2:1 side slopes and a total depth of rock of 4 m (14 ft). If required, the rock-storage area can be expanded. Dust generated from the dumping operation will be minimized by appropriate dust suppression techniques.

2.3.1.5 Construction of shafts

ES-1 will have a finished inside diameter of 3.7 m (12 ft) and a total depth of 436 m (1,430 ft). A breakout room at 183 m (600 ft), the main testing facility at 320 m (1,055 ft) below the surface, and a drill room near the bottom of the shaft at a depth of 415 m (1,360 ft), 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 335 m (1,100 ft); it will be used for ventilation, materials handling, and emergency egress.

Construction of ES-1. After the headframe, sinking deck, and associated equipment are in place (Figure 2-7), the shaft-sinking operation will be routine to the level of the upper-demonstration breakoutroom (DBR), except for testing conducted in the shaft. A typical sequence of operations would be as follows. Several small-diameter blast holes are drilled into the rock.

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

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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., to enhance the vertical advance, limit damage to rock zone, and produce acceptable-sized rock fragments). Procedures to control blasts will be developed before ESF construction begins. 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 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 miners will usually spray the rubble with water for additional dust control before mucking. The use of water in ES-1, however, will be minimal to reduce the potential for this water to affect geologic and hydrologic tests conducted in the shaft. Furthermore, 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 about 2 m (6.5 ft), and the rubble and loose wall-rock has been mucked out, the miners will stow their equipment. Scientists will then enter the shaft to map and sample the

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shaftwall, and to conduct other tests in the freshly exposed interval of shaft 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 steel liner and other 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. 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 (with little or no testing) using a method similar to that used for ES-1. A connecting drift to the lower demonstration break-out room of ES-1 will be constructed after ES-2 is completed. Although no tests are planned for ES-2, significant structural, hydrologic, and stratigraphic features may be mapped.

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2.3.1.6 Construction of underground rooms

ES-1 will have a break-out room for testing, a main testing level, and a drill room near the bottom of the shaft. The upper break-out room and a landing will be excavated at a depth of about 183 m (600 ft) below the surface. The room will be approximately 29.2 m long, 6.4 m wide, and 4.3 m high (96 ft long, 21 ft wide, and 14 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 rock-storage pile. Fluids will be disposed of in the mine waste-water pond.

Landings and approximately 1,214 m (4,000 ft) of drifts will be constructed at the main test 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.

A drill room near the bottom of the ES-1 (referred to as the "Calico Hills station") will be constructed at a depth of approximately 415 m (1,360 ft) in the same manner as the main test level and upper break-out room, described above. Some testing will also take place in the drill room.

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2.3.2 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 rock-storage pile on the east side of the ESF (Figure 2-3). The pile will be capable of containing approximately $127,000 \text{ m}^3$ ($166,000 \text{ yd}^3$) of mined material (swollen) and will be lined and bermed to minimize percolation of fluids into the ground. The waste water is not expected to contain hazardous wastes as defined by RCRA (see Section 3.3.3 for more information about RCRA). Dust from the dumping operations would be minimized by appropriate wet-suppression techniques. Waste-water and other fluids will be disposed of in a bermed and lined mine waste-water pond capable of containing 1.4×10^6 liters (375,000 gallons) of liquid.

2.3.3 PLANS FOR SITE STABILIZATION AND RESTORATION

This section describes the standard operating procedures for stabilizing disturbed areas and restoring habitat. Depending on the results of reclamation studies to be conducted, some of the procedures described below may not be used, or procedures not mentioned may be used. At this time, however, procedures that may be implemented include:

- o Scarring the surface of disturbed areas to promote moisture retention.
- o Seeding disturbed areas with native and naturalized winter annuals and planting native shrub seedlings.

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- o Removing and disposing of concrete and other debris from drill pads and hauling it to a landfill at the NTS for disposal.
- o Disking or ripping drill-pad areas to relieve soil compaction.
- o Re-filling pits and trenches.
- o Contouring disturbed areas to re-establish natural drainage patterns, to minimize erosion, to improve plant growth, and to blend with the surrounding land contours. Stockpiled topsoil will be distributed over the recontoured area to encourage moisture retention.
- o Properly sealing exploratory holes that are no longer needed for gathering data. The holes not currently in use will be capped temporarily.

The final disposition of the ESF would depend on the results of the site characterization program. There are at least three possible ESF dispositions:

1. The site characterization program may show that Yucca Mountain is unsuitable for a radioactive-waste repository. In this case, the ESF would be either decommissioned or preserved for other use (decontamination would not be required because the plans for site characterization at Yucca Mountain do not include the use of high-level radioactive materials).
2. The site may be shown to be suitable for a repository, but not selected for the first repository. In this case, the ESF would not be decommissioned because the site could be considered for a second repository.
3. The site may be shown suitable and be selected for the first repository.

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Because final decisions about techniques for shaft sealing may require data from site characterization, the following decommissioning strategies are only representative of those that might be implemented.

1. If an alternative use for the ESF is identified before decommissioning, a limited "standby decommissioning" would occur after site characterization. The utilities and ventilation system would be left in place, and periodic maintenance would preserve the structural integrity of the facility. Security would be retained to prevent unauthorized access and accidents.
2. A second strategy, designed to preserve the ESF for future use, entails removing the utilities and any salvageable materials from the interior of the facility and welding steel covers over the openings to prevent accidents or unauthorized access. After reclamation and habitat restoration of the surface, the sealed facility would be marked to identify pertinent history and details of the excavation.
3. A third decommissioning strategy includes removing all utilities and salvageable material from the underground workings and closing both shafts by backfilling with the material removed during excavations. Horizontal and vertical boreholes in the shafts would be sealed with an appropriate cement-based grout. After closure of the shafts and restoration of the surface, a small concrete structure containing a marker would be installed to record the pertinent history and details of the excavations.

Chapter 3

ENVIRONMENTAL REQUIREMENTS

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3.0 ENVIRONMENTAL REQUIREMENTS

As stated by the Secretary of Energy in DOE Order 5400.2, 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 substantive and procedural Federal environmental requirements set forth by Federal laws and regulations, Executive Orders, and DOE Orders. In regard to State and local environmental regulations 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 permitting process. The foregoing should not, however, be construed as limiting or restricting the DOE's courses of action should any State or local regulations be inconsistent with fulfilling the DOE's responsibilities under the NWSA, Atomic Energy Act, and other Federal statutes.

As described in Section 8.3 of the SCP, 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

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is necessary. Future 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. No applicable local or county environmental regulatory requirements have thus far been identified. Appendix B contains the analysis that identified the environmental regulations in this chapter, as well as the rationale for determining that other environmental regulations are inapplicable to site characterization. It is emphasized, however, that future consultation with Federal and State agencies may require that Chapter 3 be modified.

The plans for site characterization of Yucca Mountain have not been finalized. For example, at the time of this writing, the type of sewage disposal system to be used at Yucca Mountain had not been decided. Similarly, the locations and number of some drill sites, trenches, and other planned studies shown on the large maps at the end of the document are tentative. This chapter therefore represents a "snap-shot" of potentially applicable environmental statutes and regulations based on the current plans for site characterization described in Chapter 2. As the plans for site characterization become more clearly defined, compliance with additional (or fewer) regulations may be required. Moreover, as provisions of some Acts are implemented during the next several years (such as the 1986 amendments to the Safe Drinking Water Act and parts of the 1984 amendments to the Resource

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Conservation and Recovery Act), additional compliance actions may become necessary.

Compliance with environmental statutes and regulations is viewed by the DOE's Nevada Nuclear Waste Storage Investigations (NNWSI) Project 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 case the Migratory Bird Treaty Act). The compliance process is outlined briefly in the following steps:

STEP 1: Compilation of ERCP.

STEP 2: 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 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

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Officials of Nye County and Bullfrog Counties, Nevada
Nevada Division of Health
Nevada State Historic Preservation Officer (and the Advisory
Council on Historic Preservation)
Nevada State Engineer

STEP 3: Compile information for applicable permits and submit applications to appropriate Federal and State agencies. Conduct and document 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).

STEP 4: With applicable permits in-hand, and required consultations completed, the NNWSI Project will verify 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 NNWSI Project. This program is still being developed by the DOE.

STEP 5: Conduct 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.

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3.1 SOURCES OF INFORMATION

The basis for determining the applicability of environmental statutes and regulations 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 regulations have been developed, the type of activities that they regulate, and the methods by which the regulations are implemented. Finally, the third part requires an analysis of each site characterization activity in terms of whether it falls within the regulatory scope of the various environmental laws and regulations 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, 1981, DOE/EV-0132) was a source of information, particularly the flow charts that outline the steps needed to comply with the various statutes. Because this guidance manual does not include State environmental statutes and regulations (other than those Federal laws whose implementation and enforcement has been delegated to the State), the Nevada Administrative Code and the Nevada Revised Statutes were used to evaluate the relationship of Nevada's environmental laws to site characterization of Yucca Mountain.

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3.2 FEDERAL STATUTES AND EXECUTIVE ORDERS

This section identifies the Federal statutes and Executive Orders 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 its purpose and its applicability to site characterization of Yucca Mountain, the requirements of the permit application, and the process by which the DOE will obtain the permit.

3.2.1 AMERICAN ANTIQUITIES ACT (16 USC 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 federally controlled lands (16 USC Section 433).

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.

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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 Federal government, must have the permission of the secretary of the department of the government having jurisdiction over the land. Failure to obtain such permission can result in fines up to \$500 or imprisonment for a period of not more than 90 days, or both (16 USC 433).

3.2.1.3 Process

Any personnel working on land owned or controlled by DOE, upon any finding historic or prehistoric ruin or monument, or any object of antiquity, will seek approval up to the Secretary of the DOE, 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 American 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 Project will be relocated, or permission will be obtained from the Secretary of DOE to excavate or otherwise affect the objects. Personnel will comply with the procedural terms of the

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Programmatic Agreement if protected objects are found. (See discussion of Programmatic Agreement under Section 3.2.11.)

The steps by which the DOE/NNWSI Project 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 et seq.; 36 CFR Part 296; 43 CFR Part 7)

3.2.2.1 Purpose and applicability

AIRFA is primarily a policy statement intended to reaffirm Native American rights regarding religious freedom, which are guaranteed by the U.S. Constitution. The purpose of the Act is to ensure that Native Americans have access to and protection of physical locations and resources that are sacred and sometimes required for the practice of Native American religious rites and ceremonies.

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

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3.2.2.2 Requirements

Section 2 of AIRFA directs Federal agencies to examine the effects of their policies and actions on the practice of Native American religions, in consultation with traditional Native American religious leaders, to determine if changes in planned projects would be required to protect and preserve Native American religious cultural rights and practices and to report back to Congress within one year of the statute's enactment. It is implicit in Section 1 of AIRFA that continuing consultation will carry out the purposes of the Act.

3.2.2.3 Process

DOE has drafted a five-step procedure for consideration of AIRFA. The process is described by Sharples and Salk (Oak Ridge National Laboratory, Report ORNL-6166, 1985, and in DOE Report DOE/PE-0065 (June 1984).

Under this guidance, 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 (or its contractors) 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 prepares alternate plans in consultation with Native American leaders and evaluates whether the alternatives adequately meet the goals of DOE for the project. If no feasible alternative is available, DOE

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decides whether there is a compelling need for the project. The proposed final decision is submitted to the Office of Intergovernmental Affairs which includes an Indian Affairs unit. The final decision, accompanied by justifications and a report by the Office of Intergovernmental Affairs, must be reviewed and approved by the Secretary of DOE before any action is taken.

NNWSI is developing a Memorandum of Agreement with the Advisory Council on Historic Preservation and the Nevada State Historic Preservation Officer which describes the steps to be taken by the NNWSI Project to ensure compliance with AIRFA and to ensure that historic properties of cultural or religious value are identified and avoided. Under the stipulations proposed in the Programmatic Agreement, as soon as possible before any earthmoving or other activities associated with site characterization that could affect the land are undertaken at Yucca Mountain, and throughout the characterization process, 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 American Indian groups. Consultation will be held to assure that significant properties of traditional cultural or religious value to such groups are identified and avoided to the extent feasible.

If such properties are identified and effects on them cannot be avoided, the DOE will consult further with the American Indian 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.

FIGURE 3-1. AMERICAN INDIAN RELIGIOUS FREEDOM ACT

SAIC - SCIENCE APPLICATIONS INTERNATIONAL CORP.
 WMPO - WASTE MANAGEMENT PROJECT OFFICE
 BIA - BUREAU OF INDIAN AFFAIRS
 SHPO - NEVADA STATE HISTORICAL PRESERVATION OFFICE

* SYMBOLS ARE FOR INTERNAL DOE USE

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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).

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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

This act and its regulations seek to protect archaeological resources located on U.S. public lands and Indian lands, and includes protection from vandalism on sites under DOE control. The prohibitions against vandalism contained in ARPA are addressed in the Programmatic Agreement being developed between the DOE/NNWSI, the Advisory Council on Historic Preservation, and the Nevada State Historic Preservation Officer, 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

The DOE (or its subcontractor in the case of the NNWSI Project) must determine if archaeological resources that may be damaged during site characterization are present on the land owned by the Federal government. Compliance with the provisions of the National Historic Preservation Act (Section 3.2.11) will ensure that an adequate search and/or survey has been

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conducted to identify potential resources subject to the provisions of this statute. In addition, by contacting local authorities, professional archaeologists, and private individuals having archaeologic data, additional assurance can be gained that potential resources are identified. Compliance with the Programmatic Agreement (described in Section 3.2.11) will satisfy these requirements.

If there are archaeological resources that will be disturbed during characterization, and it is necessary to excavate or remove them, approval must be secured. The Secretary of the DOE, or the Secretary of the Interior acting for the Secretary of Energy, is the person with authority to issue approval to allow excavation or removal of the resource, upon a finding that: the personnel proposed to remove the item are qualified to carry out the permitted activity; the activities are undertaken for the purpose of further archaeological knowledge and the public interest; 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 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 ensure that the terms of the Programmatic Agreement (see Section 3.2.11) are complied with, which will ensure that potential

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archaeological resources are identified 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 archaeologic surveys for DOE operations in Nevada. DRI personnel conducting these surveys will have ARPA permits prior to disturbing any archaeological resources.

3.2.4 THE COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT (CERCLA) OF 1980, AS AMENDED BY THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) OF 1986 (42 U.S.C. 9601 et seq; 40 C.F.R. 300, 302, and 355; Executive Order 12580)

3.2.4.1 Purpose and applicability

CERCLA provides for the clean-up and management of hazardous wastes generated in the past which have been abandoned or left uncontrolled. CERCLA also requires notification of appropriate agencies and officials when an unpermitted release of hazardous substances occurs.

Site characterization activities at Yucca Mountain will involve small quantities of hazardous wastes. In the event of an unpermitted release of hazardous materials, certain provisions of the act may apply.

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3.2.4.2 Requirements

There are no specific permits obtainable under the Act. In the event of an unpermitted release of hazardous substances, 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 the Superfund Amendments and Reauthorization Act (SARA) however, created the Emergency Planning and Community Right to Know Act of 1986. This Act established requirements for emergency planning, spill reporting, and inventory reporting for specified classes of hazardous substances. State and local emergency planning committees are to be established and are to prepare plans to respond to releases of "Extremely Hazardous Substances" listed by the EPA. 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 OSHA Hazard Communication Standard are also required to report information concerning their inventories to state and local authorities.

3.2.4.3 Process

All hazardous substances generated during site characterization will be transported and disposed of according to Federal and State regulations (see

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Section 3.3.3). In the unlikely event of an unpermitted 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 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.

The Migrating Bird Treaty Act and the Bald and Golden Eagle Protection Act are discussed in Appendix B.

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3.2.5.2 Requirements

The DOE may request information from the U.S. Fish and Wildlife Service (FWS) on the presence of any listed species in the project area. The DOE also has the option of making this determination itself. If the DOE or FWS determine that no threatened or endangered species exist in the project area, the project may proceed. If such species are present, 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/NNWSI Project will comply with the Endangered Species Act are shown in Figure 3-2.

Informal discussions with the FWS indicate that no threatened or endangered species occur at the Yucca Mountain site. The DOE will send a letter to the FWS for verification of this finding. 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 of Yucca Mountain. 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

FIGURE 3-2. THE ENDANGERED SPECIES ACT

USFWS - U. S. FISH & WILDLIFE SERVICE

WMPD - WASTE MANAGEMENT PROJECT OFFICE

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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 the Yucca Mountain site; 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 FR 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 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.

The Mojave fishhook cactus was recently dropped from Category-2 to Category-3c and thus will probably not be considered for listing. Considering the probable long duration of the NNWSI 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.

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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. Any Federal activity, or Federally supported activity, requires compliance with this Act.

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.

3.2.6.3 Process

The steps by which the DOE/NNWSI Project will comply with the Farmland Protection Policy Act are shown in Figure 3-3.

FIGURE 3-3. PRIME FARMLAND ACT

SCS - SOILS CONSERVATION SERVICE

NV - NEVADA

CO - COUNTY

WMPO - WASTE MANAGEMENT PROJECT OFFICE

* SYMBOLS ARE FOR INTERNAL DOE USE

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The DOE will complete and submit Form AD-1006 to the Soil Conservation Service (SCS) for an evaluation by the SCS of any potential impacts to farmland by Project activities. Consultation with the Nevada Department of Conservation and Natural Resources will also be conducted at the time the SCS is contacted. Compliance may be as simple as a determination from the SCS verifying that prime or unique farmlands would not be affected by the Project. If the Project would affect prime or unique farmlands (which is very unlikely), further compliance actions are required.

On the basis of information presented in the Yucca Mountain Environmental Assessment (U.S. DOE, 1986, DOE/RW-0073), it is assumed that no prime or unique farmlands will be identified by either the SCS, the State of Nevada, or Nye County as being affected by site characterization of Yucca Mountain.

3.2.7 FEDERAL LAND POLICY AND MANAGEMENT ACT (FLPMA) OF 1976 (P.L. 94-579; 43 USC 1701-1784; EO 11989 and EO 11988).

3.2.7.1 Purpose and applicability

FLPMA establishes U.S. policy with regard to government-owned lands administered by the BLM. Among other provisions, FLPMA makes it the policy of the U.S. Government that such lands be managed in a manner that will protect the quality of scientific, scenic, historical, ecological,

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environmental, and archaeological resources; preserve and protect certain public lands in their natural condition; provide food and habitat for fish and domestic animals; and 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 some surface-based activities will occur on such lands, compliance with BLM requirements for access and use of this land is mandatory.

3.2.7.2 Requirements

The environmental regulatory requirements associated with FLPMA (as they apply to activities to be conducted during site characterization of Yucca Mountain) will be derived from Title V of FLPMA (Rights-of-Way). The DOE is currently in negotiation with the BLM and the U.S. Air Force regarding access to and use of Yucca Mountain under Title V, Section 507 of the Act (Rights-of-Way for Federal Agencies). Upon granting access, the BLM will stipulate the specific compliance requirements for the DOE. These terms and conditions will be derived largely from staff at the Las Vegas District Office of the BLM and will be based at least in part on the BLM's management plan for this area (the Esmeralda-Southern Nye Resource Management Plan; available from the Las Vegas, Nevada, District Office of the BLM).

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3.2.7.3 Process

Until the environmental regulatory requirements associated with the Right-of-Way are known, the process by which they will be complied with cannot be described.

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 site characterization activities must meet the requirements of the HMTA.

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3.2.8.2 Requirements

The DOE is required to use handlers/shippers of hazardous materials that comply with the U.S. Department of Transportation (DOT) regulations in 49 CFR 171-178. The regulations govern the packing, handling, labeling, placarding, and routing of hazardous materials, including notification procedures in the event of a spill.

3.2.8.3 Process

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

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.

FIGURE 3-4. HAZARDOUS MATERIAL TRANSPORTATION ACT

NTS - NEVADA TEST SITE

DOT - DEPARTMENT OF TRANSPORTATION

WMPD - WASTE MANAGEMENT PROJECT OFFICE

* SYMBOLS ARE FOR INTERNAL DOE USE

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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 a borrow area will be developed near the site of the exploratory shaft. Even though the borrow area may be on Air Force land, the BLM still retains management of the surface resources on this land and a Free-Use Permit would be required from the BLM. (This assumes that the U.S. Government will be supplying the sand and gravel to its contractors. If the contractors will be supplying these materials from the borrow area on BLM land, they 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

FIGURE 3-5. THE MATERIALS ACT

BLM - BUREAU OF LAND MANAGEMENT
WMPO - WASTE MANAGEMENT PROJECT OFFICE

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Mountain District Offices of the BLM for borrow areas on BLM-administered land. The application must contain 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.

3.2.9.3. Process

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

The DOE completes Form 5510-1 and submits 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)

3.2.10.1 Purpose and applicability

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

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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 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

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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 ensures 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."

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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). DOE has developed NEPA compliance guidelines that are contained in 45 FR 20694, 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, as well as related DOE guidelines and Executive Orders. OCRWM's integrated environmental program includes the development of Environmental Monitoring and Mitigation Plans (EMMPs), Socioeconomic Monitoring and Mitigation Plans (SMMPs), and Environmental Regulatory Compliance Plans (ERCPs). The EMMPs and SMMPs outline DOE's approach to monitoring and mitigating adverse environmental and socioeconomic impacts during site characterization. The ERCPs identify environmental regulatory requirements that are triggered by specific site characterization activities, and outline approaches to environmental regulatory compliance; the ERCPs constitute a major element of DOE's environmental program.

The SMMPs and EMMPs will continue to be revised by the DOE in response to discussions with representatives of the repository host States and Affected Indian Tribes, and because of possible changes in site characterization plans. DOE is preparing Environmental Field Activity Plans

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(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.

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 must respond for 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.

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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 a three-phase process, in consultation with the State Historic Preservation Officer (SHPO), as follows: 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 Advisory Council on Historic Preservation (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.

3.2.11.3 Process

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

Based on 36 CFR 800.13, the DOE is authorized to write its own process for complying with the requirements of the NHPA and the implementing

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

DRI - DESERT RESEARCH INSTITUTE

SHPO - NEVADA STATE HISTORICAL PRESERVATION OFFICE

WMPD - WASTE MANAGEMENT PROJECT OFFICE

* SYMBOLS ARE FOR INTERNAL DOE USE

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regulations. A Programmatic Agreement has been developed between the DOE, the Advisory Council on Historic Preservation, and the Nevada State Historic Preservation Officer for site characterization of the Yucca Mountain site. By complying with the stipulations in the Programmatic Agreement, such as monitoring, research, data recovery, surveys in areas not previously studied, consultation with other agencies, the development of a program of worker education, and resolution of disputes, the DOE will satisfy its responsibilities under Section 106 of the NHPA.

Pre-construction archaeological surveys are routinely done for all DOE projects in Nevada by the Desert Research Institute. Since 1977, the DOE has been conducting systematic cultural resource surveys on the Nevada Test Site and many potentially eligible historic properties 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.

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3.2.12 THE NOISE CONTROL ACT OF 1972, AS AMENDED BY THE QUIET COMMUNITIES ACT OF 1978 (42 U.S.C. 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.

3.2.12.3 Process

There are no specific Federal, state, or local compliance standards for noise control or abatement that are applicable to the Yucca Mountain area.

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DOE will monitor noise generating activities proposed by site characterization and mitigate, to the extent practicable, those activities deemed potentially harmful.

3.2.13 UNDERGROUND INJECTION CONTROL PROGRAM OF THE SAFE DRINKING WATER ACT OF 1974 (P.L. 93-523; 42 USC Sections 300j-10; 40 CFR Part 124, 144, 146)

Authority to implement the Underground Injection Control (UIC) program of the Safe Drinking Water Act (SDWA) has not yet been delegated to the State of Nevada by the U.S. EPA. The U.S. EPA program is therefore discussed here under "Federal Statutes" and Nevada's UIC program is discussed under Section 3.3.5 (Federally-delegated Statutes). Enforcement of drinking-water standards has been delegated to the State of Nevada by the U.S. EPA under provisions of the SDWA, and these are described in Section 3.3.4 under "Federally-delegated statutes."

3.2.13.1 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.

Site characterization plans currently call for the injection of small amounts of tracers through wells into the groundwater to help characterize the hydraulic properties of the aquifer. Preliminary discussions with staff

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of the U.S. EPA in San Francisco CA. indicate that this activity may qualify these wells as Class V under the UIC program. The U.S. EPA suggests that the DOE fill out the questionnaires that are associated with operation of Class V wells and submit them to the U.S. EPA for review of applicability.

3.2.13.2 Requirements

Operators of Class V wells are required to fill out a questionnaire about their injection wells and submit the completed questionnaire to the U.S. EPA. No other action is required by the operator, and no permit is issued by the U.S. EPA. The requirement is simply to report the location of the wells to the U.S. EPA, as well as other information described in Section 3.2.13.3.

3.2.13.3 Process

The steps by which the DOE/NNWSI Project will comply with the Underground Injection Control Program are shown in Figure 3-7.

The DOE determines what wells will be used for injection of tracers, and then completes the questionnaires and sends them to the U.S. EPA in San Francisco, CA. Among other things, the questionnaires request information about the location of the wells, the type of well construction, the nature

FIGURE 3-7. FEDERAL UNDERGROUND INJECTION CONTROL PROGRAM

ADU - AQUIFER

WD - WATER QUALITY

WMPO - WASTE MANAGEMENT PROJECT OFFICE

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and volume of fluids to be injected, the depth of injection, and how often injections will occur.

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

3.2.14.1 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 to take place within a defined 100-year floodplain.

3.2.14.2. Requirements

The DOE determines whether any site characterization activities will occur within a 100-year floodplain. If not, the project proceeds. If

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activities are planned within a floodplain, the DOE must consider alternatives and mitigating measures to the action. If alternatives are not feasible, the DOE must attempt to modify its actions through design changes to minimize harm to the floodplains. If, after considering design changes, activity in the floodplain is still required, the DOE must prepare a public notice explaining why there are no alternatives; this notice is then circulated for public review and comment. On the basis of any substantive comments, the DOE must re-evaluate the practicality of the alternative. If no alternative exists, the DOE's Assistant Secretary for Environment must publish a Statement of Findings in the Federal Register.

3.2.14.3. Process

The steps by which the DOE/NNWSI Project will comply with Executive Order 11988 are shown in Figure 3-8.

The DOE determines first whether the Yucca Mountain site contains floodplains as defined in the Executive Order. The DOE's implementation of EO 11988, through 10 CFR Part 1022, presumably extends to normally-dry washes such as those at Yucca Mountain; thus, the EO is presumed to apply to site characterization of Yucca Mountain. The DOE must then gather all available maps of the area that show flooding potential. If proposed activities fall within the 100-year floodplain, the DOE will evaluate alternatives to the proposed locations in a "Floodplain Assessment." If no alternatives are viable, the DOE must publish a Statement of Findings in the Federal Register

FIGURE 3-8. FLOODPLAIN MANAGEMENT (EO 11988)

USGS - U. S. GEOLOGICAL SURVEY
 WMPD - WASTE MANAGEMENT PROJECT OFFICE
 FED REGIS - FEDERAL REGISTER
 * SYMBOLS ARE FOR INTERNAL DOE USE

ALT - ALTERNATE.
 LOC - LOCATIONS.
 MIT - MITIGATION
 STMT - STATEMENT.

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at least 15 days prior to making a final decision on the proposed action. 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. An assessment of the proposed action and the alternatives considered will be prepared, along with mitigating measures to avoid adverse effects. A 3-page Statement of Finding (maximum) must then be published in the Federal Register and distributed to appropriate agencies and parties. A 15-day public review of the statement of finding is the final step in the compliance process.

The exploratory shafts facility will be outside the 100-year floodplain of Coyote Wash based on published maps of U.S. Geological Survey. Some of the facilities associated with the exploratory shafts, however, such as access roads, utility lines, and the rock-storage area, may be within the 100-year floodplain and would therefore require compliance by the DOE with this EO. The applicability of the EO 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 after consultations with the Bureau of Land Management. It is likely, however, that because no maps exist showing area of flooding along those small washes, compliance with the EO for these remote activities will not be required.

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

3.2.15.1 Purpose and applicability

The intent of Executive Order 11990 is to avoid, to the extent possible, 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.

3.2.15.2 Requirements

The DOE must 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 3.2.14.2 (Floodplains) must be followed.

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3.2.15.3 Process

The steps by which the DOE/NNWSI Project will comply with Executive Order 11990 are shown in Figure 3-9.

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, as well as the known extent of wetlands in the vicinity of Yucca Mountain and the current plans for site characterization, wetlands will not be affected by site characterization activities. The DOE will prepare a letter stating this conclusion for review and concurrence of both the U.S. Fish and Wildlife Service and the Bureau of Land Management. If these agencies do not concur, the general procedure described in Section 3.2.14.3 (Floodplains) will be followed.

FIGURE 3-9. PROTECTION OF WETLANDS (EO 11990)

* SYMBOLS ARE FOR INTERNAL DOE USE

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3.3 STATE ENVIRONMENTAL REGULATORY AUTHORITIES FOR WHICH A FEDERAL ACT MANDATES COMPLIANCE

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 OF 1977 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; NEVADA ADMINISTRATIVE CODE 445.430-445.995)

3.3.1.1 Purpose and applicability

The Clean Air Act establishes Federal policy to preserve the quality of the Nation's air resources and 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

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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 two concrete-batch plants, and land disturbances from field testing and site preparation activities 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 plants, surface grading and leveling, wind erosion, vehicle travel, and from diesel and gasoline combustion engines.

Because Yucca Mountain is in an area where the existing air quality is 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, 1986, DOE/RW-0073) 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. Nevertheless, 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, which is

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the minimum acreage of surface disturbance per year that triggers permit requirements. Furthermore, the concrete-batch plants, if they are not already permitted, will also require Registration Certificates and Operating Permits because these plants 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 445.430 through 445.945).

The Air Quality Officer (AQO) in the Nevada Division of Environmental Protection 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.

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An Operating Permit, issuable only if the operator has a valid Registration Certificate for the source, 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

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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. The application form for a Registration Certificate is available from the Nevada Division of Environmental Protection (NDEP). 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 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.

Registration Certificates for the concrete-batch plants (point sources) will be required if the plants have not already been permitted. If the plants are already permitted, a Change-of-Location form is all that needs to be submitted to the AQO. 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. 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

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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 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.

The application form for an Operating Permit is available from the NDEP. An Operating Permit must be granted if the AQO finds (from some 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

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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 (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/NNWSI Project to comply with the Clean Air Act are shown on Figures 3-10 and 3-11.

The DOE will prepare two application forms and submit 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). A copy of the Yucca Mountain Environmental Assessment (U.S. DOE, 1986) will be included with the

FIGURE 3-10. CLEAN AIR ACT - REGISTRATION CERTIFICATES

NDEP - NEVADA DEPARTMENT OF ENVIRONMENTAL PROTECTION

PSD - PREVENTION OF SIGNIFICANT DETERIORATION

REG - REGISTRATION

PREP - PREPARE

WMPD - WASTE MANAGEMENT PROJECT OFFICE

* SYMBOLS ARE FOR INTERNAL DOE USE

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FIGURE 3-11. CLEAN AIR ACT - OPERATING PERMIT

NDEP - NEVADA DEPARTMENT OF ENVIRONMENTAL PROTECTION

WMPO - WASTE MANAGEMENT PROJECT OFFICE

AQ - AIR QUALITY

STDS - STANDARDS

* SYMBOLS ARE FOR INTERNAL DOE USE

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applications. 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, although possible, is not likely considering that significant air quality impacts associated with site characterization are not expected. Within 75 days after receiving public comments, 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 some 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.

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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 445.140-445.182)

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 water. 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 into waterways [Title IV of the Act--the National Pollution Discharge Elimination System (NPDES); 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. Except for the NPDES program discussed

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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 expression "Waters of the United States" means actual surface waters into which the discharge of pollutants would be regulated by an NPDES permit. Exemptions to this requirement included discharges to storage lagoons so long as the lagoons 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). Under this interpretation a sewage lagoon constructed at Yucca Mountain, or a septic-tank system constructed in unsaturated alluvium, would be exempt from the requirements of the NPDES permit system.

The State of Nevada 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.

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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.

An NPDES permit may or may not be required for disposing of sewage at Yucca Mountain, or from other minor discharges (including pump tests that will discharge relatively small volumes of water at the surface and possible discharges from the mine waste-water pond). The DOE, however, still intends to file an application for an NPDES permit with the State. 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).

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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).

The DOE must submit a completed application form, along with a \$100 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,

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(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, is 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 must 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. Because the discharge being applied for by the DOE is relatively minor, and is in an area where the likelihood of water contamination is remote, a public hearing is not expected.

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

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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 little if any 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.

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3.3.2.3 Process

Figure 3-12 shows the steps to be taken by DOE/NNWSI to comply with the Clean Water Act.

The DOE files an application for an NPDES permit with the WQO 180 days prior to any planned discharges. A copy of the Environmental Assessment of Yucca Mountain (U.S. DOE, 1986, DOE/RW-0073), which describes the surface and underground waters in the vicinity of Yucca Mountain, will 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.

FIGURE 3-12. FEDERAL WATER POLLUTION CONTROL ACT - N.P.D.E.S.
(NATIONAL POLLUTION DISCHARGE ELIMINATION SYSTEM)

NDEP - NEVADA DEPARTMENT OF ENVIRONMENTAL PROTECTION

TRANS - TRANSMITTAL

WMPD - WASTE MANAGEMENT PROJECT OFFICE

* SYMBOLS ARE FOR INTERNAL DOE USE

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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; Nevada Administrative Code 444.8500 through 444.960)

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), nonhazardous wastes (Subtitle D), and underground storage tanks (Subtitle I), and promoting the use of recycled and recovered materials (Subtitle F). 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. As of January 15, 1986 Nevada had a draft plan for implementing and enforcing Subtitle D of RCRA (nonhazardous wastes), but this plan has not yet been approved by the U.S. EPA. In brief, 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 this Subtitle, 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

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management plans. 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 of RCRA-defined hazardous wastes per month. 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 expression "small-quantity generator," although no longer formally used with passage of the 1984 RCRA amendments, refers to waste generators producing from 100 to 1,000 kg per month of hazardous waste. Because the U.S. EPA still uses this terminology, it will be used throughout this section.) Although a small-quantity generator classification will not require the DOE to obtain a RCRA permit, it will require the DOE to conduct its operations according to specific requirements set forth in RCRA, as described in Section 3.3.3.3.

Because 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

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regulatory requirements associated with this category of waste generator 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 subsection to Subtitle C covering mining waste and other special wastes. In brief, 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 the NDEP to determine what actions might be required of the DOE after the chemical characteristics of the waste rock are determined.

Finally, plans for site characterization do not call for the use of underground storage tanks; thus, Subtitle I of RCRA is inapplicable to site characterization. At the present time, the plans call for fuel to be trucked to the site.

3.3.3.2 Requirements

The DOE determines and documents the weight of waste being generated

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during each month of site characterization. If the cumulative weight 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.

If the DOE exceeds the 100 kg hazardous-waste threshold during any month, the DOE must obtain a U.S. EPA ID 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. In the unlikely event that a permit for the treatment, storage, or disposal of hazardous wastes must be obtained, DOE must certify annually that a program is in place to reduce the volume or quantity and toxicity of such waste to the degree determined by DOE to be economically practicable. DOE must further certify annually that the proposed method of treatment, storage, or disposal is that practicable method currently available which minimizes the present and future threat to human health and the environment (Subtitle C). Furthermore, 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).

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3.3.3.3 Process

Figure 3-13 shows the steps to be taken by DOE/NNWSI 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 materials, and to determine the cumulative weight of the various hazardous wastes generated each month. Hazardous wastes are identified in 40 CFR 261 and include more than 400 types. Even though a waste may not be listed in 40 CFR 261, it may still be considered hazardous if it can be classified as 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 the weight of all hazardous wastes generated during each month of site characterization (exempted from the tally are such things as used batteries that are sent off-site for reclamation, used oil that has not been mixed with

FIGURE 3-13. RESOURCE CONSERVATION AND RECOVERY ACT

NDEP - NEVADA DEPARTMENT OF ENVIRONMENTAL PROTECTION

QTY GEN - QUANTITY GENERATOR

WMPD - WASTE MANAGEMENT PROJECT OFFICE

* SYMBOLS ARE FOR INTERNAL DOE USE

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hazardous substances, and residue left in emptied containers). If the weight of waste varies from month to month, the waste-generator category and associated requirements will vary. For example, if in June the hazardous-waste tally is less than 100 kg, the DOE needs only to identify the wastes as hazardous and dispose of them in a licensed facility or other facility for disposal of industrial or municipal wastes. 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 licensed hazardous-waste management facility. If it is established that more than 100 kg of hazardous waste are generated in a month, the DOE must obtain a U.S. EPA Identification Number. This is done by requesting a 2-page application 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). If the DOE exceeds these time and quantity limits it would be classified as a storage facility and a storage permit would be required (obtaining a RCRA storage permit can be a costly and time-consuming process; because it is not likely that a storage permit will be needed, so is not discussed in this document).

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The wastes can be stored in 55-gallon drums or in suitable containers that must be labelled "HAZARDOUS WASTE," along with the date the waste was first collected in the drums/containers. Wastes can also be stored in tanks. The containers or tanks are required to be checked every week for leaks and other problems. The stored wastes can be treated on-site without a special permit if they are treated within the quantity and time limitations described above. There are no plans to conduct such waste treatment, and the wastes will be sent to Mercury, Nevada, and shipped to an RCRA-licensed site in California along with hazardous wastes from the Nevada Test Site.

The DOE must select a waste hauler which must have a U.S. EPA ID 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 and the hauler must then fill out appropriate parts of the form; two copies are sent to the NDEP, the DOE keeps a copy, and the hauler keeps a copy. Upon delivery of the wastes to the licensed disposal facility (in California), the hauler 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).

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3.3.4 SAFE DRINKING WATER ACT OF 1974, as amended (P.L. 93-523; 42 USC 300f-300j-10; 40 CFR 124, 141-147, 149; EO 12088; Nevada Administrative Code 445.244-445.420 and 445.370-445.420)

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 not yet been delegated to the State of Nevada and is still retained by the U.S. EPA. The UIC program is discussed in Section 3.2.13 under "Federal Statutes." The Nevada State UIC program is discussed in Section 3.3.5.

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

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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 amendments to the Safe Drinking Water Act were passed by Congress. Section 205 of the amendments directs the states to establish wellhead protection programs by June 1989, but it is unlikely that this program will affect the NNWSI Project. Section 205(h) provides that Federal agencies having jurisdiction over any containment source are subject to the requirements of the State programs. Future consultations with the State of Nevada will help the NNWSI Project get a better understanding of the implementation of these amendments, and the potential impacts that their implementation could have on the NNWSI 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.

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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 3-14 shows the steps to be taken by DOE/NNWSI 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 in the Nevada State Laboratory. Based on the high quality of water from other wells in the vicinity of Yucca Mountain, chlorination is the only

```

graph TD
    Start(( )) --> NHD_Consult[NHD CONSULTED--AQUIFER DESIG.  
CONSTR SPECS & OTHER REQDTS]
    NHD_Consult --> Junction1(( ))
    Junction1 --> Analysis[ANALYSIS OF  
WATER SUPPLY]
    Junction1 --> Verify[VERIFY CONSTR SPECS  
TO NEVADA CODE]
    Junction1 --> Design[SYSTEM DESIGN & DESCRIP  
OF WATER TREATMENT SYSTEM]
    Junction1 --> Maps[PREPARE WATER  
SYSTEM MAPS]
    Junction1 --> Fee[FEE  
CALCULATIONS]
    Analysis --> Junction2(( ))
    Verify --> Junction2
    Design --> Junction2
    Maps --> Junction2
    Fee --> Junction2
    Junction2 --> Complete[COMPLETE  
APPLICATION]
    Complete --> Junction3{ }
    Junction3 --> Review[HMPD REVIEW OF WATER  
TREATMENT SYS MAT'L]
    Junction3 --> App[APPLICATION TO  
HMPD FOR REVIEW]
    Review --> Junction3
    App --> Junction3
    Junction3 --> Permit[WATER TREATMENT  
PERMIT FILLED W NHD]
    Permit --> Junction4{ }
    Junction4 --> Review2[NHD REVIEW OF WATER  
TREATMENT PERMITTING INFO]
    Junction4 --> Answer[ANSWER HMPD  
QUESTIONS]
    Review2 --> Junction4
    Answer --> Junction4
    Junction4 --> Determine[NHD DETERMINES WATER  
TREATMENT APPLICATION COMPLETE]
    Determine --> Junction5(( ))
    Junction5 --> Compile[COMPILE ADDL  
INFO (IF REQD)]
    Compile --> Junction6(( ))
    Junction6 --> Grant[NHD DECIDES TO GRANT  
WATER TREATMENT PERMIT]
    Grant --> Notice[PUBLIC  
NOTICE]
    Notice --> Junction7{ }
    Junction7 --> File[DOC TO  
FILE]
    Junction7 --> Construct[NHD GRANTS WATER TREATMENT  
PERMIT TO CONSTRUCT]
    Construct --> Answer2[ANSWER QUFSTIONS]
    Answer2 --> Junction6
  
```

The flowchart illustrates the process for obtaining a water treatment permit. It begins with an initial node leading to 'NHD CONSULTED--AQUIFER DESIG. CONSTR SPECS & OTHER REQDTS'. This leads to a junction point where five parallel tasks are performed: 'ANALYSIS OF WATER SUPPLY', 'VERIFY CONSTR SPECS TO NEVADA CODE', 'SYSTEM DESIGN & DESCRIP OF WATER TREATMENT SYSTEM', 'PREPARE WATER SYSTEM MAPS', and 'FEE CALCULATIONS'. These tasks converge at another junction point, which leads to 'COMPLETE APPLICATION'. This step leads to a decision diamond. One path from the diamond is 'HMPD REVIEW OF WATER TREATMENT SYS MAT'L', which loops back to the 'COMPLETE APPLICATION' step. The other path is 'APPLICATION TO HMPD FOR REVIEW', which leads to 'WATER TREATMENT PERMIT FILLED W NHD'. This leads to another decision diamond. One path is 'NHD REVIEW OF WATER TREATMENT PERMITTING INFO', which loops back to the 'WATER TREATMENT PERMIT FILLED W NHD' step. The other path is 'ANSWER HMPD QUESTIONS', which also loops back to the 'WATER TREATMENT PERMIT FILLED W NHD' step. From this second diamond, the process moves to 'NHD DETERMINES WATER TREATMENT APPLICATION COMPLETE', then to a junction point for 'COMPILE ADDL INFO (IF REQD)'. This leads to another junction point for 'NHD DECIDES TO GRANT WATER TREATMENT PERMIT'. This leads to 'PUBLIC NOTICE', which leads to a final decision diamond. One path from this diamond is 'DOC TO FILE', which leads to the end. The other path is 'NHD GRANTS WATER TREATMENT PERMIT TO CONSTRUCT', which leads to 'ANSWER QUFSTIONS'. This step loops back to the 'COMPILE ADDL INFO (IF REQD)' junction point.

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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.

3.3.5 NEVADA UNDERGROUND INJECTION CONTROL PROGRAM (Chapter 445 of the Nevada Administrative Code, Sections 2 through 96; NRS 445.201; 445.211; 445.221; 445.237; 445.257; 445.284; 445.307; 445.344)

Section 1446 of the Safe Drinking Water Act requires any Federal agency engaged in any activity resulting in underground injection that endangers drinking water shall comply with all federal, state, and local requirements respecting provisions of safe drinking water and underground injection.

Nevada administers a UIC program that is separate from the UIC program administered by the U.S. Environmental Protection Agency (EPA; the U.S. EPA program is discussed in Section 3.2.13). Nevada's UIC program, however, is very similar to the Federal UIC program. The U.S. EPA is currently considering delegating the authority to implement and enforce the Federal UIC program in Nevada to the Nevada Division of Environmental Protection. A decision by the U.S. EPA regarding this delegation of authority is expected sometime in mid-1988.

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3.3.5.1 Purpose and applicability

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 Nevada UIC program is therefore required.

3.3.5.2 Requirements

Unless exempted by the Director of the Nevada Department of Conservation and Natural Resources, anyone considering to intentionally inject fluids into ground waters 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).

Nevada's UIC program, as well as the Federal UIC program, regulates five classes of injection wells (Classes I, II, III, IV, and V). Informal

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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.

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3.3.5.3 Process

Figure 3-15 shows the steps to be taken by DOE/NNWSI 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.

Because the tracer tests to be conducted in wells at Yucca Mountain will generally be short-lived, the Director is authorized to issue a general permit for a single facility (presumably the Yucca Mountain site). 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.

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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/RW-0073). 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, 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)

3.4.1.1 Purpose and applicability

The purpose of Nevada Administrative Code 445.179 - 445.182, 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 State.

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DOE will, as a matter of comity address the concerns evidenced by this State law consistent with the DOE's responsibilities under the NHPA, 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 3-16 shows the steps to be taken by DOE/NNWSI to address these regulations.

```

graph LR
    Start(( )) -- MEET WITH LOCAL GOVTS (NYE CO) --> Eng1(( ))
    Eng1 -- NJ ST ENGR CONSULTED ADDL REQTS --> Eng2(( ))
    Eng2 -- PREP SANITARY WASTE SYSTEM DESCRIPTION --> Eng3(( ))
    Eng3 -- PREP --> Eng4{ }
    Eng3 -- PREP PLOT PLAN OF SYSTM --> Eng4
    Eng3 -- PREP DISCHARGE DESCRIPTION --> Eng4
    Eng3 -- PREP GROUNDWATER DESCRIPTION --> Eng4
    Eng3 -- PREP FLOODPLAIN ANALYSIS --> Eng4
    Eng4 -- CHECK FOR --> Eng5{ }
    Eng4 -- APPLICATION FEES --> Eng5
    Eng4 -- PREP COVER LTR (2 COPIES--ST & LOCAL) --> Eng5
    Eng5 -- NDEP WD PERMIT INFO TO WMPD FOR REVIEW --> Eng6{ }
    Eng5 -- ANSWER WMPD QUESTIONS --> Eng6
    Eng6 -- APPLICATION FILED WITH NJ ST ENGR --> Eng7(( ))
    Eng7 -- NJ ST ENGR REVIEW OF PERMITTING INFO --> Eng8(( ))
    Eng7 -- CONSULT WITH NJ ST ENGR TO ANSWER QUESTIONS --> Eng8
    Eng8 -- NDEP DETERMINES APPLICATION COMPLETE --> Eng9(( ))
    Eng8 -- CONSULT WITH NJ ST ENGR TO ANSWER QUESTIONS --> Eng9
    Eng9 -- PUBLIC NOTICE --> Eng10{ }
    Eng9 -- NJ STATE ENGR GRANTS PERMIT TO CONSTRUCT --> Eng10
    Eng10 -- FINAL COMPLIANCE VERIF & DOC TO FILE --> End(( ))
  
```

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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).

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

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 NWPA, the Atomic Energy Act, and other Federal statutes.

Because the NNWSI Project currently plans to use up to 127.4 acre-feet of water during site characterization, the DOE will submit an application form for a Water Appropriation Permit to the Nevada State Engineer within the Department of Conservation and Natural Resources.

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3.4.2.2 Requirements

The contents of the application form for a Water Appropriation Permit are as follows (NRS 533.335):

1. The name and post office address of the applicant.
2. The name of the source from which the appropriation is to be made.
3. The amount of water which it is desired to appropriate, expressed in terms of cubic feet per second, except in an application for a permit to store water, where the amount shall be expressed in acre-feet.
4. The purpose for which the application is to be made.
5. A substantially accurate description of the location of the place at which the water is to be diverted from its source and, if any of such water is to be returned to the source, a description of the location of the place of return.
6. A description of the proposed works.
7. The estimated cost of such works.
8. The estimated time required to construct the works, and the estimated time required to complete the application of the water to beneficial use.
9. The signature of the applicant or his properly authorized agent.

The Nevada State Engineer, under authority of NRS 533.350, 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.

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3.4.2.3 Process

Figure 3-17 shows the steps to be taken by DOE/NNWSI 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 the application and the notice will be published for four weeks. The NSE will approve or reject the application after this review period. Potential delays in processing the application can occur if the application is protested by an outside party or if the NSE needs additional information concerning the appropriation. 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.

FIGURE 3-17. NEVADA'S STATUTES & REGS FOR APPROPRIATION OF PUBLIC WATERS

WMPD - WASTE MANAGEMENT PROJECT OFFICE

SE - STATE ENGINEER

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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, 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 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 are 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

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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 3-18 shows the steps to be taken by DOE/NNWSI to address the Nevada Water Pollution Control Law.

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, 1986, DOE/RW-0073) suggest that the potential for groundwater pollution caused by site characterization is remote considering the great depth to groundwater beneath Yucca Mountain.

FIGURE 3-18. NEVADA WATER POLLUTION CONTROL LAW

NDEP - NEVADA DEPARTMENT OF ENVIRONMENTAL PROTECTION

WMPO - WASTE MANAGEMENT PROJECT OFFICE

G'WATER - GROUNDWATER

NNWSI - NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS

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3.4.4 NEVADA STATE WILDLIFE STATUTES AND REGULATIONS (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 State and local laws for which Federal sovereign immunity has not been waived, consistent with DOE's responsibilities under the NWPA, Atomic Energy Act, and other Federal statutes.

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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, removing, or destroying protected species. The desert tortoise, classified by the State as rare, is the only State-protected animal found on Yucca Mountain.

3.4.4.3 Process

Figure 3-19 shows the steps to be taken by DOE/NNWSI 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.

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

3.4.5.1 Purpose and Applicability

Nevada law provides for broad protection of the indigenous flora of the

FIGURE 3-19. NEVADA STATUTES REGARDING WILDLIFE

NDDW - NEVADA DEPARTMENT OF WILDLIFE

WMPD - WASTE MANAGEMENT PROJECT OFFICE

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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 State or lands without State permission (NRS 527.050). The destruction, mutilation, or possession of any cactus or yucca from State or Federal lands is also prohibited without written permission (NRS 527.500).

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 NHPA, Atomic Energy Act, and other Federal Statutes.

3.4.5.2 Requirements

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.

Plant species whose existence is considered endangered by the State of Nevada are provided protection under NRS 527.260. Eighteen plant species are currently listed as Endangered by the state, but none occur on Yucca Mountain.

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3.4.5.3 Process

Figure 3-20 shows the steps to be taken by DOE/NNWSI 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 3-20. NEVADA STATUTES REGARDING VEGETATION

WMPO - WASTE MANAGEMENT PROJECT OFFICE

* SYMBOLS ARE FOR INTERNAL DOE USE

Chapter 4

STATUTORY COMPLIANCE PLANNING

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4.0 STATUTORY COMPLIANCE PLANNING

4.1 ORGANIZATION AND RESPONSIBILITIES

The DOE has overall responsibility for obtaining permits for the NNWSI Project site characterization activities. Development and approval of this Plan is a DOE Waste Management Project Office (WMPO) responsibility. Interaction with regulatory agencies is coordinated through the DOE Nevada Operations Office, Health Physics and Environmental Division, as requested by WMPO, and may require involvement of other NNWSI Project participants. Permit applications, supporting documents, and filing fees are submitted to the appropriate agencies by DOE.

Figure 4-1 illustrates the organization for preparation and approval of environmental regulatory compliance documents. WMPO manages staff activities, coordinates document review, and approves all documents prior to submittal to regulatory agencies. The Environmental Regulatory Compliance Coordinator, a WMPO staff person, is responsible for managing the activities necessary to obtain permits for site characterization. The Environmental Regulatory Compliance Coordinator has the following duties:

1. Coordinating with NNWSI Project management, engineers and scientific investigators to ensure that field activity planning is reviewed to identify activities that may require compliance actions.

Figure 4-1. Organization Chart for Preparation and Review of Environmental Regulatory Compliance Documents

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2. Coordinating with NNWSI Project management, engineers and scientific investigators to ensure that environmental regulatory compliance requirements are incorporated into field activity planning.
3. Planning, scheduling, and directing NNWSI Project activities to prepare permit applications and other environmental compliance documents.
4. Issuing status reports to NNWSI Project management.
5. Representing the NNWSI Project at regulatory agency meetings and at DOE/HQ Environmental Regulatory Compliance Working Group 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. Comments will be coordinated with the Environmental Regulatory Compliance Coordinator. WMPO Engineering reviews permit applications for correct presentation of engineering information and coordinates with other NNWSI 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. WMPO Quality Assurance (QA) provides QA input and auditing for the implementation

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of this Plan. WMPO QA has overall responsibility for verifying implementation of QA controls and procedures. Technical support staff will be assigned as needed.

All NNWSI Project organizations are expected to participate, as needed, in preparing permit applications for site characterization. Individuals will be requested by WMPO 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 Permit Coordinator and arrangements for assistance will be made. Schedule conflicts will be resolved through communication with the individual concerned, the TPO, the Environmental Regulatory Compliance Coordinator, and WMPO management. Each TPO will designate a Participant Environmental Coordinator (PEC) to assist the Environmental Regulatory Compliance Coordinator in communicating environmental regulatory requirements to the participants and in providing information necessary for permit applications.

Final documents will be prepared by the Technical and Management Support Services (T&MSS) graphics, word processing, and technical-writing teams. Technical review of the material by the Environmental Regulatory Compliance Coordinator will occur before distribution for review and approval.

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4.2 QUALITY ASSURANCE

The QA controls to be used by personnel during the preparation of permit documents are contained in the NNWSI 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 NV0-196-17 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 NNWSI 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

system will be developed to monitor changing requirements and to demonstrate compliance with the necessary requirements.

4.4 PROCEDURES FOR REVISING ENVIRONMENTAL REGULATORY COMPLIANCE PLAN

Modifications to the NNWSI Project Site Characterization Plan, project study plans, and/or regulatory changes may require revisions to the NNWSI Project ERCP. Proposed revisions to the ERCP will be reviewed by the WMPO in accordance with Section 4.1 of the ERCP. Revisions approved by the WMPO that are not organizational or administrative in nature will be submitted to the Environmental Regulatory Compliance Working Group (ERCWG) for further evaluation. [Revisions that are organizational or administrative in nature will not be submitted to the ERCWG]. The ERCWG will evaluate the proposed changes for consistency with overall OCRWM policy. The proposed revisions, along with ERCWG's comments, will then be forwarded to the Headquarter's offices for concurrence. Upon concurrence, the ERCP will be modified.

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4.5 ENVIRONMENTAL REGULATORY COMPLIANCE AUDIT PROGRAM

An environmental regulatory compliance audit program will be developed and implemented by DOE to provide independent 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.

Chapter 5

SCHEDULE

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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 laws, 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 3.5. Figure 5-1 presents an overview schedule for conducting the above environmental regulatory compliance phases.

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Figure 5-1. Environmental Regulatory Compliance Schedule

APPENDIX A

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APPENDIX A

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

(TABLES A1, A2, and A3)

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TABLE A1. Nevada Central grid (State Plane Coordinate System) coordinates of existing drillholes, trenches, and other facilities at or near Yucca Mountain. (source: Holmes & Narver Survey Report No. DDD:TP0:87-003) (page 1 of 8)

Activity	Location	
EXISTING DRILLHOLES OVER 1000 FEET IN DEPTH		
<u>Exploratory Holes/Coreholes</u>		
UE25 a#1	N764900.15	E566349.98
UE25 a#7	N766249.86	E565468.51
UE25 b#1	N765243.37	E566416.39
UE25 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
25a#3	N769321.1	E602938.8
25a#4	N767971.92	E564471.64
25a#5	N766956.36	E564755.11
25a#6	N765899.48	E564500.73
<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
UE25 c#1	N757095.85	E569680.44
UE25 c#2	N756848.8	E569633.8
UE25 c#3	N756909.9	E569554.9
29a#1	N797729.01	E585574.86
29a#2	N797744.95	E585546.92
<u>Volcanic/Hydrologic Multiple Purpose 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	E558325

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TABLE A1. Nevada Central grid (State Plane Coordinate System) coordinates of existing drillholes, trenches, and other facilities at or near Yucca Mountain. (source: Holmes & Narver Survey Report No. DDD:TP0:87-003) (page 2 of 8)

Activity	Location	
<u>Water Table Holes</u>		
USW WT-1	N753940.57	E563739.18
USW WT-2	N760660.54	E561923.56
UE25 WT#3	N745995.09	E573384.41
UE25 WT#4	N768511.75	E568040.15
UE25 WT#5	N761826.0	E574249.7
UE25 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
UE25 WT#12	N739725.9	E567011.0
UE25 WT#13	N756715.0	E578756.7
UE25 WT#14	N761650.6	E575210.1
UE25 WT#15	N766116.6	E579805.7
UE25 WT#16	N774419.66	E570394.88
UE25 WT#17	N748419.6	E566211.9
UE25 WT#18	N771167.1	E564855.0
EXISTING DRILLHOLES LESS THAN 1000 FEET DEEP		
<u>Exploratory Holes/Coreholes</u>		
UE25 a#4	N767971.92	E564471.64
UE25 a#5	N766956.36	E564755.11
UE25 a#6	N765899.48	E564500.73
USW GA-1	N779365.42	E559246.98
<u>Horizontal Prototype Hole</u>		
UE25 h#1	N748353.08	E574461.38
(horizontal hole plunging ~2 degrees west from collar)		
<u>Unsaturated Zone Hydrologic Holes</u>		
UE25 UZ#4	N768715.6	E566139.3
UE25 UZ#5	N768591.0	E566135.2
USW UZ-6s	N759909.3	E558050.4

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TABLE A1. Nevada Central grid (State Plane Coordinate System) coordinates of existing drillholes, trenches, and other facilities at or near Yucca Mountain. (source: Holmes & Narver Survey Report No. DDD:TP0:87-003) (page 3 of 8)

Activity	Location	
<u>Unsaturated Zone Hydrologic Holes (continued)</u>		
USW UZ-7	N760836.1	E562911.3
USW UZ-8	N760762.2	E562293.5
USW UZ-13	N751953.2	E558488.7
<u>Waterwell Holes</u>		
J-13	N749209.3	E579650.5
J-12	N733508.2	E581011.7
J-11	N740968.2	E611746.1
<u>Repository Surface Facilities Site Exploratory Holes</u>		
UE25 RF#1	N762189.7	E570889.9
UE25 RF#2	N758800.0	E570334.8
UE25 RF#3	N765575.1	E571100.0
UE25 RF#3B	N765695.3	E571065.6
UE25 RF#4	N762090.8	E572063.2
UE25 RF#5	N759198.7	E568097.7
UE25 RF#7	N768804.0	E571170.9
UE25 RF#7A	N768767.8	E570268.8
UE25 RF#8	N765630.8	E568789.9
UE25 RF#9	N765945.0	E570643.3
UE25 RF#10	N765307.7	E570229.9
UE25 RF#11	N765621.5	E570434.6
<u>Natural Infiltration Monitoring Holes</u>		
UE25 UZN#1	N769328.9	E565224.3
UE25 UZN#2	N768605.5	E566113.6 ^a
UE25 UZN#3	N768630.4	E566119.4
UE25 UZN#4	N768663.4	E566127.1
UE25 UZN#5	N768689.4	E566133.8
UE25 UZN#6	N768705.6	E566136.6
UE25 UZN#7	N768724.1	E566141.2
UE25 UZN#8	N768743.0	E566146.5
UE25 UZN#9	N768781.5	E566155.9
UE25 UZN#10	N769868.6	E564744.1 ^a
UE25 UZN#12	N768650.9	E566695.2
UE25 UZN#13	N768024.6	E568255.1

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TABLE A1. Nevada Central grid (State Plane Coordinate System) coordinates of existing drillholes, trenches, and other facilities at or near Yucca Mountain. (source: Holmes & Narver Survey Report No. DDD:TP0:87-003) (page 4 of 8)

Activity	Location	
<u>Natural Infiltration Monitoring Holes</u> (continued)		
UE25 UZN#14	N767967.2	E568232.9
UE25 UZN#18	N766472.4	E565246.5
UE25 UZN#19	N763688.9	E564570.6 ^a
UE25 UZN#20	N763759.9	E564579.3
UE25 UZN#21	N763806.1	E564591.0
UE25 UZN#22	N763880.3	E564604.5
UE25 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
UE25 UZN#28	N763091.2	E565319.7 ^a
UE25 UZN#29	N762613.1	E565173.3 ^a
UE25 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
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
UE25 UZN#56	N760393.5	E565480.0
UE25 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

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TABLE A1. Nevada Central grid (State Plane Coordinate System) coordinates of existing drillholes, trenches, and other facilities at or near Yucca Mountain. (source: Holmes & Narver Survey Report No. DDD:TP0:87-003) (page 5 of 8)

Activity	Location	
<u>Natural Infiltration Monitoring Holes</u> (continued)		
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
UE25 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
UE29 UZN#91	N797275.0	E585340.9
UE25 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
USW UZ-N96	N759445.8	E558403.1 ^a
UE25 UZN#97	N763093.8	E565320.6
USW UZ-N98	N767996.2	E562083.5
<u>Misc. Additional Shallow Drillholes</u>		
UE25 UZNC#1	N764670.6	E566158.9
UE25 UZNC#2	N764668.4	E566157.5
UE25 TC#1	N756482.7	E612896.7
UE25 TC#2	N756485.1	E612898.2
UE25 TC#3	N756806.0	E613079.1
UE25 TC#4	N756860.0	E613094.6
UE25 TCI#1	N756778.0	E613450.1
UE25 TCI#2	N756775.8	E613451.7
UE25 TCI#3	N756781.8	E613435.4
UE25 TCI#4	N756783.1	E613437.6

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TABLE A1. Nevada Central grid (State Plane Coordinate System) coordinates of existing drillholes, trenches, and other facilities at or near Yucca Mountain. (source: Holmes & Narver Survey Report No. DDD:TP0:87-003) (page 6 of 8)

Activity	Location	
MISC. ADDITIONAL FACILITIES		
<u>Test Pits and Excavations</u>		
SHAFT MAPPING	N748401	E574452
TEST PIT #1		
SHAFT MAPPING	N748459	E574454
TEST PIT #2		
SHAFT MAPPING	N745753	E573385
TEST PIT #3		
<u>Meteorological Monitoring Stations</u>		
PRECIP. STATION	N771853.9	E558845.8
SANDY		
PRECIP. STATION	N752689.1	E558514.0
CAROLYN		
PRECIP. STATION	(to be included)	
#3		
PRECIP. STATION	(to be included)	
#4		
PRECIP. STATION	(to be included)	
#5		
<u>Trenches</u>		
TRENCH #1	N751300	E559800 ^b
TRENCH #2	N770100	E561900
TRENCH #4A	N762500	E562300
TRENCH #4B	N764200	E562300
TRENCH #6	N755000	E560400
TRENCH #7	N772800	E558400
TRENCH #8	N747500	E554500
TRENCH #9	N757800	E561300
TRENCH #10	N759600	E557600
TRENCH #11	N779300	E562200
TRENCH #12	N778100	E559500
TRENCH #13	N782700	E559600
TRENCH #14	N766000	E569300
TRENCH #15	N752400	E566800
TRENCH #16A	N754000	E572400
TRENCH #16B	N754900	E572200

Location of other trenches to be supplied

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TABLE A1. Nevada Central grid (State Plane Coordinate System) coordinates of existing drillholes, trenches, and other facilities at or near Yucca Mountain. (source: Holmes & Narver Survey Report No. DDD:TP0:87-003) (page 7 of 8)

Activity			Location
<u>Precipitation Monitoring Stations</u>			
Unnamed Tributary to Fortymile Wash	RRG ^c	N865,620	E616,670
Fortymile Wash at Narrows	PRG ^d	N778,010	E583,580
Yucca Wash	PRG	N770,320	E579,750
Exile Hill	RRG	N764,990	E569,340
North Fork Coyote Wash	PRG	N766,120	E563,030
Drillhole Wash	PRG	N753,630	E578,750
Fortymile Wash at J-13	PRG	N749,400	E577,890
Dune Wash	PRG	N743,770	E575,700
Fortymile Wash near US 95	PRG	N699,320	E568,200
Topopah Wash	PRG	N736,070	E602,410
Cane Springs Wash Tributary	PRG	N749,390	E667,300
Skull Mountain Pass on Jackass Flats Highway	PRG	N723,750	E627,060
Rock Valley on Jackass Flats Highway	PRG	N704,400	E651,830
Rock Valley at US 95	PRG	N683,380	E604,810
Amargosa River Tributary near Mercury	PRG	N659,900	E666,890
Stockade Pass	PRG	N878,700	E635,610
<u>Streamflow Monitoring Stations</u>			
Amargosa River near Beatty	CSG ^e	N780,900	E472,880
Tributary to Fortymile Wash	RSG ^f	N865,620	E616,670
Fortymile Wash at Narrows	RSG	N778,010	E583,580
Yucca Wash	CSG	N770,320	E579,750
Drillhole Wash	CSG	N753,630	E578,750
Fortymile Wash at J-13	RSG	N749,400	E577,890
Dune Wash	CSG	N743,770	E575,700
Fortymile Wash near US 95	RSG	N699,320	E568,200
Topopah Wash	CSG	N736,070	E602,410
Cane Spring Wash Tributary	CSG	N749,390	E667,300
Amargosa River Tributary near Mercury	CSG	N659,900	E666,890
Amargosa River Tributary #1 near Johnnie	CSG	N622,800	E664,360
Amargosa River Tributary #2 near Johnnie	CSG	N614,160	E674,320

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TABLE A1. Nevada Central grid (State Plane Coordinate System) coordinates of existing drillholes, trenches, and other facilities at or near Yucca Mountain. (source: Holmes & Narver Survey Report No. DDD:TP0:87-003) (page 8 of 8)

Activity	Location		
<u>Streamflow Monitoring Stations</u> (continued)			
Indian Springs Valley Tributary	CSG	N661,500	E432,950
<u>Other Test Pits and Trenches</u> (to be included)			
<u>Scour Chains</u> (to be included)			

^a = planned ponding study.

^b Trench locations are taken from letter WMP0:MMB (June 1985).

^c RRG = Recording Rain Gage (Tipping bucket).

^d PRG = Plastic Rain Gage.

^e CSG = Crest-stage Stream Gage

^f RSG = Recording Stream Gage

TABLE A2. Nevada Central grid (State Plane Coordinate System) coordinates of proposed drillholes, shafts, artificial infiltration experiments, and other facilities at Yucca Mountain. (sources: Holmes & Narver Survey Report No. DDD:TP0:87-003) (page 1 of 6)

Activity	Location		Comments
<u>Shafts</u>			
USW ES-1	N766255	E563630	
USW ES-2	N766405	E563890	
DEEP DRILLHOLES REQUIRING DRILL PADS			
<u>Unsaturated Zone Hydrologic Holes</u>			
USW UZ-2	N759769	E558180	(use existing drill pad)
USW UZ-3	N759625	E558220	(use existing drill pad)
USW UZ-9	N760000	E566250	
USW UZ-9A	N760000	E566250	(share drill pad w/ UZ-9)
USW UZ-9B	N760000	E566250	(share drill pad w/ UZ-9)
USW UZ-10			(not surveyed; near USW UZ-13)
USW UZ-11	N757400	E555800	
USW UZ-12	N757400	E555800	(share drill pad w/ UZ-11)
USW UZ-14			(not surveyed; near USW UZ-1)
USW VSP-1	(close to UZ-6)		(prototype drilling method; vertical seismic profiling support)
<u>Exploratory Holes</u>			
UE25 ph#1	(close to Trench 14)		(May be more than one hole on the same pad; for planning purposes assume 1 hole)
<u>Geologic Coreholes</u>			
USW G-5	N781930	E563008	
USW G-6	N778722	E548922	
UE25 G#7	N724586	E566090	
<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)

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TABLE A2. Nevada Central grid (State Plane Coordinate System) coordinates of proposed drillholes, shafts, artificial infiltration experiments, and other facilities at Yucca Mountain. (sources: Holmes & Narver Survey Report No. DDD:TP0:87-003) (page 2 of 6)

Activity	Location	Comments
<u>In Situ Stress Study Holes</u>		
USW ISS-1	(to be determined)	(locations to be selected from >20 tentative sites distributed regionally in S. Nevada)
USW ISS-2	(to be determined)	
<u>Fortymile Wash Recharge Study Holes</u>		
UE25 FM#1	(to be determined)	(not surveyed; located in the wash near J-12 and J-13, on the NTS)
UE25 FM#2		
UE25 FM#3		
Shallow infiltration monitoring neutron holes		(plans for up to 10 holes)
<u>Water-Table Holes</u>		
USW WT-8	N762283	E557049
USW WT-9	N769477	E557642
UE25 WT#19	N747978	E589973
UE25 WT#20	N728303	E565143
USW WT-21	N760086	E550328
USW WT-22	N778858	E528373
USW WT-23		(not surveyed; north of UZ-1, in Drill Hole Wash)
USW WT-24		(not surveyed; between G-2 & WT-16)
<u>Southern Tracer Complex Holes, if needed</u>		
		(location not yet determined)
<u>Saturated Zone Hydrologic Holes</u>		
USW H-7		(not surveyed; 3000 feet east of H-6, on Yucca Crest)
<u>Horizontal Borehole</u>		
		(location has yet to be determined, but near the north-west end of the repository block)

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TABLE A2. Nevada Central grid (State Plane Coordinate System) coordinates of proposed drillholes, shafts, artificial infiltration experiments, and other facilities at Yucca Mountain. (sources: Holmes & Narver Survey Report No. DDD:TP0:87-003) (page 3 of 6)

Activity	Location	Comments	
<u>Geostatistical Drilling Program</u>			
Phase I - 12 holes		(Exact location of holes has yet to be determined, but will consist of a grid over the repository block)	
Phase II - 12 holes			
Phase III - 9 or more holes			
SHALLOW DRILLHOLES NOT REQUIRING DRILL PADS			
<u>Natural Infiltration Monitoring Holes</u>			
USW UZ-N11	N760000	E556400 ^a	
USW UZ-N15	N760150	E556600 ^a	
UE25 UZN#16	N765500	E565300 ^a	
USW UZ-N17	N759350	E556250 ^a	
USW UZ-N27	N770450	E562300 ^a	
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 (Approx. 10 holes at each location)</u>			
LPRS-1	N751400	E559300	(designations are tentative)
LPRS-2	N761353	E559048	

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TABLE A2. Nevada Central grid (State Plane Coordinate System) coordinates of proposed drillholes, shafts, artificial infiltration experiments, and other facilities at Yucca Mountain. (sources: Holmes & Narver Survey Report No. DDD:TP0:87-003) (page 4 of 6)

Activity	Location	Comments
<u>Large-plot Rainfall Simulation Tests (approx. 10 holes at each location)</u> (continued)		
LPRS-3	N757200	E559990
LPRS-4	N760434	E561881
LPRS-5	N760860	E562321
LPRS-6	N765500	E565300
LPRS-7	N755550	E560150
LPRS-8	N770450	E562300
LPRS-9	N765500	E557950
LPRS-10	N765750	E557950
LPRS-11	N763091	E565320
LPRS-12	N762048	E565233
<u>Small-plot Rainfall Simulation Tests (Approx. 4 holes at each location)</u>		
SPRS-1	N751400	E559300
SPRS-2	N761026	E558406
SPRS-3	N759446	E558403
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
SPRS-24		(to be determined)
SPRS-25		(to be determined)

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TABLE A2. Nevada Central grid (State Plane Coordinate System) coordinates of proposed drillholes, shafts, artificial infiltration experiments, and other facilities at Yucca Mountain. (sources: Holmes & Narver Survey Report No. DDD:TP0:87-003) (page 5 of 6)

Activity	Location	Comments
<u>Amargosa Desert Recharge Holes</u> (Number not yet determined)		(locations to be determined)
<u>Playa Coring</u> (Number not yet determined)		(location to be determined)

ADDITIONAL PLANNED ACTIVITIES

Trenches

146	N757000	E572000
YW-23	N774000	E573500

Eastside of Bare Mountain

1)	N770500	E509000
2)	N749500	E511700
3)	N741000	E509000

Additional Trenches (to be included)

Pavements (to be included)

Shallow Seismic Refraction Surveys

Crater Flat Study Area	N748000	E530000	(center only)
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Fortymile Wash Study Area	N757500	E580000	(center only)
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Shallow Seismic Reflection Surveys

	West End		East End	
1	N762000	E562000	N752000	E578000
2	N721000	E553000	N738000	E579000
3a	N761000	E562000	N767000	E567000

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TABLE A2. Nevada Central grid (State Plane Coordinate System) coordinates of proposed drillholes, shafts, artificial infiltration experiments, and other facilities at Yucca Mountain. (sources: Holmes & Narver Survey Report No. DDD:TP0:87-003) (page 6 of 6)

Activity	Location	Comments
<u>Shallow Seismic Reflection Surveys (continued)</u>		
3b E571000	N767000	E567000 N777000
4 E552000	N746000	E532000 N757000
5 E572000	N769000	E561000 N776000
6a E578000	N757000	E570000 N676000
6b E582000	N767000	E578000 N779000
7 E562000	N754000	E558000 N753000
8 E565000	N783000	E557000 N786000
9 E566000	N778000	E559000 N782000

^a = ponding study planned.

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TABLE A3. Nevada Central Grid coordinates of proposed precipitation, streamflow, and meteorological monitoring stations. (Source: Section 8.1.3.1.2 of the SCP) (page 1 of 3)

Instrumentation	Location
<u>Planned Site Precipitation and Streamflow Stations</u>	
S1 Wren Wash - Below UE-25 UZN-98, just below lower confluence	N767,900 E562,250
S2 Wren Wash - Above UE-25 UZN-26, just below upper confluence	N768,890 E560,450
S3 Wren Wash - Above USW UZ N-70, near top of drainage	N769,450 E559,830
S4 Drill Hole Wash - Just above USW UZN-46	N772,250 E559,700
S5 Drill Hole Wash - Just below UE 25 UZ N18	N766,350 E565,240
S6 Coyote Wash - North Fork, 100 ft downstream from trench	N766,300 E562,500
S7 Coyote Wash - South Fork, just upstream from USW UZ-N42	N765,650 E562,700
S8 Coyote Wash - South Fork, just below crest of Yucca Mountain	N766,150 E559,675
S9 Pagany Wash - Just below UE25 UZ N12	N768,550 E566,800
S10 Pagany Wash - Just above UE25 UZ N10	N770,050 E564,650
S11 Split Wash - 500 ft above UE25 UZ N19	N763,910 E564,125
S12 H4 Canyon - 1,000 ft above USW H4	N762,275 E563,150
S13 WT-2 Canyon - Just below USW UZ-7	N760,850 E563,000
S14 WT-2 Canyon - North Fork, just below USW UZ N73	N760,950 E559,010
S15 Ghost Dance Wash - North Fork, west of QTec deposit	N758,700 E559,600

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TABLE A3. Nevada Central Grid coordinates of proposed precipitation, streamflow, and meteorological monitoring stations. (Source: Section 8.1.3.1.2 of the SCP) (page 2 of 3)

Instrumentation		Location	
<u>Planned Site Precipitation and Streamflow Stations</u> (continued)			
S16	Ghost Dance Wash - South Central Fork, lower part of	N757,480	E560,375
S17	Abandon Wash - Just below Ghost Dance fault trench	N755,050	E560,500
S18	Drainage South of USW UZ13 - Just below USW UZ N-33	N750,300	E559,350
S19	Solitario Canyon - Near USW UZ N35	N754,525	E556,875
S20	Solitario Canyon - Canyon Mouth near USW WT-7	N755,300	E554,225
S21	Solitario Canyon - Mid-part of canyon just above USW H6 road	N762,750	E556,190
S22	Solitario Canyon - Upper part of canyon-due west of Wren Wash	N768,780	E557,725
S23	Solitario Canyon - Unnamed tributary between UZ N81 and USW UZ N79	N757,675	E566,000
S24	Solitario Canyon - Unnamed tributary just above USW UZ N36	N765,800	E557,775
P1	Yucca Crest-north end (Precip. only)	N772,100	E558,670
P2	Yucca Crest near top of Split Wash (Precip. only)	N763,920	E559,300
P3	Yucca Crest, near USW H3 (Precip. only)	N756,540	E558,450
P4	Yucca Crest, near USW G3 (Precip. only)	N765,780	E558,480

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TABLE A3. Nevada Central Grid coordinates of proposed precipitation, streamflow, and meteorological monitoring stations. (Source: Section 8.1.3.1.2 of the SCP) (page 3 of 3)

Instrumentation		Location	
<u>Meteorological Monitoring Stations</u>			
W2	USW-UZ1	N771,270	E560,220
W3	USW H5	N766,630	E558,900
W4	ES-1	N765,995	E563,260
W5	USW H-6	N763,300	E554,070
W6	USW UZ-6	N759,730	E558,320
W7	UE25 9A, 9B	N760,450	E564,760
W8	USW UZ N58	N754,850	E560,700
W9	USW UZ N33	N750,400	E559,310
W10	USW WT-7	N755,520	E554,400
W1	Southeast of Area 25, subdock, Coexisting station	N761,250	E568,950

APPENDIX B

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APPENDIX B

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

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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 therefore been evaluated in terms of their applicability, or lack of 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.

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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; National Wildlife Refuge System Administration Act.	Inapplicable because water-related habitat does not exist at Yucca Mountain; inapplicable because current plans do not require the use or traverse of U.S. Fish and Wildlife Service lands.
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. (See Hazardous Materials Transportation Act in Chapter 3.)
Coastal Barriers 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 and 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.

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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 by any land-management agencies.
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 Orders 11988 and 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.

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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 Order 12088.	There is no explicit permit or approval associated with this EO, although the intent of this EO--to comply with pollution control standards--will be followed.
Response to Environmental Damage; Executive Order 12286.	Applicable; see discussion under the "Comprehensive Environmental Response, Compensation, and Liability Act" in this Table.
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.

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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. (Federal and State programs)	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 of by the DOE, comprehensive plans for conservation and rehabilitation programs to be implemented on DOE lands (Section 670g of 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 which is included in this table).	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.

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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.
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.
Reservoir Salvage Act.	Inapplicable because characterization of Yucca Mountain will not affect any reservoir areas.
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.

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

Authority	Applicability to Site Characterization
Bald and Golden Eagle Protection Act. (Nevada Revised Statutes 503.610 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 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 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.
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.

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TABLE B2 - STATE ENVIRONMENTAL REGULATIONS

Regulation	Applicability to Site Characterization
Water Appropriation Permit.	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.
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.

MAPS

- MEDIUM DUTY ROADS
LIGHT DUTY ROADS
UNIMPROVED ROADS
TRAILS
RAILROADS
SUBSURFACE EXTENT OF PROPOSED REPOSITORY

SOURCES:

1976 1:24,000 USGS TOPOGRAPHIC MAPS
1976 1:24,000 USGS ORTHOPHO TO MAPS
80 FOOT CONTOURS FROM HSTS 1:250,000
HEATHY, W/C A TOPOGRAPHIC QUADRANGLE
GRID TICES BASED ON SEVADA STATE
COORDINATE SYSTEM, CENTRAL ZONE
MAP COMPILED IN SEPTEMBER 1987

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EXPANDED VIEW OF ESF SHOWN ON MAP 3

MAP 4

LEGEND

- DRILL PADS
- ▲ TRENCHES AND TEST PITS
- DRILL HOLES NOT REQUIRING PADS
- ⊕ MONITORING STATIONS
- SHALLOW SEISMIC REFRACTION SURVEY
- EXPLORATORY SHAFT FACILITY (ESF)
- == MEDIUM DUTY ROADS
- LIGHT DUTY ROADS
- ~ UNIMPROVED ROADS
- ~ UNIMPROVED ROADS (PROPOSED)
- ~ TRAILS
- ~ TRAILS (PROPOSED)
- ~ SHALLOW SEISMIC REFLECTION LINES (PROPOSED)
- ~ RAILROADS
- ~ POWERLINES
- ~ WATER PIPE LINES
- SUBSURFACE EXTENT OF PROPOSED REPOSITORY

SOURCES:

1956 1:24,000 USGS TOPOGRAPHIC MAPS
 1976 1:24,000 USGS ORTHOPHOTO MAPS
 1983 1:50,000 USGS TOPOGRAPHIC MAPS
 7/1985 AND 9/1987 1:24,000 AERIAL PHOTOGRAPHY
 PROPOSED ACTIVITY LOCATIONS FROM DRAFT SITE
 CHARACTERIZATION PLAN - AUGUST 1987
 GRID TICS BASED ON NEVADA STATE
 COORDINATE SYSTEM, CENTRAL ZONE
 MAP COMPILED IN SEPTEMBER 1987

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