UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of:	)	
Private Fuel Storage, L.L.C., (Independent Spent Fuel Storage Installation)	)	Docket No. 72-22

STATE OF UTAH)
) ss.
COUNTY OF SALT LAKE)

AFFIDAVIT OF BRYAN T. ALLEN

I, BRYAN T. ALLEN, being duly sown upon oath, depose and state as follows:

1. I have been engaged as counsel for Petitioners Castle Rock Land & Livestock, L.C., a Utah limited liability company, Skull Valley Co., Ltd., a Utah limited partnership, and Ensign Ranches of Utah, L.C., a Utah limited liability company in the above-caption proceeding and am an attorney licensed to practice in the State of Utah.

2. . have reviewed and am familiar with the application (the "Application") of Private Fuel Storage, L.L.C. ("PFS") for a license to store spent nuclear fuel at the Private Fuel Storage Facility ("PFSF") in the Skull Valley Indian Reservation (the "Goshute Reservation") in Tooele County, Utah.

3. Attached hereto as Exhibit A is a true and correct copy of Section 1.1 of the License Application of PFS which provides in part, that PFS proposes to construct and operate the PFSF at an away-from-reactor site located on the Goshute Reservation. Section 1.1 further

provides that PFS seeks to have the proposed PFSF licensed as an ISFSI pursuant to 10 C.F.R. Part 72.

4. Attached hereto as Exhibit B is a true and correct copy of Section 1.1 of the Emergency Plan (the "EP") submitted as part of the Application, which provides in part, that the proposed PFSF is designed to store spent fuel containing up to 40,000 metric tons of uranium from commercial reactors. Section 1.1 of the EP also provides that the proposed PFSF is designed to store spent fuel for up to 40 years, at which time spent fuel will have been transferred off-site, and the PFSF will be ready for decommissioning. Section 1.1 of the EP further provides that the Application is for a twenty year license; nevertheless, the PFS intends to file an application for license renewal for an additional 20 year term, if necessary.

5. Attached hereto as Exhibit C is a true and correct copy of Earl Lane, The Leftovers of a Nuclear Age, Newsday, August 4, 1997, at A07, which provides in part that in 1992, a 5.6 magnitude earthquake 8 miles from Yucca Mountain affected the Yucca Mountain site and caused one million dollars worth of damages at the DOE field office.

6. Attached hereto as Exhibit D is a true and correct copy of Earl Lane, The Leftovers of a Nuclear Age by Earl Lane, published in Newsday on August 3, 1997, at A04, which provides in part that researchers recently found unexpected traces of radioactive chlorine-36 produced during the atmospheric bomb tests deep inside of Yucca Mountain, suggesting that there are fast pathways for carrying water down to the repository level.

7. Attached hereto as Exhibit E is a true and correct copy of Keith Rogers, Plutonium Found In Water, Las Vegas Review-Journal, September 11, 1997, at 1A, which provides in part that researchers at the Nevada Test Site believe that plutonium from test

explosions in the 1950's migrated into nearby ground water attached to very small mineral particles.

8. Attached hereto as Exhibit F is an abstract to an work in progress by Annie B. Kersting and Joseph L. Thompson, entitled Near Field Migration of Radionuclide in the Subsurface at the Nevada Test Site, which provides:

> Our ability to characterize and mitigate contamination of radionuclides in the subsurface is limited by our understanding of the mechanisms and major pathways for transport. There is strong evidence that particles and colloids (< 1 um) are ubiquitous in groundwater and that they have the potential to enhance the transport of contaminants that strongly sorb to the solid phase. In order to investigate the migration of radionuclides via colloids we carried out a series of filtration experiments using groundwater pumped from wells downgradient from an underground nuclear test event. We analyzed unfiltered groundwater, colloidal material caught on a series of filter sizes, and the ultrafiltrate for gamma-emitting radionuclides and tritium. Tritium, ^{60}Co, ^{137}Cs, $^{152,154,155}Eu$ and Pu isotopes were detected in the unfiltered groundwater samples. Most of the activity was caught on the filters; the ultrafiltrate had only a few percent of the radionuclides other than tritium. The colloidal material consists of zeolites (mordenite), clays (illite), and cristobalite (SiO_2). These minerals are consistent with the lithology of the host aquifer (volcanic tuff). We conclude that radionuclides can and do bind to colloids that then may be transported significant distances in the saturated zone.

9. Attached hereto as Exhibit G is a true and correct copy of Section 205 of The Nuclear Waste Policy Act of 1997, 105th Cong., 1st Sess. Senate Bill 104, Version 4, as passed the United States Senate on April 15, 1997.

10. Attached hereto as Exhibit H is a true an correct copy of Kenneth J. Garcia et al., Fighting for Lethal Leftovers, San Francisco Chronicle, April 13, 1995, at A1.

11. Attached hereto as Exhibit I is a true and correct copy of DOE/RW-1457, Department of Energy Annual Capacity Report (OCRWM: March 1995), which in part describes the order in which spent nuclear fuel will be accepted at a proposed permanent repository for the disposal of spent nuclear fuel for the first ten years of operation In addition, the report

provides for spent nuclear fuel to be received at a rate of no more than 900 metric tons of uranium per year.

12. Attached hereto as Exhibit J is a true and correct copy of DOE, Summary of Public Scoping Comments Related to the Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High -Level Radioactive Waste at Yucca Mountain, Nye County, Nevada) (May 1997), which provides 'n part that 7000 MTU, of the total 70,000 MTU, of spent nuclear fuel to be stored at a proposed permanent repository for the disposal of spent nuclear fuel will be government-generated spent nuclear fuel from the Navy Nuclear Propulsion Program and similar sources.

Dated this 21st day of January, 1998.

Bryan T. Allen

SUBSCRIBED AND SWORN TO before me this 21st day of January, 1998

NOTARY PUBLIC
Residing at Salt Lake City

MY COMMISSION EXPIRES:

Sept 14, 2000

Notary Public
KATHLEEN McPOLIN
185 South State Street, Suite 1300
Salt Lake City, Utah 84111
My Commission Expires
September 14, 2000
State of Utah

CHAPTER 1

GENERAL AND FINANCIAL INFORMATION

1.1 APPLICATION FOR LICENSE

Private Fuel Storage L.L.C. (PFSLLC) proposes to construct and operate an Independent Spent Fuel Storage Installation (ISFSI) at an away from reactor site located on the Skull Valley Indian Reservation in Tooele County, Utah. The Private Fuel Storage Facility (PFSF) site is located approximately 27 miles west-southwest of Tooele City in the center of Skull Valley, 1.5 miles west of Skull Valley Road. The site location is shown in Figure 1-1.

The function of the PFSF will be to store nuclear fuel that has been discharged from U.S. commercial nuclear generating plants. Spent fuel will be transported to Utah by rail. One of two alternatives will be selected for transport between the railroad main line and the PFSF site. The shipping cask will either be off-loaded at an intermodal transfer point at the railroad main line and loaded onto a heavy haul tractor/trailer for transporting to the PFSF, or the shipping cask will be transported via a new railroad spur connecting the PFSF directly to the railroad main line.

Multi-purpose canisters will be utilized for both the shipping casks and storage casks. No handling of bare fuel will occur at the PFSF since operations will be limited to handling of sealed canisters. The project will operate under a "start clean, stay clean" (contamination free) philosophy which will serve to minimize the possibility of transporting any externally contaminated canisters to the PFSF. The canisters will be stored at the PFSF in a vertical configuration inside concrete storage casks, which will be stored on concrete pads in a protected area of the site.

This license application for the proposed PFSF has been prepared in accordance with 10 CFR Part 72 and the guidance provided in NRC Regulatory Guide 3.50, "Standard Format and Content for a License Application to Store Spent Fuel and Radioactive Waste", Rev. 1, September 1, 1989. The License Application consists of the following parts:

(a) The License Application including the Proposed Technical Specifications and Preliminary Decommissioning Plan, as required by 10 CFR 72.26 and 10 CFR 72.30, respectively, which are set out herein.

(b) The technical information outlined in a Safety Analysis Report as required by 10 CFR 72.24 which is enclosed in a separate document entitled "Private Fuel Storage Facility Safety Analysis Report" forwarded herewith and made a part hereof.

(c) The emergency planning information required by 10 CFR 72.32 which is contained in a separate document entitled "Private Fuel Storage Facility Emergency Plan" forwarded herewith and made a part hereof.

(d) Environmental information required by 10 CFR 72.34 and 10 CFR 51, Subpart A, which is contained in a separate document entitled "Private Fuel Storage Facility Environmental Report" forwarded herewith and made a part hereof.

(e) Physical safeguards information required by 10 CFR 72, Subpart H which is contained in a separate document entitled "Private Fuel Storage Facility Security Plan". The Security Plan is forwarded under separate cover in accordance with 10 CFR 72, Subpart H and is made a part hereof.

Operations at the originating reactors in preparation or support of spent fuel shipments to the PFSF are performed under the individual reactor's license. Such activities include loading spent fuel into the canisters, seal welding the canisters, and transferring the canisters into shipping casks. Any changes to the reactor licensee's facilities or procedures in order to accommodate these activities will be the responsibility of the individual licensee, and are not a part of this License Application.

Transportation of the spent fuel shipping casks from the originating reactor to the PFSF will occur in accordance with 10 CFR 71 and the originating reactor's license, and is not a part of this License Application.

1.2 NAME OF THE APPLICANT

Private Fuel Storage L.L.C.

1.3 ADDRESS OF APPLICANT

Private Fuel Storage L.L.C.
PO Box C4010
La Crosse, WI 54602-4010

1.4 DESCRIPTION OF BUSINESS OF APPLICANT

PFSLLC is a limited liability company owned by eight U.S. utilities which serve more than 17 million customers in 21 states. Its headquarters are in La Crosse, Wisconsin.

In 1996, the member utilities provided electrical energy to over 17 million customers in the states of Wisconsin, Minnesota, New York, Iowa, Michigan, Illinois, Pennsylvania,

New Jersey, West Virginia, Ohio, Indiana, Virginia, Kentucky, Tennessee, North Dakota, South Dakota, Alabama, Mississippi, Georgia, Florida, and California. The operating revenue for the member utilities in 1996 totaled $37 billion.

1.5 LEGAL STATUS AND ORGANIZATION

PFSLLC is a limited liability company organized and existing under the laws of the state of Delaware with its principle office located in La Crosse, Wisconsin, at the address stated above. It is registered and authorized to transact business in the state of Utah.

PFSLLC is not owned, controlled, or dominated by any alien, a foreign corporation, or foreign government. The names of PFSLLC directors and principal officer, all of whom are citizens of the United States, are provided at the end of this chapter.

1.6 FINANCIAL QUALIFICATIONS

A financing plan has been developed which ensures that the PFSLLC has reasonable assurance of obtaining the necessary funds to construct, operate and decommission the PFSF. Several mechanisms will be used, including equity contributions from PFSLLC members pursuant to Subscription Agreements, pre-shipment customer payments pursuant to Service Agreements (through which the customers of the PFSLLC commit to store their spent fuel at the PFSF and the PFSLLC agrees to provide the customers with storage services), and annual storage fee payments pursuant to Service Agreements. The PFSLLC is also retaining the option of obtaining portions of the construction funds through the sale of debt securities secured by the Service Agreements.

The PFSF project has been developed on a phased basis. Steps I and II, which involved preliminary investigations, predated the formation of the PFSLLC. Step III began with the formation of the PFSLLC and concluded with the filing of the License Application. This step was funded by direct payments to the PFSLLC from member utilities pursuant to Subscription Agreements. Step IV includes the NRC licensing proceeding as well as detailed design and preparation of bid specifications. The budget for Step IV is approximately $10 million, including contingencies, to be funded by direct payments to the PFSLLC from the member utilities pursuant to Subscription Agreements. These Step IV payments will be made on a quarterly basis. Given the relatively small size of this payment for any participating utility, there is the reasonable assurance that the PFSLLC will obtain Step IV funding.

Step V represents the construction of the PFSF. The budget for this phase is $100 million and includes site preparation; construction of the access road, administration building, visitors center, security and health physics building, operations and maintenance building, canister transfer building and storage pads; procurement of canister transfer and transport equipment; and transportation corridor construction. The Step V budget also includes necessary personnel costs, licensing fees, and host benefits, as well as a contingency amount.

Step V will be funded through several mechanisms. An additional $6 million in equity contributions is planned from PFSLLC members pursuant to Subscription Agreements. The bulk of the Step V costs is expected to be funded through Service Agreements with PFSF customers (including both PFSLLC members and non-members). Payments under each Service Agreement will be spread out over the period of time from construction through spent fuel delivery. No construction will proceed unless Service Agreements committing for a significant quantity of spent fuel storage have been signed. The nominal target is 15,000 MTU of storage commitments. Raising the non-

equity portion of Step V costs through Service Agreements will allow the PFSLLC to avoid financing costs for construction. The PFSLLC, however, retains the option to finance the non-equity portion of Step V costs through debt financing secured by Service Agreements. As with direct financing from customers, no construction will take place without the commitment through Service Agreements for a significant quantity of spent fuel storage. Unless PFSLLC members and non-members have committed to a significant quantity of storage, construction of the PFSF will not begin. Thus, there will be reasonable assurance that the PFSLLC will obtain Step V funding.

Step VI, the operational phase of the PFSF, will also be funded through the Service Agreements. The significant costs of this phase will include procurement and/or fabrication of canisters ($432 million) and storage casks ($134 million). These components will be obtained on an as-needed basis, to coincide with the schedule for moving spent fuel to the PFSF. All capital costs associated with the storage of any spent fuel will be paid by the customer pursuant to the Service Agreement prior to the acceptance by the PFSLLC of that spent fuel. Since the PFSF will not accept spent fuel for storage without prior payment through Service Agreements of the necessary capital costs for transportation and storage, there is reasonable assurance that the PFSLLC will obtain the necessary Step VI costs.

The on-going operations and maintenance cost for spent fuel in storage at the PFSF will be paid by the customer on an annual basis as required by the Service Agreements. The annual operations and maintenance cost is estimated to be $49 million for a 20 year facility operating life and $31 million for a 40 year life. The Service Agreements will provide assurance for the continued payment of these costs by requiring the customers to provide annual financial information, meet creditworthiness requirements, and , if necessary, provide additional financial assurances (such as an

advance payment, irrevocable letter of credit, third-party guarantee, or a payment and performance bond).

1.7 DECOMMISSIONING FUNDING ASSURANCE

The PFSF will be operated under a "start clean, stay clean" philosophy, with contractual obligations in the Service Agreement with each customer and PFSF administrative procedures to assure that no radioactive contamination is introduced into the facility. Thus the intention is to maintain the PFSF free of radiological contamination at all times. During the operational phase of the facility, all radioactive contamination will be removed immediately upon its discovery. The cost estimate for decommissioning nonetheless conservatively assumes that certain areas and components will require decontamination.

The method of funding decommissioning activities consists of two components: storage cask decommissioning and decommissioning for the remainder of the facility. The costs for decommissioning each storage cask is estimated at $17,000. This amount will be prepaid into an externalized escrow account under the Service Agreement with each customer, prior to shipment of each spent fuel canister to the PFSF. The full amount of potential decommissioning costs will thus be collected in a segregated account prior to the receipt of each spent fuel canister at the PFSF. This method of funding provides for prepayment of the storage cask decommissioning costs prior to any potential exposure of the storage cask to radiation or radioactive material, and therefore prior to the need for any decommissioning. As storage cask decommissioning is completed, the amount of funds in the escrow account will be adjusted periodically to reflect the remaining decommissioning efforts. This method of funding complies with the requirements of 10 CFR 72.30(c)(1).

The costs of decommissioning the remainder of the facility and site is estimated to be $1,631,000, which will be funded through a letter of credit coupled with an external sinking fund. Customers will be required under the Service Agreements to pay the costs to decontaminate any portion of the facility for which they may be responsible for contaminating. As the actual costs of decontamination and decommissioning are paid into the external sinking fund, the letter of credit will be reduced by an equivalent amount. This funding method complies with the requirements of 10 CFR 72.30(c)(3).

The per-canister fee and the amounts of the escrow account, external sinking fund and letter of credit will be reviewed and adjusted annually to account for inflation and any changes in the scope or cost of decommissioning. The escrow account, letter of credit and external sinking fund will be established in conformance with the guidance of NRC Regulatory Guide 3.66.

1.8 SITE LOCATION AND COMPLETION DATES

The proposed PFSF is located on the Skull Valley Indian Reservation which is within Tooele County, Utah, 27 miles west-southwest of Tooele City. The site is located 1.5 miles west of the Skull Valley Road. It is anticipated that the PFSF will be issued a specific license to receive, transfer and possess spent fuel in accordance with the requirements of 10 CFR 72 prior to January 1, 2000. Construction of the PFSF is scheduled to start on January 1, 2000, with completion by December 31, 2001. The construction and preoperational testing will be completed in time to allow operation of the facility in 2002.

1.9 RESTRICTED DATA

This application does not contain any Restricted Data or other defense information, and

CHAPTER 1

FACILITY DESCRIPTION

1.1 FACILITY PURPOSE

The purpose of the Private Fuel Storage Facility (PFSF), is to provide for safe and cost-effective storage of spent nuclear fuel from numerous nuclear reactors in the United States at a single, centralized location.

A consortium of utilities, through the Private Fuel Storage L.L.C. (PFSLLC), have joined in a cooperative agreement with the Skull Valley Band of Goshute Indians (Band) to undertake the development, licensing, construction, and operation of the PFSF. The PFSF will be built on the Skull Valley Indian Reservation and will provide timely, centralized, cost-effective spent fuel storage capacity to meet the needs of the utilities and provide long-term, stable financial income, employment, and training opportunities for Band members. The PFSF will adopt a "Start Clean / Stay Clean" philosophy in order to preserve the site and surrounding environment and to permit utilization of the land and all buildings constructed in this project for other traditional industrial uses after the facility is decommissioned.

The PFSF is designed to store spent fuel from commercial nuclear reactors in sealed metal canisters, containing up to 40,000 Metric Tons of Uranium[1] (MTU), which will require approximately 4,000 storage casks. The PFSF will utilize a dry cask storage technology, which is currently in use at several operating nuclear reactors in the United States and abroad. Dry cask storage safely stores spent nuclear fuel inside sealed

[1] Metric Tons of Uranium (initial uranium). This includes the small amount of mixed oxide fuels that are anticipated to require storage.

canisters rather than in a spent fuel pool. The canister-based system produces negligible radioactive waste and therefore is compatible with the PFSF "Start Clean / Stay Clean" philosophy. This technology is also compatible with the long-term plans of the DOE interim storage facility and permanent repository. The PFSF is designed to store spent fuel for up to 40 years, at which time all of the spent fuel will have been transferred off-site and the facility will be ready for decommissioning. The initial request for a license is for a term of 20 years. Prior to the end of the initial license term, an application for license renewal will be submitted for an additional 20 year term, if necessary.

The PFSF is required to be licensed by the NRC in accordance with 10 CFR 72 (Reference 1). As part of the license application, this Emergency Plan has been prepared to comply with 10 CFR 72.24(k) and 72.32(a).

1.2 FACILITY LOCATION

The Skull Valley Indian Reservation is located in Tooele County, in northwestern Utah, approximately about 27 miles west-southwest of Tooele City[2]. The location of the PFSF and a map of the general area surrounding the PFSF are shown in Figure 1-1. Figure 1-2 is a U.S. Geological Survey map showing the Skull Valley Indian Reservation and surrounding areas.

The PFSF is located in the northwest corner of the Skull Valley Indian Reservation, Tooele County, Township 5 South, Range 8 West, all of Section 6, and portions of adjacent Sections 5, 7, and 8. Interstate Highway 80 and the Union Pacific Railroad mainline are approximately 24 miles north of the PFSF site. The Skull Valley Road runs from Interstate 80 past the reservation.

[2] Tooele City is used to distinguish the City of Tooele from Tooele County.

1.3 AREA NEAR THE SITE

The PFSF site is situated in the northwest corner of the Skull Valley Indian Reservation, as shown in Figures 1-1 and 1-2. The PFSF is accessed by a new road from the Skull Valley Road as shown on Figure 1-3, the PFSF Site Plan. The reservation consists of approximately 18,000 acres, of which the PFSF site area is approximately 820 acres. The Skull Valley Band of Goshute Indian village is approximately 3.5 miles east-southeast of the PFSF site. This village consists of several community buildings and has about 30 residents.

The Skull Valley generally runs north and south, bounded by the Cedar Mountains to the west and by the Stansbury Mountains to the east. The land in the Skull Valley is extremely arid, characterized by some grasses, cactus, shrubs and rock outcroppings, with very little agricultural usage. There is some cattle grazing in Skull Valley.

The area surrounding the PFSF site is very sparsely populated. Terra, a small residential community with a population of 120 (Reference 2), is located 10 miles east-southeast of the PFSF. The nearest town is Dugway, approximately 12 miles south of the PFSF, with a population of approximately 1,700 (Reference 2). There are no towns between the PFSF and Interstate 80, 24 miles north of the PFSF. The largest population center in the area is Tooele City, the county seat of Tooele County, with a population of approximately 15,200 (Reference 2). This city is approximately 27 miles east-northeast of the PFSF, on the east side of the Stansbury Mountains. Residents of Tooele County work for a variety of employers, including military installations (Deseret Chemical Depot, Dugway Proving Ground and Tooele Army Depot), agricultural, mining and various public and private sector enterprises.

All Tooele County law enforcement, fire and emergency medical services are dispatched from the Tooele County Sheriff's Dispatch Center, located in the Tooele County Courthouse in Tooele City, as described in the Tooele County Emergency Operations Plan (Reference 3). Because of the intervening Stansbury Mountains, it is a drive of approximately 55 miles from Tooele City to the PFSF, with the north route completely around the mountain range, and the south route through the mountains, by means of Johnson Pass.

The Tooele Valley Medical Center, which has about 38 beds and is equipped to provide decontamination and ambulance services, is located in Tooele City. An ambulance procured by the PFSF will be stationed at the PFSF to expedite transporting any seriously injured personnel to Tooele Valley Medical Center, as necessary.

In order to enhance the response to fires, two fire trucks procured by the PFSF will be available for rapid response to fires at the PFSF. One fire truck will be stationed on the PFSF site, and the other will be stationed at the Goshute Village, available for use at the PFSF in the event of a fire. Members of the PFSF fire brigade will be trained in the operation of the fire trucks and in advanced first aid.

1.4 DESCRIPTION OF THE PFSF

The PFSF is designed to store spent fuel from U.S. commercial nuclear reactors, containing up to 40,000 MTU in sealed metal canisters (approximately 4,000 storage casks). The canister-based spent fuel storage technology selected for use at the PFSF utilizes sealed metal canisters to store multiple spent fuel assemblies. Each canister is placed inside of a concrete cask. The dry cask storage system design is passive and relies on natural convection for cooling. This system is an integral part of the facility "Start Clean / Stay Clean" philosophy, in that it eliminates the need to handle individual

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HEADLINE: THE LEFTOVERS OF THE NUCLEAR AGE / WANTED: SAFE SPOT FOR NUCLEAR WASTE / $3B LATER, NEV. SITE IS STILL IN QUESTION

BYLINE: By Earl Lane. WASHINGTON BUREAU

DATELINE: Yucca Mountain, Nevada

BODY:

Yucca Mountain, Nevada - This barren desert ridge about 100 miles northwest of Las Vegas is surrounded by some of the most forbidding territory in the world.

To the southwest is fabled Death Valley. To the east, the desert floor is pockmarked by manmade craters and laced with radioactive debris created during 825 underground and 100 atmospheric nuclear test explosions.

Yucca Mountain would seem a good candidate for the last resting place for some of the nation's most dangerous nuclear waste. For some, there is an appealing symmetry to burying the spent fuel from the nation's commercial nuclear program in the same remote territory that helped give birth to the Atomic Age.

But despite the expenditure of nearly $3 billion and two decades of investigation, federal officials still cannot say for sure whether it would be safe to put the spent reactor fuel - as well as some radioactive waste from military operations - in a hole some 1,000 feet below the crest of Yucca Mountain.

There is a hum of activity at the site and an intimation of progress. Huge ventilation fans whine at the north portal to the five-mile, U-shaped tunnel that has been dug through the heart of the mountain. Work crews and researchers shuttle in and out of the facility on small rail cars, heading for cave-like alcoves where experimental equipment has been arrayed to study the underground environment in detail.

Outside, dozens of boreholes have been sunk into the mountain and its nearby landscape. A U.S. Geological Survey team lowers sensors into a deep shaft from the crest of the 4,960-foot mountain to determine its "pneumatic" behavior - or how the mountain breathes gases in and out of its fissures according to changes

in atmospheric pressure.

Probably no other patch of land on Earth has received more scientific attention during the past decade. The "site characterization" process has involved hundreds of scientists - geologists, hydrologists, seismologists, vulcanologists. Lake Barrett, acting director of the Department of Energy's office for civilian radioactive waste, estimates the scientific analyses of **Yucca Mountain** now are approaching 1 million pages.

And yet fundamental questions, particularly about the amount of **water** infiltration and its flow rates through the mountain, remain unanswered even as federal officials promise to deliver a viability decision on the repository site by late next year. A final recommendation on the site's suitability would come three years later.

Project officials cite the recently completed tunnel as a milestone toward resolving Yucca Mountain's future. Some critics see it as but a metaphor for the money pit of unfulfilled dreams in a nuclear waste disposal program that has been marked by cost overruns, schedule delays, changing criteria, management problems, scientific controversy and political opposition.

"The nuclear establishment is harvesting the fruits of years of incompetence and mendacity," said Dean Abrahamson, a public-policy specialist at the University of Minnesota who also spent 20 years in the nuclear industry.

When commercial reactors were being built in the 1960s, he said, federal officials "treated waste as if it were a non-problem." The attitude, Abrahamson said, was "when we get enough of it, we'll dig a hole someplace and bury it."

Now, in the twilight of the 20th Century, that has proved to be much easier said than done. Daniel Dreyfus, Barrett's predecessor at the Energy Department, said the Yucca Mountain project was unfocused when he took over in late 1993. "The scientific approach to the thing was to collect a lot of data and not to design a facility," Dreyfus said. There was little sense of closure and "in trying to get a composite plan together, there were great big pieces of it nobody got around to." He cited the lack of studies on how close the fuel canisters should be spaced in the tunnels and what heat output would be acceptable.

Barrett is confident there will be enough data by 2001 to decide whether to proceed with a formal application to the Nuclear Regulatory Commission to build the repository. He declines to lay odds, although Sen. Frank Murkowski (R-Alaska), chairman of the Senate Committee on Energy and Natural Resources, says department officials tell him privately that they think there is an 80 percent chance the mountain will prove suitable as a burial site.

If it is not, analysts say, there are no alternatives on the horizon. And given the history of the Yucca Mountain project, few are willing to predict when or if it will be completed. The proposed opening of the repository already has been set back twice - first from 1998 (the deadline set by law) to 2003; and then to 2010. Energy Department officials have talked about 2015 as a more realistic target.

Such uncertainty has helped drive the nuclear industry's campaign on Capitol

Hill for an interim storage site - essentially a parking lot for casks filled with spent fuel - on several dozen acres of desert adjacent to Yucca Mountain. More than 30,000 tons of spent fuel has accumulated at commercial power reactors nationwide, and industry officials say they are running out of space to keep it. But the Clinton administration opposes any effort to mandate such a storage facility until it is clear the mountain will be the ultimate burial site for the waste.

Determination of that suitability has been a fitful process with changing financial resources and technical criteria. In 1981, according to one account, federal officials had estimated that repository site studies could be done for $60 million to $80 million. By 1987, the estimate was $2 billion each for three sites - and Congress stepped in to declare Yucca Mountain the sole candidate.

By 1992, the Energy Department was projecting it would cost $6.3 billion to study Yucca Mountain and prepare a license application. Congress balked, cutting annual appropriations and forcing a reorganization of the project and a loss of 1,075 contractor jobs.

The result has been a leaner effort, Energy Department officials said, which is aimed at coming to closure on some key scientific issues. They include:

- Earthquakes: The Yucca Mountain site is on or near 33 active faults, including one - the Ghost Dance fault - that intersects the repository level deep underground. The Nevada Agency for Nuclear Projects - a state office that monitors the Yucca Mountain project - reviewed earthquake data for southern Nevada and found that since 1976 there have been 621 seismic events of greater than 2.5 magnitude within 50 miles of Yucca Mountain. Most notable was a 5.6-magnitude earthquake near Little Skull Mountain - eight miles southeast of Yucca - on June 29, 1992. That quake caused nearly $1 million worth of damage to a Department of Energy field office at Yucca Mountain.

Energy Department officials say - and scientists generally agree - that earthquakes pose less hazard to underground structures than they do to surface facilities because of the way shock waves travel through soils versus solid rock. In any event, the agency says, the repository site has been stable for the past million years (evidence suggests the last major disturbance of the Ghost Dance fault occurred 11 million to 12 million years ago). A 1995 National Research Council report found the regional geology is expected to remain relatively stable for about 1 million years.

- Volcanoes: Yucca Mountain was formed millions of years ago by volcanic eruptions that produced layers of ash that eventually condensed into a very hard, dense form of rock called tuff. The explosive-type volcano that formed Yucca is extinct, but there remain seven small, dormant volcanoes in the area that are under study. Two of the cones are 12 to 27 miles away and may have been active within the past 100,000 years. A panel of scientists estimated last year that the possibility of an eruption through the repository in the next 10,000 years is about 1 in 10,000.

- Geology and water flow: Probably the biggest question mark at Yucca Mountain remains the amount and flow of water in and near the repository site. Although it is an arid region - with an average of about 6.6 inches of rainfall a year - some water infiltrates the mountain, and a climate change could bring

more.

Deep within the mountain, researchers have found unexpected traces of radioactive chlorine-36 produced during the atmospheric bomb tests. They conclude that the material, carried along by water infiltration, traveled nearly 1,000 feet into the mountain fairly rapidly during the half-century since the beginning of the bomb testing. This raises the question of whether there are "fast pathways" for carrying moisture through cracks and fissures in the mountain to the repository level. Over time, such moisture would cause the fuel containers to corrode. As their contents are released, the seeping water could transport radioactive material into the rock and eventually to the underlying ground water table.

Researchers also have found pockets of trapped water in the mountain. Although the pockets are below the proposed repository level, scientists say it is important to understand how they formed and whether any similar pockets could be breached during excavation of repository tunnels.

"We have found very little liquid water in the mountain," says geologist John Peck.

In theory, the containers of spent fuel will produce enough heat to drive off any nearby moisture. Still, as the fuel containers - and the surrounding rock - cool over time, any water vapor present could condense out as liquid water that could corrode the containers.

Project scientists plan several tests to see just how the rock behaves when it is heated. One small-scale heating test is now under way in an alcove off the main Yucca Mountain tunnel. A larger test is scheduled to begin in several years, too late to provide any data for the "viability assessment" due next year.

The Nuclear Waste Technical Review Board, a peer-review group that reports to Congress and the Energy Department, and the Lawrence Livermore National Laboratory in California have raised questions about whether the agency is doing large heating tests for long enough times. The Livermore researchers have argued that it would take a minimum of six years of heating to provide an adequate look at the rock behavior. The large-scale test now is planned for four years.

Project officials have been studying further steps - in addition to the packaging of the spent-fuel assemblies in double-walled metal canisters - to keep water away from the waste for a longer time. These can include additional fillers in the casks, drip shields above the canisters to deflect water, drains in the storage tunnels, backfilling the repository to slow or divert water flow and even use of additives on the tunnel floors to react with any waste that does escape the casks.

Even as some key members of Congress have pushed for a prompt decision at Yucca Mountain, the congressional General Accounting Office reported earlier this year that budget-cutting and the resulting constriction of scientific activity on the project could mean more delays.

GAO had pointed out in May, 1993, that the underlying reason for the slow progress and escalating costs at Yucca Mountain had been the Energy Department's

top-heavy management and support structure on the project. Less than half of the money was being spent on scientific and technical investigations at the mountain.

Energy Department officials say that has changed, with a sharper focus now on ways to contain and isolate the waste within a repository.

To complicate ma , the agency is trying to determine whether Yucca Mountain is a su.'e cion for a waste repository as the regulatory standards by which the site wi. be judged are changing.

The Nuclear Regulatory Commission's licensing standards must be consistent with radiation health standards of the Environmental Protection Agency. But EPA is ust beginning the process of issuing its health standards for Yucca Mountain site. And those standards are expected to reflect a different - and more controversial - approach than the agency took originally in setting standards for nuclear waste repositories.

Previously, the standard emphasized limiting cumulative releases of radioactive materials - and their concentrations in air, water and soil - over a 10,000-year time frame. The new approach, recommended by an advisory panel convened by the National Academy of Sciences, is expected to emphasize the level of risk for a "critical group" of people living near the repository rather than the absolute amount of radiation released.

That could mean acceptance of releases that do not d ctly threaten the health of nearby residents generally. But one member e panel - Thomas Pigford of the University of California at Berkeley - rgued strongly that the critical group should be narrowly defined as the so-called subsistence farmers who draw water from wells near the waste dump, grow most of their own food and live at the time of maximum radiation releases. While such farmers may be few and far between, protecting them would be a conservative approach that avoids what Pigford said would be "an unjustified and unprecedented leniency in public health protection from radioactive waste."

Larry Weinstock, acting director of the EPA's Office of Radiation and Indoor Air, said the agency is likely to issue its Yucca Mountain stardards in the fall. "You don't have to go all the way to the subsistence farmer to come up with something that is reasonable," Weinstock said. He said the agency is going to define an area around Yucca Mountain and the population of concern. He said EPA also probably will "set some maximum level of dose or contamination of groundwater that could exist outside of a certain region."

Nevada officials say pending legislation in Congress - which the White House said it will veto - would pre-empt the EPA by setting an average annual exposure limit of 100 millirems for the repository. State officials consider that limit - equal to one-third of the natural radiation we receive annually from background sources such as cosmic rays - to be too high.

As a practical matter, project scientists say it is highly unlikely any person will be exposed to whatever maximum the EPA comes up with. A 1995 computer analysis concluded that during the first 10,000 years after burial, the peak radiation releases to exposed individuals would be only 0.8 millirems per year - far below the annual background exposure of 300 millirems. Even under the worst-case assumptions, the radiation doses to the maximally exposed individuals

would be about 40 millirems per year.

But Pigford says it is the potential radiation exposures over the longer haul - say after 100,000 years - that could be more serious. It is then, after a slow buildup of contamination in the ground water over hundreds of millenia, that some people who use the water could receive radiation doses much higher than those predicted for the first 10,000 years, Pigford says.

In the end, Energy Department officials say, it is unreasonable to expect that all the technical answers will be available before Uncle Sam decides whether to go ahead with the repository. Some of the information - on the performance of the waste canisters over time, for example - can only be gathered and analyzed once the repository is built and loaded. The design of the repository (which also continues to evolve) will allow the Energy Department to retrieve the waste canisters for a period of time - probably about 70 years - during which performance of the repository can be carefully monitored.

"We're not trying to prove Yucca Mountain is the best site," says Theodore Garrish, a vice president of the Nuclear Energy Institute, the industry's policy organization. "We are trying to prove it is a good site . . . engineering and good science can make this site work." He predicted that if Yucca Mountain ultimately is deemed unsuitable, "it'll be years and years before the country comes to a solution" for the nuclear waste dilemma.

Arjun Makhijani, a physicist at the nonprofit Institute for Energy and Environmental Research, said his organization would like to see an independent agency manage any spent-fuel repository. "The Department of Energy does not have a good record of managing its own wastes" at nuclear weapons facilities, Makhijani said.

Some analysts have argued that the spent fuel should be left in temporary storage at reactor sites not only until questions at Yucca Mountain are resolved but also until social acceptance of the project is higher.

Federal officials see that as a recipe for further inaction.

Barrett said: "Those who call for no solution as the best solution and just let's think about it for a decade or two are repeating the mistakes of the early 1950s," when tough decisions on how to manage spent fuel were left for another day. Plan for Nuclear Waste The U.S. government is investigating a site at Yucca Mountain, Nev., to be the repository for the nation's nuclear waste. Site studies currently are going on there and the repository could be operational in about 15-20 years. Here is a look at how nuclear waste might be stored at the planned facility: Preparing the Waste How the waste is prepared at the waste handling building for storage in the repository. 1. The cask used for transporting the waste to Nevada is removed from its carrier. 2. The cask is then opened and the nuclear wastes is moved to a staging rack. The waste is then loaded into a storage container. 3. The lids are welded onto the disposal containers. The containers' outer lids will take as much as 33 hours to weld on. 4. The sealed container is placed on a rail car and pushed up to a transporter. A remote-controlled mechanism in the transporter pulls the container and the rail car inside. The Process 1. Canisters of nuclear waste, sealed in special casks, are shipped to the site by truck or train and are initially stopped at security station. 2. Casks are cleared to the carrier staging shed, where they

are inspected for external contamination. 3. Casks then are sent to the waste handling building, where the waste is removed from the casks and placed in special containers that will be stored in the mountain. 4. Storage containers are placed into transporters. A locomotive attaches itself to the transporter and pulls it from the building, through the north portal, down the north ramp and to its destination at one of the emplacement blocks. 5. Containers are pushed into one of the tunnels in an emplacement block, where it will be periodically checked by sensors and robots. Tunnel Travel How the storage containers are deposited in the emplacement drifts. 1. The transporters carrying the nuclear waste are pulled through the portals and ramps by locomotives. 2. Once the transporter reaches an emplacement drift, it pushes the storage container out onto a loading dock. 3. A transfer locomotive then backs up an emplacement locomotive to the leading dock. 4. Emplacement locomotive pushes storage container to its position in the emplacement block. Types of Waste The Nevada site is being designed to handle three types of nuclear waste: Fuel assemblies from boiling-water reactor power plants Fuel assemblies from pressurized water reactor power plants Four canisters filled with a mixture of glass and waste from defense-related programs.

SOURCE: Department of Energy; Nuclear Regulatory Commission

GRAPHIC: Newsday Illustrated Color Chart by Steve Madden-Plan fo Nuclear Waste: Here is a look at how nuclear waste might be stored at the planned facility Source: Department of Energy; Nuclear Regulatory Commission. (SEE END OF TEXT; ILLUSTRATIONS NOT IN TEXT DATABASE). Color Photos by Ken Korotkin- 1) Above, possible site for a temporary waste repository near the 2) permanent facility proposed at Yucca Mountain, Nev., below.

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SERIES: THE LEFTOVERS OF THE NUCLEAR AGE. First in a series

HEADLINE: THE LEFTOVERS OF THE NUCLEAR AGE / THE ERA AFTER / AT NUCLEAR PLANTS NATIONWIDE, TONS OF WASTE PILE UP AMID A POLITICAL, SCIENTIFIC DEBATE

BYLINE: By Earl Lane. WASHINGTON BUREAU

DATELINE: Limerick, Pa.

BODY:

Limerick, Pa. - Nestled in racks at the bottom of a 39-foot-deep pool of water, the used fuel from the Limerick nuclear reactor betrays only the slightest hint that it will remain deadly for 10,000 years or more.

The radioactive fuel gives off a faint blue glow as high-energy particles it emits speed through the water.

The effect is eerily alluring - amplified by water so clean that it tricks the eye. Although 22 feet below the surface, the cross-like tops of the fuel bundles seem within reach.

Such bundles - nasty leftovers of the nuclear era - have been accumulating in storage pools at 109 commercial power reactors across the country and at 10 closed reactors. More than 34,000 tons await disposal, an amount that grows by about 2,000 tons a year.

The fuel is called "spent," but that is a misnomer. It will retain its ominous residual activity for millennia. The final disposal of spent reactor fuel - an afterthought during the "Atoms for Peace" optimism at the birth of nuclear power - has become one of the great technical and political challenges of the modern era. It is the ultimate not-in-my-backyard dilemma.

The Environmental Protection Agency is charged with developing radiation protection standards for the ages - from identifying the population that might be at-risk from any radiation leaking from a waste repository to setting dose limits. Planners also must consider what could happen if someone were to inadvertently intrude into the dump centuries from now.

It is as if the ancient Egyptians had to do a risk assessment before burying King Tut, trying to determine the chances that his pyramid would ever be disturbed.

Such forecasting aside, the nation's spent-fuel disposal program has been stymied, critics say, by false starts, escalating costs, management ineptitude, missed deadlines and nagging doubts about how quickly to put the deadly waste out of sight and out of mind.

The effort has been complicated recently by an all-out industry campaign to persuade Congress to approve a temporary holding facility for the waste adjacent to Nevada's Yucca Mountain, a step critics say is ill-timed and could jeopardize the effort to determine whether that barren ridge 100 miles northwest of Las Vegas is suitable as a permanent burial site for the commercial spent fuel as well as some wastes from military nuclear programs.

The temporary storage site would compete with the Yucca Mountain project for tight funds, they say, and - if built - would ease the pressure to build the permanent repository, now projected to open in 2010 at the earliest and cost at least $33 billion (in 1994 dollars) through 2071. Under provisions of a House bill, the temporary storage facility would have an initial license period of 20 years, a second phase of up to 100 years - and renewable beyond that.

"I don't think they industry officials care about" a permanent repository, says Robert Loux of the state of Nevada's Nuclear Waste Projects Office. "They believe their only opportunity to get waste away from reactor sites is through interim storage."

Loux questions whether the temporary facility - essentially a parking lot for huge casks filled with reactor fuel assemblies - could be built, licensed and operating as quickly as the congressional legislation envisions. By a 65-34 vote in April, the Senate approved a plan to open the temporary storage site by 2003. On Thursday, a House subcommittee passed a similar bill with a 2002 opening for the storage site. The full House is expected to follow suit. But the White House promises a veto. The Clinton administration opposes any attempt to establish an interim storage site in Nevada until the viability of Yucca Mountain as a permanent burial site is established.

Backers of the interim facility say it will provide a measure of relief for utilities that have started to build expensive on-site storage facilities at nuclear reactors because the government has been unable to deliver on its legal obligation - affirmed last year by a U.S. appeals court - to start taking the waste off their hands by next January.

Utilities, state regulators and federal officials are due in court next month to discuss compensation or other legal remedies for the Energy Department's inability to take the waste. The department already has broached the possibility of reimbursing utilities - at taxpayer expense - for some of the cost of building new on-site storage facilities for used reactor fuel.

The battle over an interim storage facility in Nevada is but the latest chapter in the tangled and vexing history of nuclear waste policy in the United States.

Many experts remain confident that the nuclear waste dilemma - with its attendant questions about the safety of moving the spent fuel - - can be solved. "Most people in the field don't see any problems," said Peter Soo, a nuclear

engineer at Brookhaven National Laboratory. "The solutions are at hand. We know how to do it."

But as Brookhaven's own public relations fiasco with a small tritium leak from its main research reactor has shown, the public anxiety about all things radioactive can make calm discussion about technical solutions for nuclear waste problems difficult.

Brookhaven also became an early lightning rod for opposition to spent-fuel transport in the mid-1970s when New York City objected to truck shipments of the lab's spent fuel on city streets. Although a court ruled in its favor, Brookhaven decided to ship the fuel off Long Island by barge instead.

The history of nuclear waste policy is littered with aggrieved parties, heated rhetoric and often shaky data on both sides. The industry lately has been pressing a sense of urgency, labeled dubious by critics, about reactors running out of storage space and facing shutdown (a contention that surfaced in Senate debates in the early 1980s as well). Anti-nuclear activists have warned that transport of spent fuel will create "mobile Chernobyls," potential catastrophes on wheels in ill-prepared communities, although there has never been a serious accident involving spent-fuel transport here or abroad. For years, the Energy Department promised that it would meet the congressionally mandated Jan. 31, 1998, deadline for accepting spent fuel from commercial reactors - even as it made little substantive progress toward that goal while spending nearly $3 billion at Yucca Mountain alone.

The debate has been marked by what seems at times an unbridgeable gap between engineers who feel comfortable with the risks and benefits of nuclear power and a public that fears the specter of any radiation release, mistrusts the assurances of engineers and scientists and has felt misled in the past by inept management of government nuclear weapons plants and some commercial power reactors.

"On the whole, the industry has done a poor job of educating the public and establishing confidence with the public in their ability to deal with nuclear materials and nuclear waste," said Vincent Franceschi, president of Vectra Technologies, a vendor of storage casks for spent nuclear fuel. "The technologists have rebutted back with factual, technical arguments that don't carry much weight in an emotional discussion. It's a pretty steep uphill battle."

Rather than an impending crisis in fuel storage space, some social scientists say, the real crisis is the continuing lack of public confidence in nuclear technology.

"The civilian nuclear power program has grown out of the weapons program and the bomb," said Paul Slovic, president of Decision Research Inc. of Eugene, Ore. "The image of the bomb is in the back of virtually everyone's mind . . . If you ask people what a typical accident might entail at a nuclear plant, you get images that look like the aftermath of a nuclear bomb." Slovic's firm has done opinion research on nuclear issues for Nevada.

Given the adamant opposition of that state - and the likelihood of wider public concern once transportation of spent fuel begins nationally - Slovic and others say it makes more sense to leave the stuff where it is until attitudes

change.

Marvin Resnikoff of Radioactive Waste Management Associates, a Manhattan-based consultant who has done contract work for Nevada, argues that storage at reactors is safer for now than mounting a large-scale movement of spent fuel to a single location.

"The longer the fuel sits and cools down, the safer it is to transport it," Resnikoff said. For now, he said, the spent fuel should be stored at reactors. "You make it, you take it," Resnikoff said.

There is little sympathy for that view in the U.S. nuclear industry, which sees few hopes of ever building another reactor - the last order in this country came in 1978 - unless the waste disposal dilemma is resolved.

Industry officials contend the Energy Department is dragging its feet. "We haven't got back anything but excuses," said Michael Morris, president of Consumers Energy Co., a nuclear utility in Jackson, Mich.

By getting spent fuel - at more than 70 reactor sites in 34 states - to Nevada as soon as possible, analysts say, the industry avoids having to store it indefinitely at reactors at a time when proposed utility restructuring already threatens to leave operators of unprofitable nuclear power plants with as much as $70 billion in unrecoverable costs.

Nuclear industry officials counter that it is the taxpayers who might have to pay billions if Uncle Sam is required to reimburse for on-site storage costs and other economic impacts on utilities after failing to take title to the commercial spent fuel.

Moreover, they argue that reactors were never meant to become de facto fuel storage sites. Many are situated on waterways or in other environmentally sensitive locations. With increasing local opposition to on-site fuel storage, the industry says it could be caught in an untenable position: unable to ship the fuel to a central storage or disposal site and unable to keep piling it up at the reactors.

But is the situation as desperate as portrayed in some of the congressional debates?

Proponents of the interim storage facility - citing industry figures - have warned that 27 reactors will run out of space to house their spent fuel by next year, with dozens of others to follow during the next decade.

But those 27 reactors already has alternative arrangements for on-site storage of the fuel, according to reports the utilities filed with the federal government. Even industry officials acknowledge that no reactor is seriously threatened with shutdown in the near-term.

"You don't need to shut down reactors," said Morris of Consumers Energy Co. "This isn't a threat."

Morris said the industry has a legitimate gripe, however, about the lack of results 15 years after Congress ordered utilities to start collecting fees from

ratepayers - now running about $630 million a year - for a federally run disposal program that seems no closer than it did a decade ago.

"There needs to be some certainty in the planning process," said Theodore Garrish, vice president for nuclear waste at the industry's Nuclear Energy Institute.

That was what Congress had tried to do when it passed the 1982 Nuclear Waste Policy Act. It ordered the Department of Energy to start a rigorous, nationwide search for spent-fuel repository sites and to begin accepting spent fuel from utilities on Jan. 31, 1998, a target which some scientists say was unrealistic from the outset.

The act ordered the Energy Department to develop two high-level waste repositories, one in the West and one in the East, where most of the commercial reactors are situated. But the agency proposed some sites - such as the government's polluted Hanford reservation in Washington state - that even its own scientists warned were likely unacceptable. Plagued by unrealistic deadlines and local opposition to proposed sites, the selection process was in disarray by 1986.

Frustrated, Congress called off the search in 1987 and passed legislation designating Yucca Mountain - in politically weak Nevada - as the sole repository candidate.

A decade later, the suitability of Yucca Mountain as a permanent waste repository remains to be determined, with gaps in information about such basic questions as the water infiltration rates. A five-mile tunnel through the mountain was completed recently and will allow more extensive studies.

Recent discoveries suggest that rainwater may percolate into the mountain at least four times faster than previously estimated. Scientists also have found evidence suggesting that some water has been able to reach the repository horizon - about 1,000 feet underground - in 50 years or less.

Given time, moisture can attack even the sturdiest waste containers.

A viability assessment of the Yucca Mountain repository - essentially a decision on whether there are any showstoppers so far - is due late next year, with a final decision on its suitability due by 2001.

For backers of Yucca Mountain, the biggest nightmare is that it would prove unsuitable after billions spent and no other site jumps to the fore. "We don't have a contingency plan if we decide we are not going to make a commitment to a geologic repository," said Daniel Dreyfus, who formerly headed the Energy Department's Office of Civilian Radioactive Waste Management. Accordingly, he said, a barely hidden agenda on Capitol Hill is to approve the temporary storage facility, get the spent fuel to Nevada at all costs "and the hell with it."

Even if shipments of spent fuel to Nevada were to begin in a few years - whether to an interim storage site or a permanent repository - they would not necessarily bring quick relief to some locations where critics of on-site storage of reactor fuel have been vocal.

The existing contracts between the Energy Department and the nuclear utilities call for the oldest fuel to be shipped first. Reactors that have been shut down recently for political or economic reasons - such as the Trojan reactor near Portland, Ore. - do not have the oldest fuel and could be stuck with on-site storage for up to 20 years in any event.

In fact, much of the spent fuel slated for initial transport lies not in storage pools at active reactor sites but at an existing storage facility at a commercial fuel-reprocessing facility in Morris, Ill., that never operated. Also slated for early removal is fuel still on-site at the defunct reprocessing facility at West Valley, near Buffalo.

The Nuclear Waste Technical Review Board, an independent panel of experts reporting to Congress and the Department of Energy, said last year that "developing a centralized storage facility at Yucca Mountain now would only reduce, but not eliminate, the need to continue adding spent fuel storage capacity at reactor sites." The board also concluded that there is "no compelling technical or safety reasons for moving spent fuel to a centralized storage facilty for the next few years." It said "the methods now used to store spent fuel at reactor sites are safe and are likely to remain safe for decades to come."

The industry developed ways to squeeze more spent fuel into the existing storage ponds and built large storage casks that can be lowered into the cooling pools and filled remotely with used fuel assemblies. The casks are then raised, drained of water, sealed and placed on reinforced, fenced concrete storage pads near the reactor for indefinite storage.

The federal Nuclear Regulatory Commission, which licenses the storage casks, has concluded that they can be safely used for as long as a century. There now are 10 on-site storage facilities in the United States, and another dozen being planned. The first such at-reactor facility, at the Surry Power Station in southeast Virginia, now has 31 filled casks and slots for as many as 84 - enough to store all of the spent fuel from the two Surry reactors when their operating licenses expire in 2012 and 2013.

While industry officials agree such dry cask storage facilities are safe, they argue it would be more efficient - and cheaper - to manage and secure the spent fuel at one central location rather than dozens of reactor sites, especially with some communities now starting to object to construction of new on-site storage facilities.

The Nuclear Energy Institute, the industry lobbying group, estimates that as many as 55 nuclear sites may require at-reactor storage facilities by 2010 - when the permanent repository is supposed to start accepting spent fuel. The cost of building and operating those facilities through 2010 is projected to be at least $4.3 billion, according to Theodore J. Garrish, the institute's vice president for nuclear waste management.

Auke Piersma, an analyst for Public Citizen - a nonprofit group that has been critical of the nuclear industry - challenges those estimates. Using Department of Energy data and different criteria for the amount of reserve space required in the spent fuel pools, Piersma projects that 32 sites will need added storage by 2010. He puts the cost at $665 million.

The Congressional Budget Office has estimated the central storage facility being discussed in Congress would cost $2.3 billion over five years, with $1.4 billion of that devoted to transporting the spent fuel to Nevada from sites around the country.

Transportation is another sore point for opponents of the centralized facility. Some state and local officials worry about the potential for more frequent accidents if the number of spent-fuel shipments increases dramatically. There have been estimates that it would take as many as 17,000 rail and highway shipments over several decades to move the spent fuel to Nevada.

Specialists say there has never been a serious accident during the more than 2,400 shipments of spent nuclear fuel in the United States over the years. While commercial spent fuel has been piling up at reactors, used fuel from smaller research reactors is shipped regularly to a Department of Energy storage site near Aiken, S.C.

"Spent reactor fuel has moved around this country for years," said Susan Shankman, a specialist on nuclear fuel transportation and safety at the Nuclear Regulatory Commission. "Research reactor fuel moves almost weekly, and safely."

Critics also contend that certification of the shipping casks is done largely through computer simulation of accident scenarios and subscale tests of cask models. Whether those tests adequately predict the behavior of the casks under real world conditions such as a catastrophic highway tunnel fire remains a point of contention.

Daniel Dreyfus, who formerly headed the Energy Department's commercial radioactive waste program, sees the current argument over an interim storage site as a "sideshow" to the more pressing question of whether Yucca Mountain will be deemed suitable as a burial site for the waste. "We've bet the farm on one site geologically," Dreyfus said. "We're unlikely to ever look at another site if it doesn't work," he said.

Dreyfus, who also worked on Capitol Hill for many years, said "the politicians got suckered" in the early 1980s when they approved a nuclear waste disposal program that has proved to be far more costly, complex and difficult to sell than they had imagined. There was talk at the time of building a repository for a total of $800 million, Dreyfus said.

D. Warner North, a senior vice president of Decision Focus Inc., a consulting firm in Mountain View, Calif., argues that social sciences are now proving as necessary as Earth sciences and engineering in setting policy on nuclear waste. "We should ask the social scientists for their help in communicating with the public about nuclear waste," North wrote recently in Physics Today.

Proponents of a centralized storage facility say their message is simple enough. "It's in the best interest of the communities locally that the spent fuel not be kept there indefinitely," said Eileen Supko of Energy Resources International, a consulting firm that has done work for the nuclear industry. "It makes no sense to store the fuel for 50 or 100 years. It's a waste of resources. We could be spending that money on renewables, clean coal technology, the next generation of nuclear plants, whatever."

Dreyfus, now associate director for operations at the National Museum of Natural History, agrees that the spent fuel should not be left at reactor sites indefinitely.

"The basic truth is that someday it's got to move," Dreyfus said. But he adds, "I can't find any reason to leap forward and do it instantly." How Waste Occurs 1. Nuclear reactors are powered by enriched uranium-235 fuel. This fuel is in the form of bullet-sized pellets loaded into long rods. The fuel turns the coolant into steam, which turns the turbines that make electricity. 2. About 200 rods are packed into fuel assemblies. After about six years, the spent fuel assemblies are removed and placed in storage pools to cool. Here they remain unless they are removed to dry storage.

GRAPHIC: Newsday illustrated chart by Steve Madden - How Waste Is Created. Source: Department of Energy. Nuclear Regulatory Commission. (SEE END OF TEXT; ILLUSTRATIONS NOT IN TEXT DATABASE). 1) Color cover photo by Dan Z. Johnson - Engineer Matthew Eyre at spent-fuel cooling pool at Limerick, Pa., power plant. 2) Color photo by Ken Korotkin- View inside the Yucca Mountain project tunnel, where nuclear waste would be stored if the U.S. government approves the Nevada site as a permanent repository for radioactive materials. 3) Color photo by Dan Z. Johnson- A pool of water cools used radioactive fuel from a nuclear reactor in Limerick, Pa. 4) Photo by Dan Z. Johnson A sign in the spent-fuel pool area warns workers at the Limerick, Pa., nuclear reactor.

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BYLINE: Keith Rogers

BODY:

Nevada's U.S. senators say tainted ground water at the test site supports their fears about Yucca Mountain.

By Keith Rogers
Review-Journal

Plutonium from a below-ground nuclear test conducted more than 28 years ago has traveled nearly a mile through ground water layers at the Nevada Test Site, two government scientists said Wednesday.

The discovery raised concerns with U.S. Sens. Harry Reid and Richard Bryan, both D-Nev., about future contamination risks if nuclear waste is stored at Yucca Mountain.

The scientists said plutonium, a potentially deadly cancer-causing agent from the core of a nuclear bomb, was detected in a monitoring well eight-tenths of a mile south of the Benham test that was conducted Dec. 19, 1969, in the northwest part of the test site.

The levels were within safe drinking water standards and the contamination had not migrated off the test site, 65 miles northwest of Las Vegas, they said.

The levels were less than half the 4-millirem-per-year dose allowed for drinking water, the scientists said.

'This is the first time we've seen plutonium transported in ground water,' said Annie Kersting, a chemist from Lawrence Livermore National Laboratory in California.

Kersting and her colleague, Joe Thompson, a chemist from the Los Alamos, N.M., national laboratory, revealed their findings in a paper presented during a session of the American Chemical Society's national meeting in Las Vegas.

After their presentation, they said the fact that plutonium was carried through ground water attached to very small mineral particles _ clay and zeolites _ does not necessarily mean plans for Yucca Mountain should be halted. Yucca Mountain, which borders the test site, is 100 miles northwest of Las Vegas.

'I don't know if it has any particular significance. The material was deposited as a result of nuclear tests without engineered barriers,' like those proposed for the Yucca Mountain repository, Thompson said.

But after the presentation, Reid and Bryan, in a joint statement, said the discovery is more evidence that confirms the nation's high-level nuclear waste should not be entombed in Yucca Mountain.

'This report adds significant credibility to our previously-stated concerns that proceeding with the storage of nuclear waste at the (planned) Yucca Mountain repository poses a grave risk of environmental contamination,' Reid said.

'Contaminated ground water at the Nevada Test Site is not something that should be taken lightly,' he said. 'If what we have seen before bears out, there is a lot of work which needs to be done on radiation and ground water before anybody starts storing any high-level nuclear waste here.'

Bryan said the report is 'another red flag that has been raised up the Yucca Mountain flagpole.'

'This new report on the speed with which plutonium has migrated through the water table should send shock waves through the scientific community,' Bryan said. He noted that even though the report focused on the test site, 'far greater quantities of radioactive materials would be stored at Yucca Mountain.'

The repository is being designed to contain 77,000 tons of high-level radioactive waste, primarily metal-encased pellets of spent fuel from commercial nuclear power reactors. Ten percent of the waste would come from military sources and would be solidified before it is stored as glass logs. Plutonium is one of the radioactive waste components. It has a half-life of some 24,000 years _ the time it takes for half of its atoms to decay to safe levels.

Rick Nielsen, executive director of Citizen Alert, a statewide environmental group, said the report signals an alarm about the future quality of ground water in the Southern Nevada region.

'With our limited water supply, we don't need any more contamination in the future,' he said. 'It shows how easily our ground water can become contaminated.'

Nielsen said scientists need to determine how long it will take for the contamination to migrate off the test site, a question Kersting and Thompson said they are trying to answer.

Said Kersting, 'How far does plutonium migrate? We don't know.

'It's clear from this work that our understanding of the subsurface geology is inadequate,' she said.

The study was part of an ongoing monitoring program at the test site that began in 1973.

Scientists have theorized that the higher temperatures and pressures produced by a nuclear chain reaction below ground melts rock around the blast cavity, but also adds new fractures in the bedrock. The Benham test was conducted at 4,500 feet below the surface and some 2,000 feet below the water table. The test had an energetic yield equivalent to detonating 1.15 million tons of TNT.

Kersting and Thompson analyzed samples from two monitoring wells. The wells were sampled three times over a 16-month period ending in April.

By comparing the ratio of different plutonium isotopes attached to fine particles of minerals in the samples they were able to tell that the plutonium contamination came from the 1968 Benham test and not from the 1975 Tybo test, a smaller test that was detonated in the same area closer to the surface at a depth of 2,500 feet.

'Is it coming from the melt glass (in the test cavity)? I don't think so. I think it's a step in between that alters the chemistry. You could have had fractures (from the test) that inhibited ground **water,**' Kersting said.

'Indeed, minerals in the subsurface have the ability to transport plutonium,' she said. 'I think the **Yucca Mountain** Project should look at these results.'

Nielsen said the discovery raises the question about what scientific proof is needed to deem **Yucca Mountain** unsuitable for storing high-level radioactive waste.

'What is a disqualifying factor? We keep finding more and more evidence that Yucca Mountain should not be licensed as a repository. If this is not enough, what is enough to disqualify it?' he asked.

While this was the first time that scientists confirmed that plutonium had migrated from a test cavity, it was not the first time radioactive materials have escaped from a test cavity into ground water at the test site.

In 1990, Department of Energy scientists acknowledged they had found fission products in water from the 1977 Sandreef nuclear test at Yucca Flat in a hole that was dug eight years later for the Aleman test. They believed the materials _ bits of radioactive cesium, antimony, and high levels of tritium, a radioactive form of hydrogen _ had been injected through cracks in rock layers that widened at the time of the blast.

The materials had traveled one-fifth of a mile from the Aleman cavity, which means at that rate it would take 1,120 years for the materials to migrate beyond the southern boundary of the test site.

For about a year after contaminants were discovered in the Aleman hole, scientists were puzzled by small amounts of plutonium that had been detected. They later concluded their samples were tainted with plutonium that had been scattered across the test site from above-ground tests and consequently had been washed into the hole by surface runoff.

LANGUAGE: ENGLISH

LOAD-DATE: September 12, 1997

UCRL-JC-127977 Abs

NEAR-FIELD MIGRATION OF RADIONUCLIDES IN THE SUBSURFACE AT THE NEVADA TEST SITE: EVIDENCE FOR COLLOID TRANSPORT OF RADIONUCLIDES THROUGH FRACTURED VOLCANIC ROCK. Annie B. Kersting, Lawrence Livermore National Laboratory, Livermore CA 94550 and Joseph L. Thompson, Los Alamos National Laboratory, Los Alamos NM 87545.

Our ability to characterize and mitigate contamination of radionuclides in the subsurface is limited by our understanding of the mechanisms and major pathways for transport. There is strong evidence that particles and colloids (< 1 μm) are ubiquitous in groundwater and that they have the potential to enhance the transport of contaminants that strongly sorb to the solid phase. In order to investigate the migration of radionuclides via colloids we carried out a series of filtration experiments using groundwater pumped from wells downgradient from an underground nuclear test event. We analyzed unfiltered groundwater, colloidal material caught on a series of filter sizes, and the ultrafiltrate for gamma-emitting radionuclides and tritium. Tritium, ^{60}Co, ^{137}Cs, $^{152,154,155}Eu$ and Pu isotopes were detected in the unfiltered groundwater samples. Most of the activity was caught on the filters; the ultrafiltrate had only a few percent of the radionuclides other than tritium. The colloidal material consists of zeolites (mordenite), clays (illite), and cristobalite (SiO_2). These minerals are consistent with the lithology of the host aquifer (volcanic tuff). We conclude that radionuclides can and do bind to colloids that then may be transported significant distances in the saturated zone.

*This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under contract No. W-7405-Eng-48.

7TH REFERENCE of Level 1 printed in FULL format.

FULL TEXT OF BILLS

105TH CONGRESS; 1ST SESSION
IN THE SENATE OF THE UNITED STATES
PUBLIC PRINT - Includes amendments incorporated

S. 104

1997 S. 104; 105 S. 104

<=A1> Retrieve Bill Tracking Report

SYNOPSIS:
AN ACT To amend the Nuclear Waste Policy Act of 1982.

DATE OF INTRODUCTION: JANUARY 21, 1997

DATE OF VERSION: MAY 7, 1997 -- VERSION: 4

SPONSOR(S):
Sponsor not included in this printed version.

TEXT:
* Be it enacted by the Senate and House of Representatives of the United*
*States of America in Congress assembled, *That the **Nuclear** Waste Policy Act of 1982 is amended to read as follows:
"SECTION 1. SHORT TITLE AND TABLE OF CONTENTS.
"(a) SHORT TITLE.-THIS ACT MAY BE CITED AS THE '**NUCLEAR** WASTE POLICY ACT OF 1997'.
"(B) TABLE OF CONTENTS.-

"SEC. 2. DEFINITIONS.

"For purposes of this Act:

"(1) ACCEPT, ACCEPTANCE.-THE TERMS 'ACCEPT' AND 'ACCEPTANCE' MEAN THE SECRETARY'S ACT OF TAKING POSSESSION OF SPENT NUCLEAR FUEL OR HIGH-LEVEL RADIOACTIVE WASTE.

"(2) AFFECTED INDIAN TRIBE.-THE TERM 'AFFECTED INDIAN TRIBE' MEANS ANY INDIAN TRIBE-

"(A) WHOSE RESERVATION IS SURROUNDED BY OR BORDERS AN AFFECTED UNIT OF LOCAL GOVERNMENT, OR

"(B) WHOSE FEDERALLY DEFINED POSSESSORY OR USAGE RIGHTS TO OTHER LANDS OUTSIDE OF THE RESERVATION'S BOUNDARIES ARISING OUT OF CONGRESSIONALLY RATIFIED TREATIES MAY BE SUBSTANTIALLY AND ADVERSELY AFFECTED BY THE LOCATING OF AN INTERIM STORAGE FACILITY OR A REPOSITORY IF THE SECRETARY OF THE INTERIOR FINDS, UPON THE PETITION OF THE APPROPRIATE GOVERNMENTAL OFFICIALS OF THE TRIBE, THAT SUCH EFFECTS ARE BOTH SUBSTANTIAL AND ADVERSE TO THE TRIBE.

"(3) AFFECTED UNIT OF LOCAL GOVERNMENT.-THE TERM 'AFFECTED UNIT OF LOCAL GOVERNMENT' MEANS THE UNIT OF LOCAL GOVERNMENT WITH JURISDICTION OVER THE SITE OF A REPOSITORY OR INTERIM STORAGE FACILITY. SUCH TERM MAY, AT THE DISCRETION OF THE SECRETARY, INCLUDE OTHER UNITS OF LOCAL GOVERNMENT THAT ARE CONTIGUOUS WITH SUCH UNIT.

"(4) ATOMIC ENERGY DEFENSE ACTIVITY.-THE TERM 'ATOMIC ENERGY

"(3) A PLAN AND COST ESTIMATE FOR THE REMAINING WORK REQUIRED TO COMPLETE THE LICENSE APPLICATION UNDER SECTION 206(C) OF THIS ACT, AND

"(4) AN ESTIMATE OF THE COSTS TO CONSTRUCT AND OPERATE THE REPOSITORY IN ACCORDANCE WITH THE PRELIMINARY DESIGN CONCEPT IN PARAGRAPH (1) OF THIS SUBSECTION.

"(B) PRESIDENTIAL DETERMINATION.-NO LATER THAN MARCH 1, 1999, THE PRESIDENT, IN HIS SOLE AND UNREVIEWABLE DISCRETION, MAY MAKE A DETERMINATION DISQUALIFYING THE **YUCCA MOUNTAIN** SITE AS A REPOSITORY, BASED ON THE PRESIDENT'S VIEWS THAT THE PREPONDERANCE OF INFORMATION AVAILABLE AT SUCH TIME INDICATES THAT THE **YUCCA MOUNTAIN** SITE IS NOT SUITABLE FOR DEVELOPMENT OF A REPOSITORY OF USEFUL SIZE. IF THE PRESIDENT MAKES A DETERMINATION UNDER THIS SUBSECTION-

"(1) THE SECRETARY SHALL CEASE ALL ACTIVITIES (EXCEPT NECESSARY TERMINATION ACTIVITIES) AT THE **YUCCA MOUNTAIN** SITE AND SECTION 206 OF THIS ACT SHALL CEASE TO BE IN EFFECT; AND

"(2) NO LATER THAN 6 MONTHS AFTER SUCH DETERMINATION, THE SECRETARY SHALL REPORT TO CONGRESS ON THE NEED FOR ADDITIONAL LEGISLATION RELATING TO THE PERMANENT DISPOSAL OF **NUCLEAR** WASTE.

"(C) PRELIMINARY SECRETARIAL DESIGNATION OF INTERIM STORAGE FACILITY SITES.-

"(1) IF THE PRESIDENT DOES NOT MAKE A DETERMINATION UNDER SUBSECTION (B) OF THIS SECTION, NO LATER THAN MARCH 31, 1999, THE SECRETARY SHALL MAKE A PRELIMINARY DESIGNATION OF A SPECIFIC SITE WITHIN AREA 25 OF THE NEVADA TEST SITE FOR PLANNING AND CONSTRUCTION OF AN INTERIM STORAGE FACILITY UNDER SECTION 205.

"(2) WITHIN 18 MONTHS OF A DETERMINATION BY THE PRESIDENT THAT THE **YUCCA MOUNTAIN** SITE IS UNSUITABLE FOR DEVELOPMENT AS A REPOSITORY UNDER SUBSECTION (B), THE PRESIDENT SHALL DESIGNATE A SITE FOR THE CONSTRUCTION OF AN INTERIM STORAGE FACILITY. THE PRESIDENT SHALL NOT DESIGNATE THE HANFORD **NUCLEAR** RESERVATION IN THE STATE OF WASHINGTON, AND THE SAVANNAH RIVER SITE AND BARNWELL COUNTY IN THE STATE OF SOUTH CAROLINA, OR THE OAK RIDGE RESERVATION IN THE STATE OF TENNESSEE, AS A SITE FOR CONSTRUCTION OF AN INTERIM STORAGE FACILITY. IF THE PRESIDENT DOES NOT DESIGNATE A SITE FOR THE CONSTRUCTION OF AN INTERIM STORAGE FACILITY, OR THE CONSTRUCTION OF AN INTERIM STORAGE FACILITY AT THE DESIGNATED SITE IS NOT APPROVED BY LAW WITHIN 24 MONTHS OF THE PRESIDENT'S DETERMINATION THAT THE **YUCCA MOUNTAIN** SITE IS NOT SUITABLE FOR DEVELOPMENT AS A REPOSITORY, THE INTERIM STORAGE FACILITY SITE AS DEFINED IN SECTION 2(19) OF THIS ACT IS DESIGNATED AS THE INTERIM STORAGE FACILITY SITE FOR PURPOSES OF SECTION 205. THE INTERIM STORAGE FACILITY SITE SHALL BE DEEMED TO BE APPROVED BY LAW FOR PURPOSES OF THIS PARAGRAPH.

"SEC. 205. INTERIM STORAGE FACILITY.

"(a) NON-SITE-SPECIFIC ACTIVITIES.-AS SOON AS PRACTICABLE AFTER THE DATE OF ENACTMENT OF THE **NUCLEAR** WASTE POLICY ACT OF 1997, THE SECRETARY SHALL SUBMIT TO THE COMMISSION A TOPICAL SAFETY ANALYSIS REPORT CONTAINING A GENERIC DESIGN FOR AN INTERIM STORAGE FACILITY. IF THE SECRETARY HAS SUBMITTED SUCH A REPORT PRIOR TO SUCH DATE OF ENACTMENT, THE REPORT SHALL BE DEEMED TO HAVE SATISFIED THE REQUIREMENT IN THE PRECEDING SENTENCE. NO LATER THAN DECEMBER 31, 1998, THE COMMISSION SHALL ISSUE A SAFETY EVALUATION REPORT APPROVING OR DISAPPROVING THE GENERIC DESIGN SUBMITTED BY THE SECRETARY.

"(B) SITE-SPECIFIC AUTHORIZATION.-THE SECRETARY SHALL DESIGN,

CONSTRUCT, AND OPERATE A FACILITY FOR THE INTERIM STORAGE OF SPENT **NUCLEAR** FUEL AND HIGH-LEVEL RADIOACTIVE WASTE AT THE INTERIM STORAGE FACILITY SITE DESIGNATED UNDER SECTION 204 AND LICENSED BY THE COMMISSION UNDER THIS SECTION. THE COMMISSION SHALL LICENSE THE INTERIM STORAGE FACILITY IN ACCORDANCE WITH THE COMMISSION'S REGULATIONS GOVERNING THE LICENSING OF INDEPENDENT STORAGE OF SPENT **NUCLEAR** FUEL AND HIGH-LEVEL RADIOACTIVE WASTE (10 CFR PART 72). SUCH REGULATIONS SHALL BE AMENDED BY THE COMMISSION AS NECESSARY TO IMPLEMENT THE PROVISIONS OF THIS ACT. THE COMMISSION MAY AMEND PART 72 OF TITLE 10, CODE OF FEDERAL REGULATIONS WITH REGARD TO FACILITIES NOT COVERED BY THIS ACT AS DEEMED APPROPRIATE BY THE COMMISSION.

"(C) LIMITATIONS AND CONDITIONS.-

"(1) THE SECRETARY SHALL NOT COMMENCE CONSTRUCTION OF AN INTERIM STORAGE FACILITY (WHICH SHALL MEAN TAKING ACTIONS WITHIN THE MEANING OF THE TERM 'COMMENCEMENT OF CONSTRUCTION' CONTAINED IN THE COMMISSION'S REGULATIONS IN SECTION 72.3 OF TITLE 10, CODE OF FEDERAL REGULATIONS) BEFORE THE COMMISSION, OR AN APPROPRIATE OFFICER OR BOARD OF THE COMMISSION, MAKES THE FINDING UNDER SECTION 72.40(B) OF TITLE 10, CODE OF FEDERAL REGULATIONS.

"(2) AFTER THE SECRETARY MAKES THE PRELIMINARY DESIGNATION OF AN INTERIM STORAGE SITE UNDER SECTION 204, THE SECRETARY MAY COMMENCE SITE DATA ACQUISITION ACTIVITIES AND DESIGN ACTIVITIES NECESSARY TO COMPLETE LICENSE APPLICATION AND ENVIRONMENTAL REPORT UNDER SUBSECTION (D) OF THIS SECTION.

"(3) NOTWITHSTANDING ANY OTHER APPLICABLE LICENSING REQUIREMENT, THE SECRETARY MAY UTILIZE FACILITIES OWNED BY THE FEDERAL GOVERNMENT ON THE DATE OF ENACTMENT OF THE **NUCLEAR** WASTE POLICY ACT OF 1997 AND LOCATED WITHIN THE BOUNDARIES OF THE INTERIM STORAGE SITE, IN CONNECTION WITH ADDRESSING ANY IMMINENT AND SUBSTANTIAL ENDANGERMENT TO PUBLIC HEALTH AND SAFETY AT THE INTERIM STORAGE FACILITY SITE, PRIOR TO RECEIVING A LICENSE FROM THE COMMISSION FOR THE INTERIM STORAGE FACILITY, FOR PURPOSES OF FULFILLING REQUIREMENTS FOR RETRIEVABILITY DURING THE FIRST FIVE YEARS OF OPERATION OF THE INTERIM STORAGE FACILITY.

"(D) LICENSE APPLICATION.-NO LATER THAN 30 DAYS AFTER THE DATE ON WHICH THE SECRETARY MAKES A PRELIMINARY DESIGNATION OF AN INTERIM STORAGE FACILITY SITE UNDER SECTION 204, THE SECRETARY SHALL SUBMIT A LICENSE APPLICATION AND AN ENVIRONMENTAL REPORT IN ACCORDANCE WITH APPLICABLE REGULATIONS (SUBPART B OF PART 72 OF TITLE 10, CODE OF FEDERAL REGULATIONS, AND SUBPART A OF PART 51 OF TITLE 10, CODE OF FEDERAL REGULATIONS, RESPECTIVELY). THE LICENSE APPLICATION-

"(1) SHALL BE FOR A TERM OF 40 YEARS; AND

"(2) SHALL BE FOR A QUANTITY OF SPENT **NUCLEAR** FUEL OR HIGH-LEVEL RADIOACTIVE WASTE EQUAL TO THE QUANTITY THAT WOULD BE EMPLACED UNDER SECTION 507 PRIOR TO THE DATE THAT THE SECRETARY ESTIMATES, IN THE LICENSE APPLICATION, TO BE THE DATE ON WHICH THE SECRETARY WILL RECEIVE AND STORE SPENT **NUCLEAR** FUEL AND HIGH-LEVEL RADIOACTIVE WASTE AT THE PERMANENT REPOSITORY.

"(E) DESIGN.-

"(1) THE DESIGN FOR THE INTERIM STORAGE FACILITY SHALL PROVIDE FOR THE USE OF STORAGE TECHNOLOGIES WHICH ARE LICENSED, APPROVED, OR CERTIFIED BY THE COMMISSION, TO ENSURE COMPATIBILITY BETWEEN THE INTERIM STORAGE FACILITY AND CONTRACT HOLDERS' SPENT **NUCLEAR** FUEL AND FACILITIES, AND TO FACILITATE THE SECRETARY'S ABILITY TO MEET THE

SECRETARY'S OBLIGATIONS UNDER THIS ACT.

"(2) THE SECRETARY SHALL CONSENT TO AN AMENDMENT TO THE CONTRACTS TO PROVIDE FOR REIMBURSEMENT TO CONTRACT HOLDERS FOR TRANSPORTABLE STORAGE SYSTEMS PURCHASED BY CONTRACT HOLDERS IF THE SECRETARY DETERMINES THAT IT IS COST EFFECTIVE TO USE SUCH TRANSPORTABLE STORAGE SYSTEMS AS PART OF THE INTEGRATED MANAGEMENT SYSTEM: *

* *Provided,* That the Secretary shall not be required to expend any funds to modify contract holders' storage or transport systems or to seek additional regulatory approvals in order to use such systems.

"(f) LICENSE AMENDMENTS.-

"(1) THE SECRETARY MAY SEEK SUCH AMENDMENTS TO THE LICENSE FOR THE INTERIM STORAGE FACILITY AS THE SECRETARY MAY DEEM APPROPRIATE, INCLUDING AMENDMENTS TO USE NEW STORAGE TECHNOLOGIES LICENSED BY THE COMMISSION OR TO RESPOND TO CHANGES IN COMMISSION REGULATIONS.

"(2) AFTER RECEIVING A LICENSE FROM THE COMMISSION TO RECEIVE AND STORE SPENT **NUCLEAR** FUEL AND HIGH-LEVEL RADIOACTIVE WASTE IN THE PERMANENT REPOSITORY, THE SECRETARY SHALL SEEK SUCH AMENDMENTS TO THE LICENSE FOR THE INTERIM STORAGE FACILITY AS WILL PERMIT THE OPTIMAL USE OF SUCH FACILITY AS AN INTEGRAL PART OF A SINGLE SYSTEM WITH THE REPOSITORY.

"(G) COMMISSION ACTIONS.-

"(1) THE ISSUANCE OF A LICENSE TO CONSTRUCT AND OPERATE AN INTERIM STORAGE FACILITY SHALL BE CONSIDERED A MAJOR FEDERAL ACTION SIGNIFICANTLY AFFECTING THE QUALITY OF THE HUMAN ENVIRONMENT FOR PURPOSES OF THE NATIONAL ENVIRONMENTAL POLICY ACT OF 1969 (42 U.S.C. 4321 ET SEQ.). PRIOR TO ISSUING A LICENSE UNDER THIS SECTION, THE COMMISSION SHALL PREPARE A FINAL ENVIRONMENTAL IMPACT STATEMENT IN ACCORDANCE WITH THE NATIONAL ENVIRONMENTAL POLICY ACT OF 1969, THE COMMISSION'S REGULATIONS, AND SECTION 207 OF THIS ACT. THE COMMISSION SHALL ENSURE THAT THIS ENVIRONMENTAL IMPACT STATEMENT IS CONSISTENT WITH THE SCOPE OF THE LICENSING ACTION AND SHALL ANALYZE THE IMPACTS OF TRANSPORTATION OF SPENT **NUCLEAR** FUEL AND HIGH-LEVEL RADIOACTIVE WASTE TO THE INTERIM STORAGE FACILITY IN A GENERIC MANNER.

"(2) THE COMMISSION SHALL ISSUE A FINAL DECISION GRANTING OR DENYING A LICENSE FOR AN INTERIM STORAGE FACILITY NOT LATER THAN 32 MONTHS AFTER THE DATE OF SUBMITTAL OF THE APPLICATION FOR SUCH LICENSE.

"(3) NO LATER THAN 32 MONTHS FOLLOWING THE DATE OF ENACTMENT OF THE **NUCLEAR** WASTE POLICY ACT OF 1997, THE COMMISSION SHALL MAKE ANY AMENDMENTS NECESSARY TO THE DEFINITION OF 'SPENT **NUCLEAR** FUEL' IN SECTION 72.4 OF TITLE 10, CODE OF FEDERAL REGULATIONS, TO ALLOW AN INTERIM STORAGE FACILITY TO ACCEPT (SUBJECT TO SUCH CONDITIONS AS THE COMMISSION MAY REQUIRE IN A SUBSEQUENT LICENSE)-

"(A) SPENT **NUCLEAR** FUEL FROM RESEARCH REACTORS;

"(B) SPENT **NUCLEAR** FUEL FROM NAVAL REACTORS;

"(C) HIGH-LEVEL RADIOACTIVE WASTE OF DOMESTIC ORIGIN FROM CIVILIAN **NUCLEAR** REACTORS THAT HAVE PERMANENTLY CEASED OPERATION BEFORE SUCH DATE OF ENACTMENT; AND

"(D) SPENT **NUCLEAR** FUEL AND HIGH-LEVEL RADIOACTIVE WASTE FROM ATOMIC ENERGY DEFENSE ACTIVITIES.

FOLLOWING ANY SUCH AMENDMENTS, THE SECRETARY SHALL SEEK AUTHORITY, AS NECESSARY, TO STORE SUCH FUEL AND WASTE AT THE INTERIM STORAGE FACILITY. NONE OF THE ACTIVITIES CARRIED OUT PURSUANT TO THIS

PARAGRAPH SHALL DELAY, OR OTHERWISE AFFECT, THE DEVELOPMENT, LICENSING, CONSTRUCTION, OR OPERATION OF THE INTERIM STORAGE FACILITY.

"SEC. 206. PERMANENT REPOSITORY.

"(a) REPOSITORY CHARACTERIZATION.-

"(1) CHARACTERIZATION OF THE YUCCA MOUNTAIN SITE.-THE SECRETARY SHALL CARRY OUT SITE CHARACTERIZATION ACTIVITIES AT THE YUCCA MOUNTAIN SITE IN ACCORDANCE WITH THE SECRETARY'S PROGRAM APPROACH TO SITE CHARACTERIZATION. SUCH ACTIVITIES SHALL BE LIMITED TO ONLY THOSE ACTIVITIES WHICH THE SECRETARY CONSIDERS NECESSARY TO PROVIDE THE DATA REQUIRED FOR EVALUATION OF THE SUITABILITY OF SUCH SITE FOR AN APPLICATION TO BE SUBMITTED TO THE COMMISSION FOR A CONSTRUCTION AUTHORIZATION FOR A REPOSITORY AT SUCH SITE, AND FOR COMPLIANCE WITH THE NATIONAL ENVIRONMENTAL POLICY ACT OF 1969 (42 U.S.C. 4321 ET SEQ.).

"(2) GUIDELINES.-THE SECRETARY SHALL AMEND THE GUIDELINES IN PART 960 OF TITLE 10, CODE OF FEDERAL REGULATIONS, TO BASE ANY CONCLUSIONS REGARDING WHETHER A REPOSITORY SITE IS SUITABLE ON, TO THE EXTENT PRACTICABLE, AN ASSESSMENT OF TOTAL SYSTEM PERFORMANCE OF THE REPOSITORY.

"(B) ENVIRONMENTAL IMPACT STATEMENT.-

"(1) PREPARATION OF ENVIRONMENTAL IMPACT STATEMENT.-CONSTRUCTION AND OPERATION OF THE REPOSITORY SHALL BE CONSIDERED A MAJOR FEDERAL ACTION SIGNIFICANTLY AFFECTING THE QUALITY OF THE HUMAN ENVIRONMENT FOR PURPOSES OF THE NATIONAL ENVIRONMENTAL POLICY ACT OF 1969 (42 U.S.C. 4321 ET SEQ.). THE SECRETARY SHALL PREPARE AN ENVIRONMENTAL IMPACT STATEMENT ON THE CONSTRUCTION AND OPERATION OF THE REPOSITORY AND SHALL SUBMIT SUCH STATEMENT TO THE COMMISSION WITH THE LICENSE APPLICATION. THE SECRETARY SHALL SUPPLEMENT SUCH ENVIRONMENTAL IMPACT STATEMENT AS APPROPRIATE.

"(2) SCHEDULE.-

"(A) NO LATER THAN SEPTEMBER 30, 2000, THE SECRETARY SHALL PUBLISH THE FINAL ENVIRONMENTAL IMPACT STATEMENT UNDER PARAGRAPH (1) OF THIS SUBSECTION.

"(B) NO LATER THAN OCTOBER 31, 2000, THE SECRETARY SHALL PUBLISH A RECORD OF DECISION ON APPLYING FOR A LICENSE TO CONSTRUCT AND OPERATE A REPOSITORY AT THE YUCCA MOUNTAIN SITE.

"(C) LICENSE APPLICATION.-

"(1) SCHEDULE.-NO LATER THAN OCTOBER 31, 2001, THE SECRETARY SHALL APPLY TO THE COMMISSION FOR AUTHORIZATION TO CONSTRUCT A REPOSITORY AT THE YUCCA MOUNTAIN SITE.

"(2) MAXIMIZING CAPACITY.-IN DEVELOPING AN APPLICATION FOR AUTHORIZATION TO CONSTRUCT THE REPOSITORY, THE SECRETARY SHALL SEEK TO MAXIMIZE THE CAPACITY OF THE REPOSITORY, IN THE MOST COST-EFFECTIVE MANNER, CONSISTENT WITH THE NEED FOR DISPOSAL CAPACITY.

"(3) DECISION NOT TO APPLY FOR A LICENSE FOR THE YUCCA MOUNTAIN SITE.-IF, AT ANY TIME PRIOR TO OCTOBER 31, 2001, THE SECRETARY DETERMINES THAT THE YUCCA MOUNTAIN SITE IS NOT SUITABLE OR CANNOT SATISFY THE COMMISSION'S REGULATIONS APPLICABLE TO THE LICENSING OF A GEOLOGICAL REPOSITORY, THE SECRETARY SHALL-

"(A) NOTIFY THE CONGRESS AND THE STATE OF NEVADA OF THE SECRETARY'S DETERMINATIONS AND THE REASONS THEREFOR; AND

"(B) PROMPTLY TAKE THE ACTIONS DESCRIBED IN PARAGRAPHS (1) AND

1ST STORY of Focus printed in FULL format.

The San Francisco Chronicle

APRIL 13, 1995, THURSDAY, FINAL EDITION

SECTION: NEWS; Pg. A1

LENGTH: 4370 words

HEADLINE: Fighting For Lethal Leftovers
Texas farm town sees future in storing toxic plutonium

BYLINE: Kenneth J. Garcia, David Perlman, Chronicle Staff

DATELINE: Amarillo, Texas

BODY:

On the flat, fertile plains of the Texas Panhandle, where wind-whipped rows of wheat and dusty cattle ranches cloud the landscape, the U.S. government is unloading a product that is proving nearly as indestructible as it is deadly.

And the boosters in Amarillo can't get enough of it.

The product is plutonium -- the explosive heart of atom bombs, which is among the most toxic and radioactive of substances. But civic leaders, who want the plutonium stored at the Pantex nuclear assembly plant, see it as a rich resource with incalculable value for everyday citizens.

''The Department of Energy wants to be in a community where it is welcome, and that's certainly the truth here,'' said Steve Alhenius, economic director of the Amarillo Chamber of Commerce. ''We feel plutonium is a viable energy source. Who's to say that we won't run out of oil or natural gas someday and might need an alternative source of fuel?''

With no more calls for renewed weapons production, U.S. Cold War colonies such as Amarillo, Aiken and Richland are locked in a competition to decide which will assume the brunt of the country's nuclear materials work during the next century.

This is what has become of the Cold War colonies. With their production lines shut down, their facilities aging and their financing under attack, they are desperately seeking any role within the shrinking weapons network that will provide jobs and money during the coming years.

They are vying, at the behest of the energy department, for the storage rights to a half-century accumulation of nuclear fuels -- a contest further intensified by DOE budget cuts that will cost tens of thousands of jobs from Florida to California in the next few years.

In Amarillo, a place more synonymous with sorghum and beef, that translates into lobbying for surplus plutonium, a substance with a radioactive half-life of 24,390 years. It seems as odd a move as the original choice to place Pantex on

the Great Plains of Texas, prairie land that served as the railhead for the great cattle drives of the late 1800s and as home to buffalo-hunting Comanches until they were driven out by the U.S. Army.

But to defense officials, Pantex's location almost smack dab in the middle of America made the unrelentingly flat grasslands a logical site as the final assembly point for the nation's nuclear weapons. So it was on this prime farmland that the hub of the nuclear weapons complex was born in secrecy and in silence.

Now, everyone from farmers to high school students visit the high-security plant. Buses filled with tourists whisk by guard towers, concrete bunkers and underground assembly bays where all of the nation's nuclear weapons were put together and where they are now steadily being dissembled.

Every visitor is exposed to a series of briefings, exhibits and fact sheets -- all telling them why Pantex, 17 miles northeast of Amarillo, is the best site for a national plutonium recycling center and for storing up to 20,000 plutonium pits, elements that will require the world's best safekeeping and security.

''One of the issues we have to deal with is the community's willingness to be educated about plutonium,'' said Alhenius, the chamber official. ''The problem with most of this country is that anything nuclear is viewed as a negative. That's not the case here.''

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As he looks at the outline of Amarillo from his 15th-floor window inside the Bank of Amarillo building, Jerome Johnson sees a wealth of opportunity for a city that for decades was regarded as an extended truck stop along Route 66.

Measured and eloquent, the white-haired lawyer and co-chair of Panhandle 2000 is the biggest Pantex booster in Amarillo. Nobody really wants plutonium, he said, but it makes sense to keep the pits at Pantex because the explosive elements in the weapons are already there.

''None of the alternatives for storing it are clearly a winner,'' he said. ''But they know how to handle it and how to store it. This isn't just a problem for Amarillo, it's a problem for the whole world.''

Unlike Johnson, the nation's scientific community sees only limited options for dealing with plutonium in the future.

Some engineers believe that it could be used to fuel civilian nuclear reactors. But given the substance's tremendous explosive capability and availability of vast amounts the reactor fuel uranium, which is cheaper and easier to use, most physicists believe all efforts should concentrate on finding a safe way to get rid of the plutonium.

For even after the military plutonium is disposed of, the remaining material will have to be stored for tens of thousands of years in some deep repository where neither humans, earthquakes, volcanic activity or subterranean water channels can disrupt the storage sites.

In the meantime, the boosters in Amarillo believe that Pantex, which has been handling plutonium for 40 years, is the safest place to store the pits. So they hold rallies, hand out buttons and lobby in Washington, D.C., for the right to hold the stuff.

They are also competing against civic interests in Aiken for a tritium-producing accelerator and have helped set up a consortium of Texas universities to study future uses of plutonium and other fissile materials.

''Nobody wants something done out there that would be unsafe, but Pantex has always been accepted on the part of its safety record,'' Johnson said. ''There's always been an inventory of plutonium out there and because of the emotions over this issue, the danger of plutonium has been overrated.

''Everybody involved in this is in the same position: The DOE doesn't need all these sites and we recognize that. But this is about survival, and in the scheme of things, Pantex is a very logical place to survive and to flourish.''

* -- --

The razor wire on the 18-foot high cyclone fence at Pantex sparkles in the midday sun, drawing the eyes away from the dusty beige earth piled on top of the concrete bunkers. A guard in an armor-plated Chevrolet Suburban drives by, his face and the 30-caliber submachine gun in the rear hidden by tinted windshields.

Beyond three sets of barbed fences lies Pantex's Zone 4, home to 60 World War II-era steel and concrete ''igloos'' that house plutonium pits, the cores of nuclear warheads. The pits confine the explosive plutonium inside steel jackets, and each pit is delicately suspended inside a cushioned canister.

Between the two fences closest to the entrance is an expanse of clay-colored soil that is scanned by high-tech sensors. Two guard towers rise over each side of the area, which is patrolled by a heavily armed SWAT team.

The entrances to the bunkers are covered by massive concrete slab doors with four holes -- the only key being an industrial forklift heavy enough to raise the cement blocks.

''So even if a group of terrorists somehow made it in, they'd have to be carrying one of these (forklifts) in their back pocket to get to the pits,'' said Tom Walton, the energy department's spokesman at Pantex.

This is the most secure area in the DOE's nuclear weapon complex, a veritable fortress with layers of security that appear to cover every possible attack. By most expert accounts, the plutonium appears to be safely stored.

Safety is the biggest concern at Pantex. Terrorists and black marketers are secretly trying to acquire enough of the stuff to build at least a crude bomb from stolen plutonium. And it only takes about 4 kilograms -- a ball about the size of a grapefruit -- to make one.

Renegade nations such as Iraq, Iran and North Korea have made no secret of their desire to acquire at least small nuclear arsenals; and there are others such as Israel, India and Pakistan that will not acknowledge the secret atom

bombs they are known to possess.

But the risk of theft by terrorist is only one part of the safety puzzle.

Energy department officials admit that they do not fully understand the effects of long-term storage of the radioactive metal. The plutonium pits in nuclear weapons were only designed to last 20 to 30 years and the aging process and stability of their containers remain uncertain.

That is among the concerns of residents opposed to Pantex as a short-term storage site, with short-term meaning up to 50 years. A group of auditors found last year that a forklift accident in the bunkers could slam several pits together until the plutonium has a chain reaction and emits lethal radiation. A team of scientists concluded that the plant needs a computerized tracking system to monitor each of the thousands of individual pits.

Beverly Gattis, head of Serious Texans Against Nuclear Dumping, said that despite years of complaints about the site being directly on the flight path of huge military transport planes landing at Amarillo International Airport, the potential for a crash has hardly raised an eyebrow.

''They just said that planes don't fly over Pantex,'' she said. ''So I guess all these years we've been looking at UFO's.''

In February, several Pantex employees reported that a small plane had landed near Zone 4. But when security teams rushed out to find the aircraft, they could not even find a tire mark.

''That remains an unknown,'' is how Walton explained it, adding that huge C-5s and B-52s used by military training crews no longer fly directly over Zone 4. But even as he said that, a green C-5 appeared to line up directly over the security area's stadium lights on its descent over the plant.

''Even if one crashed, it would have to penetrate the bunker, then get through the walls, penetrate the barrels and rupture the pit,'' he said. ''The chances of that happening are pretty remote.''

* -- --

To outsiders, the energy department's new openness policy, which includes the public tours, has been a slow but welcome change from the agency's cloak-and-dagger past.

But to the workers, it is an unsettling intrusion.

Just ask Dolores Hernandez. Barely 4 foot 10 with a youthful face, Hernandez probably could have sneaked into the auditorium with the Amarillo high school students who have toured Pantex.

Yet her navy blue jumpsuit, with the American flag stitched on the sleeve, gives her away. Hernandez works on ''the line,'' the place where all of nuclear weapons in the U.S. arsenal were once assembled and are now being taken apart.

Hernandez, 37, has worked on the line for 15 years and has been trained in

nearly 10 nuclear weapons systems. She works in one of Pantex's specially designed assembly bays, and until recently would only admit to people that she was employed at the plant. She began as a clerk and then applied for an opening on the then-highly classified assembly line.

''I don't know who told me not to talk, all I know is that it was known that you didn't,'' she said. ''That's how we were trained. So it feels strange to talk.''

Hernandez, accompanied by two other line workers during the interview, said that although her job was more stressful during heavy arms buildup periods, such as during the Reagan administration, the increased emphasis on safety, openness and record-keeping makes life difficult at Pantex.

''It seems like everything we do is now viewed under a microscope,'' she said. ''Ten years ago, the atmosphere was much more to get the product out the door. But now, there's a lot of uncertainty.''

Like the vast majority of Pantex workers, Hernandez supports the energy department's plan for plutonium storage at Pantex. She thinks it all can be done quite safely, but then, she has been marrying high explosives with plutonium in missiles for more than a decade.

''Everyone just learns to respect it,'' she said. ''You have to remember that there aren't any other jobs like this. I mean, where can I go to find work when I tell people that for the last 15 years I've assembled nuclear weapons?''

* -- --

On a warm spring day, the Pantex site is permeated by the smell of the adjoining IBP plant, one of the country's largest beef processing plants, a sprawling, high-tech slaughterhouse.

For years, the farmers who live around the 16,000-acre plant said they consciously looked the other way while Pantex workers were efficiently assembling thousands of nuclear warheads.

But when the energy department, in conjunction with the Panhandle 2000 boosters group, made a grab for their land a few years back, the farmers rebelled.

Ronnie and Trish Neusch, who raised four children in their farmhouse on the western edge of Pantex, were among those who accidentally found out that their wheat, cane and milo fields had been offered to the department by the group supporting Pantex's expansion.

Indeed, under the plan, all farms within a mile radius of the plant would have been sacrificed, while the boosters promised to supply the agency with all the utilities, roads and water that it might require.

''Land acquisition involves only a small number of landowners and should proceed quickly and without significant complications,'' according to the boosters' proposal. The farmers were never even notified.

The move turned into a public relations nightmare, uniting the farmers for the first time in decades against the plant, forcing numerous public hearings, environmental studies and, ultimately, killing the Pantex expansion plan.

The farmers organized their own groups, including Panhandle Area Neighbors and Landowners and Save Texas Agriculture and Resources. They hooked up with other advocates and began a crash education course on the history of Pantex and other weapons sites.

And they did not like what they learned. The farmers were particularly worried that any toxic waste released at Pantex might seep into the Ogallala Aquifer, which sits several hundred feet beneath the site. The Ogallala is the largest aquifer in the United States, running from South Dakota to north Texas.

Jim and Jeri Osborne, who for more than 40 years have lived with explosions shaking their walls, security guards roaming their pastures and Pantex's stadium lights turning their nights into days, have no problem with the plant carrying out its post-Cold War mission to disassemble the country's nuclear weapon stockpile.

But the energy department's desire to store up to 20,000 plutonium pits has triggered a chain reaction even among many conservative Republicans such as the Osbornes.

After living so long with the fitful bureaucracy of the nuclear weapons industry, the Osbornes now find it difficult to believe the promises of a safe and secure future at Pantex, especially with polluted graveyards such as Hanford and Rocky Flats serving as symbols of the department's darkest side.

''For years they told us that planes don't fly over the plant, even though we can watch them out our window,'' Jim Osborne said. ''They've told us that no radiation has escaped the plant, even when they've had accidental releases. And now they want to store all of the plutonium in the United States here.''

Trish Neusch said the biggest problem centers on trust. After four decades of living with secrecy and lies, she asks, why should people start believing that everything is safe and secure?

''Can you imagine,'' she said, ''turning one of the leading agricultural areas in America into a nuclear waste depository?

''We always had the mind-set here of taking the worst the government had to offer, but that all changed. If this plan goes ahead, we run the real risk of having all the plutonium in the U.S. stored in our back yard and then having the federal government just walk away someday.''

* -- --

As Aiken and Richland and Amarillo struggle with their changing roles in the post-Cold War era, the federal government is grappling with the toughest question of all: what to do with all the lethal leftovers from the decades of ' arms buildup.

So far, only one permanent repository has been designated for for nuclear

wastes and it is being developed primarily to store spent fuel elements from the civilian nuclear power industry.

It is a series of caverns excavated in the depths of Yucca Mountain and located inside the energy department's heavily-guarded Nevada Test Site 65 miles north of Las Vegas.

If approved, the Yucca Mountain repository will cost billions of dollars. The proposed storage facility has some severe limits. Although the site would be designed to hold the wastes for thousands of years, its storage capacity will not allow more than the 600 tons of plutonium now being held temporarily in spent fuel rods at civilian nuclear power plants across the country.

Within the past month, scientists at the Los Alamos National Laboratory have raised a new problem, warning that their calculations indicate the masses of nuclear fuel to be deposited there might ultimately corrode their containers and trigger huge nuclear explosions inside the mountain.

Nevada's governor and legislature have opposed the Yucca Mountain project as a major safety hazard from the beginning, and powerful political forces are lining up against it.

''The whole problem is a heritage of the Cold War today, and arms controllers and environmentalists are often pitted against each other, even though they have the same goal -- to prevent humanity from being irreparably damaged,'' says Wolfgang K. H. Panofsky, the renowned Stanford physicist.

''The problem simply won't go away,'' he admits, ''and we can't really solve it. All we can do is minimize the risks.''

THE PANTEX PLANT

The Pantex Plant is located in the Texas Panhandle on 16,k000 acres 17 miles northeast of Amarillo. It was constructed by the Army in 1942 as a conventional bomb plant, decommissioned after World War II and sold to Texas Tech University as excess government property. In 1951 the Atomic Energy Commission asked that 10,000 acres of the site be used for nuclear weapons work. During the mid 1960s, Pantex experienced its first expansion with the assumption of weapons maintenance and modification tasks from plants that closed in San Antonio and Clarksville Tenn..The second expansion came with the closing of a plant in Burlington, Iowa in 1975. The Pantex Plant has been the only U.s. nuclear weapons assembly/disassembly plant since Burlington closed

CHART:

DISMANTLING NUCLEAR WEAPONS

* Where nuclear bombs are dismantled

Outside view (above) of assembly/disassembly cells, or 'Gracel Gerties' at the Pantex plant. The circular structures are about 33 feet in diameter and have about 17 feet of gracel on the roof. These facilities are designed for the portion of the assembly or disassembly where the chemical high explosive

material and nuclear package are put together or separated. Pantex has 13 of these units.

* Number of nuclear weapons dismantled at Pantex.
The Pantex Plant is the United States' main site for weapons dismantlement. weapon design varies greatly, requiring a range of methods to safely disassemble and dispose of the materials. Nuclear bombs and most nuclear artillery shells are returned to Pantex intact. Only the warheads from missiles are returned; launch vehicles are disposed of elsewhere. Disassembly occurs in the 'Gravel Gerties' and may take days to weeks to complete

YEAR NUMBER OF WEAPONS

1989 1,208

1990 1,151

1991 1,595

1992 1,303

1993 1,556

1994 1,371

Source: U.S. Department of Energy

CHRONICLE GRAPHIC

EC:

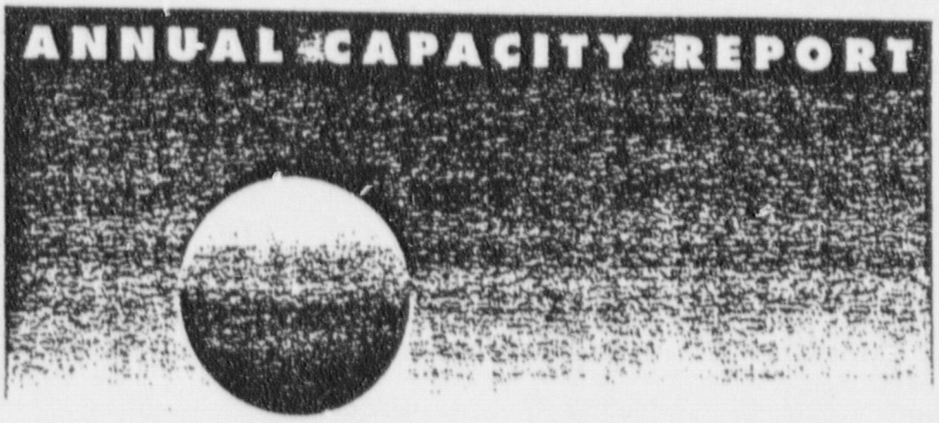
GRAPHIC: PHOTO (7), GRA,(1) A field near the Pantex nuclear assembly plant was plowed, farmers fought a plan to expand the plant, (2) Activist Beverly Gaddis and Energy Department official Tom Williams have been discussing Pantex's future, (3) Sixty steel and concrete bunkers at the Pantex site, house the explosive cores of nuclear warheads, known as 'plutonium pits', (4) Jeri Osborne, whose home is close to the plant that explosions there shake her walls, has been tracking cancer cases in areas surrounding Pantex, (5) Panhandle 2000 President Jerome Johnson looked out over Amarillo, whose downtown is dotted with em

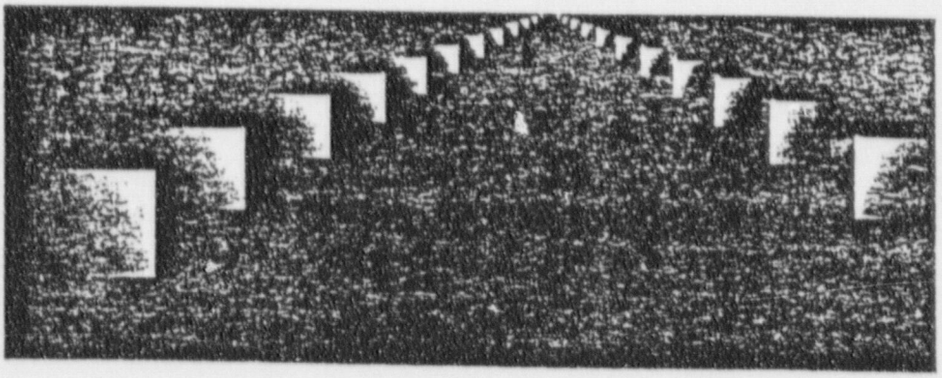
LANGUAGE: ENGLISH

LOAD-DATE: April 13, 1995

DOE/RW-0457

ACCEPTANCE PRIORITY RANKING
&
ANNUAL CAPACITY REPORT





U.S. DEPARTMENT OF ENERGY
OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
WASHINGTON, DC 20585

MARCH 1995

1.0 INTRODUCTION

The Nuclear Waste Policy Act of 1982, as amended (the Act)[1], assigns the Federal Government the responsibility for the disposal of spent nuclear fuel and high-level waste. The Director of the Department of Energy's Office of Civilian Radioactive Waste Management (the Department) is responsible for carrying out the functions assigned to the Secretary of Energy by the Act. Section 302(a) of the Act authorizes the Secretary to enter into contracts* with the owners and generators** of commercial spent nuclear fuel and/or high-level waste. The Standard Contract for Disposal of Spent Nuclear Fuel and/or High-Level Radioactive Waste[2] (Standard Contract) established the contractual mechanism for the Department's acceptance and disposal of spent nuclear fuel and high-level waste. It includes the requirements and operational responsibilities of the parties to the Standard Contract in the areas of administrative matters, fees, terms of payment, waste acceptance criteria, and waste acceptance procedures. The Standard Contract provides for the acquisition of title to the spent nuclear fuel and/or high-level waste by the Department, its transportation to Federal facilities, and its subsequent disposal.

The Standard Contract requires the Department to issue an annual Acceptance Priority Ranking (APR) report and an Annual Capacity Report (ACR). The APR establishes the order in which the Department allocates the projected acceptance capacity for commercial spent nuclear fuel. The ACR applies projected nominal acceptance rates for the system to the priority ranking in the APR, resulting in individual allocations for the owners and generators expressed in metric tons of uranium (MTU). These capacity allocations, as listed in the ACR, form the basis for the Purchasers' submittal of Delivery Commitment Schedules (DCS). As specified in the Standard Contract, the ACR is for planning purposes only and, thus, is not contractually binding on either DOE or the Purchasers.

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*Individual contracts are based upon the Standard Contract for Disposal of Spent Nuclear Fuel and/or High-Level Radioactive Waste (10 CFR Part 961).

**Owners and generators of spent nuclear fuel and high-level waste who have entered into agreements with the Department and/or have paid fees for purchase of disposal services are referred to as "Purchasers."

In reviewing the data provided by Purchasers for preparation of the 1993 APR, the Department determined that discrepancies in the weights of the discharged fuel assemblies existed. These discrepancies were between the information provided by Purchasers on Annex B to Appendix G of the Standard Contract and information being provided by Purchasers on the Nuclear Fuel Data Form, RW-859. The Department initiated a review to determine the cause of these discrepancies in order to ensure consistency and accuracy of the detailed information used in the APR. This review, which was limited to fuel that was permanently discharged, incore, or temporarily discharged as of April 7, 1983, resulted in numerous minor adjustments to previously reported APR values. Previous editions of the APR, which reported discharges to a 0.01 MTU level of precision, required numerous adjustments as Purchasers implemented various fuel management activities. The Department has determined that this level of precision is not necessary for allocating nominal waste acceptance capacity. Therefore, beginning with this publication, all discharges in the APR will be listed to the 0.1 MTU level of precision. Consequently, the ACR and subsequent DCS reviews will also be to the 0.1 MTU level of precision. Since this change in precision was applied uniformly to the entire APR, changes from the 1992 report caused by the change in precision are not individually explained, however all other changes reported by the Purchasers are listed and explained in Appendix C. In all cases, adjustments to previously reported values have been made by rounding up to the next highest 0.1 MTU. An annual nominal waste acceptance capacity was used to assure that no Purchaser had been impacted adversely with respect to a waste acceptance allocation as compared to an allocation reported in previous editions of the ACR.

The length and thoroughness of this review delayed the issuance of the 1993 ACR and APR. The information from the 1993 APR and ACR is combined with this report. In an effort to reduce the administrative burden associated with the publication of separate ACR and APR reports, the Department has decided to issue a consolidated APR/ACR Report for 1994 and subsequent years. The 1994 APR/ACR Report has been printed in a loose-leaf binder format, to allow for the updating of selected pages rather than revision of the entire report.

1.1 BASIS FOR THE ACCEPTANCE PRIORITY RANKING

As required by the Standard Contract, the APR is based on the date the spent nuclear fuel was permanently discharged, with the oldest spent nuclear fuel, on an industry-wide basis, given the highest priority. The phrase "date the spent nuclear fuel was permanently discharged" means the date the reactor went subcritical for the purpose of permanently discharging the spent nuclear fuel, as reported to the Department by the Purchasers on the Nuclear Fuel Data Form, RW 859. The APR is the basis for allocating projected spent nuclear fuel (SNF) acceptance capacity in the ACR. The 1994 APR listing is based on SNF discharges through December 31, 1993. The APR listing has been included as Appendix A.

Revisions to the information base of this APR were, and in the future will be, addressed consistent with the Department's May 15, 1991, communication on the opportunity to verify the accuracy of the information contained in the draft version of the 1991 APR. Discharges that were not identified during the comment period on the draft 1991 APR were assigned a Ranking Date (i.e. the end of the priority ranking of the report year). Future discharges will be added to the priority ranking based on their date of permanent discharge. If SNF currently designated as temporarily discharged is redesignated as permanently discharged (without subsequent irradiation), the date of redesignation will become the Ranking Date, instead of the date of actual discharge. Reinserted assemblies, previously designated as permanently discharged, will be removed from the priority ranking. Appendix C itemizes all of the differences between the 1992 APR and the 1994 APR which have resulted in changes to the overall ranking.

1.2 BASIS FOR THE ANNUAL CAPACITY REPORT

The ACR (see Appendix E) applies a 10-year projected nominal waste acceptance rate to the APR, resulting in individual capacity allocations. In the previous ACR, the projected nominal acceptance rate was based on the assumption of SNF acceptance beginning in 1998 at a Monitored Retrievable Storage facility prior to repository operations. Due to the uncertainty associated with the date of commencement of operation of the waste management system, the annual nominal waste acceptance rates are presented by year(s) of operation of the system rather

than by specific calendar year(s). The projected nominal acceptance rates also reflect the capacity limit imposed by the Act on such a storage facility prior to repository operations. These projected nominal waste acceptance rates are presented in Table 1. The Department will continue to process DCS submittals on an annual basis.

Table 1. Projected Nominal Waste Acceptance Rates for Spent Nuclear Fuel

Year	SNF (MTU)
Year 1	400
Year 2	600
Year 3	900
Year 4	900
Year 5	900
Year 6	900
Year 7	900
Year 8	900
Year 9	900
Year 10	900
TOTAL	8,200

Operation of the system with the nominal waste acceptance rates presented in Table 1 will result in the acceptance of 8,200 MTU of SNF for the first 10 years. This table provides only an approximation of the system throughput rates and is subject to change depending on Congressional action regarding the conditions for the siting, construction, and operation of an interim storage facility, if any, the repository, and the system design and configuration. The Department will further define and specify the system operating and waste acceptance parameters as the Program progresses, and inform the Purchasers accordingly. Until the SNF is accepted by the Department, Section 111(a)(5) of the Act assigns the waste owners and generators the primary responsibility to provide for, and pay the costs of, interim storage.

The Tables in Appendix B list the Purchasers' annual allocations for each of the first 10 years*** of projected CRWMS operation. Table 2 presents a summary of all Purchasers' annual allocations based on the nominal waste acceptance rates for the 10-year period covered by this report. Fuel assembly reinsertions identified during the reporting period ending December 31, 1993, have resulted in changes to the APR. Additionally, modifications have been made to reflect changes in weight of certain fuel assemblies as determined from the review of the Annex B information. The allocations in years 1 to 10 have been adjusted to reflect; 1) reinsertions of SNF previously identified as being permanently discharged; 2) cycle discharge date correction; and 3) updated weights from Annex B information. However, the projected nominal waste acceptance rates were adjusted for each of the allocation years so that the acceptance queue would not be impacted. The notes to Appendix B, Tables B.1 through B.10, identify and document the reasons for the changes affecting the first 10 years of projected CRWMS operation.

*** The term "year," when used in reference to capacity allocation in this report, means the calendar year, beginning January 1 and ending December 31.

TABLE 2. SUMMARY OF PURCHASERS' ANNUAL ALLOCATIONS (MTU)[a]

PURCHASER	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10	TOTAL
ALABAMA POWER COMPANY	--	--	--	--	--	21.2	--	--	24.4	12.9	58.5
ARIZONA PUBLIC SERVICE	--	--	--	--	--	--	--	--	--	--	--
ARK POWER & LIGHT COMP	--	--	--	23.3	28.2	--	30.2	--	46.4	--	128.1
BABCOCK AND WILCOX COM	--	--	0.1	0.1	--	--	--	--	--	--	0.1[b]
BALTIMORE GAS & ELEC C	--	--	--	12.6	41.5	28.5	52.2	--	55.3	29.6	219.7
BOSTON EDISON COMPANY	--	3.9	25.5	82.6	--	--	11.5	5.6	--	42.7	171.8
CAROLINA POWER & LIGHT	--	70.1	24.3	23.7	50.5	32.1	20.6	93.1	--	49.6	364.0
CLEVELAND ELEC ILLUM C	--	--	--	--	--	--	--	--	--	--	--
COMMONWEALTH EDISON CO	21.1	60.5	154.5	121.9	166.2	175.3	66.9	107.8	98.2	98.3	1068.7
CONNECTICUT YANKEE ATO	65.5	22.5	19.8	21.8	21.9	20.2	--	21.9	--	21.9	215.5
CONSOLIDATED EDISON CO	3.0	27.7	32.8	--	27.1	--	28.3	2.3	22.2	--	143.4
CONSUMERS POWER COMPAN	--	2.5	87.4	2.7	27.4	3.5	26.5	--	2.9	30.8	183.7
DAIRYLAND POWER COOP	0.8	6.0	3.0	3.9	--	3.4	--	--	1.5	3.3	21.9
DETROIT EDISON COMPANY	--	--	--	--	--	--	--	--	--	--	--
U.S. DOE	22.8	6.4	3.3	4.5	7.3	72.9	16.4	--	3.3	20.0	156.9
DUKE POWER COMPANY	--	24.9	47.7	62.5	58.4	56.2	61.2	31.6	63.5	66.4	472.4
DUQUESNE LIGHT COMPANY	--	--	--	--	--	--	16.2	--	--	24.4	40.6
FLORIDA POWER & LIGHT	--	20.9	37.0	40.5	32.9	40.9	71.4	33.1	52.2	37.7	366.6
FLORIDA POWER CORP	--	--	--	--	1.4	--	26.1	20.5	--	30.2	78.2
G. E. URANIUM MGT.	145.2	--	--	--	--	--	--	--	--	--	145.2
GENERAL ATOMICS	0.1	0.1	--	--	0.1	--	--	0.1	0.1	0.1	0.1[b]
GEORGIA POWER COMPANY	--	--	--	0.8	4.5	--	35.3	--	56.4	15.2	112.2
GPU NUCLEAR	31.1	43.0	46.8	49.5	33.9	5[illegible].3	--	27.6	--	--	287.2
GULF STATES UTILITIES	--	--	--	--	--	--	--	--	--	--	--
HOUSTON LIGHTING & POW	--	--	--	--	--	--	--	--	--	--	--
IES UTILITIES, INC.	--	--	15.4	13.9	21.8	0.8	--	16.6	15.5	--	84.0
ILLINOIS POWER COMPANY	--	--	--	--	--	--	--	--	--	--	--
INDIANA & MICH ELEC CO	--	--	--	28.6	29.2	--	62.5	27.9	69.8	--	218.0
KANSAS GAS AND ELECTRI	--	--	--	--	--	--	--	--	--	--	--
LONG ISLAND POWER AUTH	--	--	--	--	--	--	--	--	--	--	--
LOUISIANA POWER AND LI	--	--	--	--	--	--	--	--	--	--	--
MAINE YANKEE ATOMIC	--	26.4	57.9	27.3	--	50.7	--	26.3	28.2	--	216.8
MISSISSIPPI POWER & LI	--	--	--	--	--	--	--	--	--	--	--
NEBRASKA PUB POWER DIS	--	--	--	23.6	13.8	--	31.2	28.7	21.0	--	118.3
NEW YORK POWER AUTH	--	--	--	25.9	3.7	51.1	34.7	30.0	--	69.8	215.2
NORTH ATLANTIC ENERGY	--	--	--	--	--	--	--	--	--	--	--
NIAGARA MOHAWK POWER C	9.4	49.0	38.9	30.8	--	31.2	--	--	36.9	--	196.2
NORTHEAST UTIL SVC COM	5.5	40.7	28.2	24.2	41.9	26.6	28.1	59.1	--	28.4	282.8
NORTHERN STATES POWER	--	26.2	83.6	29.9	33.9	17.6	32.6	43.3	35.7	16.1	318.9
OMAHA PUB POWER DIST	--	--	9.4	12.9	19.0	16.4	--	14.8	--	14.6	87.1
PACIFIC GAS AND ELECT	7.3	6.0	2.6	13.3	--	--	--	--	--	--	29.2
PENNSYLVANIA POWER & L	--	--	--	--	--	--	--	--	--	--	--
PHILADELPHIA ELEC CORP	--	--	36.3	68.1	47.7	48.8	51.7	51.3	40.6	50.8	395.3
PORTLAND GENERAL ELEC	--	--	--	--	0.5	--	--	24.4	16.1	17.0	58.0
PUB SVC COMPANY OF COL	--	--	--	--	--	--	--	--	--	--	--
PUB SVC ELEC & GAS COM	--	--	--	--	--	--	17.5	29.5	--	25.8	72.8
ROCHESTER GAS & ELEC	32.0	4.6	24.4	16.1	16.2	15.7	--	14.2	5.9	6.8	135.9
SACRAMENTO MUNICIP UTI	--	--	--	9.3	--	26.0	--	30.2	19.0	--	84.5
SOUTH CAROLINA ELEC &	--	--	--	--	--	--	--	--	--	--	--
SOUTHERN CALIF EDISON	35.6	20.5	19.3	19.3	--	19.2	--	19.3	--	--	133.2
TENNESSEE VALLEY AUTHO	--	--	--	--	58.7	5.5	115.6	66.0	116.2	52.4	414.4
TEXAS UTILITIES GENERA	--	--	--	--	--	--	--	--	--	--	--
TOLEDO EDISON COMPANY	--	--	--	--	--	--	--	--	--	25.1	25.1
UNION ELEC COMPANY	--	--	--	--	--	--	--	--	--	--	--
VERMONT YANKEE NUCLEAR	--	72.9	--	12.0	8.7	27.5	25.7	17.0	--	22.2	186.0
VIRGINIA POWER	--	8.2	69.4	43.9	54.7	20.2	23.4	32.9	29.0	52.8	334.5
WASH PUB POWER SUPPLY	--	--	--	--	--	--	--	--	--	--	--
WISCONSIN ELEC POWER C	16.3	43.1	19.8	27.1	36.8	24.9	9.7	12.9	16.1	21.8	228.5
WISCONSIN PUB SVC CORP	--	--	4.4	17.7	16.1	--	5.3	13.3	16.5	14.5	87.8
YANKEE ATOMIC ELEC COM	9.9	10.1	9.7	8.7	--	9.4	--	--	8.5	--	56.3
NOMINAL TOTAL	400.[illegible]	600.0	900.0	900.0	900.0	900.0	900.0	900.0	900.0	900.0	8200.0

a All allocations have been adjusted from the 1992 ACR to reflect the change in the degree of precision.
b These totals are not the sum of the annual allocations because the actual annual values are much less than .1 MTU.

Environmental Impact Statement For A Proposed Repository

At Yucca Mountain, Nevada

Summary of Public Scoping Comments

Related to the

Environmental Impact Statement

for a Geologic Repository for the Disposal

of Spent Nuclear Fuel and High-Level Radioactive Waste

at Yucca Mountain, Nye County, Nevada

May 1997
U.S. Department of Energy
Yucca Mountain Site Characterization Office

TABLE OF CONTENTS

List of Figures

List of Tables

Appendix A SUMMARY OF SCOPING COMMENTS BY CATEGORY

ACRONYMS

CFR - Code of Federal Regulations

DOE - Department of Energy

EIS - Environmental Impact Statement

FR - Federal Register

HLW - high-level radioactive waste

MTHM - metric tons of heavy metal

NEPA - National Environmental Policy Act

NTS - Nevada Test Site

NWPA - Nuclear Waste Policy Act

SNF - spent nuclear fuel

1. INTRODUCTION

1.1 PURPOSE AND ORGANIZATION OF THE DOCUMENT

The U. S. Department of Energy (DOE) is evaluating in the *Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada* [Repository Environmental Impact Statement (EIS)] the proposal to construct, operate, and permanently close a geologic repository [*Federal Register* (FR) 1995a]. This comment summary document summarizes comments and issues identified during the public scoping process and indicates the general approach for addressing issues in the Repository EIS.

Section 1 describes the history and scope of the Repository EIS, the alternatives being evaluated in the EIS, and related National Environmental Policy Act (NEPA) reviews. Section 2 summarizes the major issues identified during the public scoping process for the Repository EIS and describes a general approach for what will be addressed in the EIS. Appendix A contains comment summaries compiled by DOE based on the public comments received during the public scoping process for the Repository EIS.

On July 9, 1996, DOE published a final rule in the *Federal Register* that, among other things, eliminated the requirement to prepare an implementation plan [formerly in Section 1021.312 of DOE NEPA regulations at 10 Code of Federal Regulations (CFR) Part 1021]. This change was made to simplify the DOE NEPA process, reduce cost, and save time. The elimination of the implementation plan does not, however, relinquish the requirement to consider public scoping comments and factor them into the preparation of an EIS. This document summarizes and categorizes comments received during the public scoping process into issue areas to discuss what issues will be addressed in the EIS. The intent is not to provide a direct response to every question that was asked during the public scoping period. Preparation of this document fulfills DOE's commitment, made during the EIS scoping process, to inform the public of the outcome of that process.

1.2 BACKGROUND

The Nuclear Waste Policy Act of 1982, as amended, (NWPA) directs the DOE to evaluate the suitability of the Yucca Mountain site in southern Nevada as a potential site for development of a geologic repository for the disposal of spent nuclear fuel (SNF) and high-level radioactive waste (HLW). If the Secretary of Energy determines that the Yucca Mountain site is suitable, the Secretary may then recommend that the President approve the site for development of a repository. Under the NWPA, such a recommendation must be accompanied by a Final EIS. Therefore, DOE is preparing the Repository EIS to support a potential recommendation for development of a repository at Yucca Mountain. The NWPA also directs the Nuclear Regulatory Commission to adopt DOE's Repository EIS, to the extent practicable, in connection with any

subsequent construction authorization and license that the Commission issues to DOE for the repository.

As discussed in the Notice of Intent, the proposed action is to construct, operate, and eventually close a repository at Yucca Mountain for the geologic disposal of 63,000 metric tons of heavy metal (MTHM) of commercial SNF and 7,000 MTHM of DOE SNF (includes SNF from the Navy Nuclear Propulsion Program) and HLW (FR 1995a). The NWPA states that the EIS does not have to discuss the need for a repository, alternatives to geologic disposal, or alternative sites to Yucca Mountain. DOE identified three alternatives to implement the proposed action based on thermal load objectives; namely, a high thermal load, an intermediate thermal load, and a low thermal load. For each implementing alternative, packaging and transportation options will also be considered.

During the scoping period, DOE received many comments noting the existence of SNF and HLW in excess of 70,000 MTHM, and encouraging DOE to evaluate the total projected inventory of SNF and HLW. In addition, some commentors requested that the EIS evaluate the disposal of other highly radioactive waste types that may require permanent isolation, consistent with related DOE NEPA reviews and other DOE planning documents. Other commentors noted that DOE has a responsibility to start accepting waste shipments prior to the projected 2010 start of repository operations.

Based on the comments received, DOE is considering presenting incremental analyses for the disposal of all projected SNF and HLW, as well as other highly radioactive waste types that may require permanent isolation, and/or incremental analyses for receipt of waste at Yucca Mountain prior to full operation of the repository. It should be noted that any DOE decisions based in part on analyses presented in the Repository EIS must be consistent with the provisions of the NWPA and other applicable law. In addition under the NWPA, the Nuclear Regulatory Commission decision approving the first repository license application shall prohibit the emplacement in the first repository of more than 70,000 MTHM of SNF and HLW, until such time as a second repository is in operation.

Figure 1-1 provides a timeline representation of the current schedule for preparation of the Repository EIS.

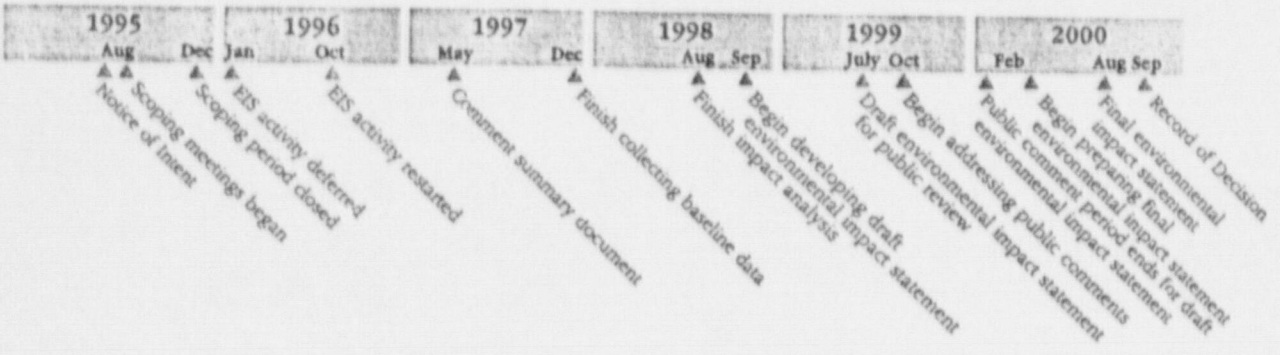

Figure 1-1. Repository EIS Timeline

1.3 ALTERNATIVES TO BE EVALUATED IN THE REPOSITORY ENVIRONMENTAL IMPACT STATEMENT

The proposed action is to construct, operate, and eventually close a repository at Yucca Mountain for the geologic disposal of 63,000 MTHM of commercial SNF and 7,000 MTHM of DOE SNF and HLW. Four alternatives will be evaluated: three alternatives to implement the proposed action and the No Action alternative. The implementing alternatives will be based on thermal load objectives: a high thermal load that considers the emplacement of more than 80 MTHM per acre, an intermediate thermal load of between 40 and 80 MTHM per acre, and a low thermal load of less than 40 MTHM per acre. Each of the thermal loads would produce different underground configurations for the subsurface repository. The configuration would change in size and layout to accommodate emplacement of the waste (i.e., lower thermal loads would require larger underground areas because the waste would be more widely spaced.)

As part of each implementing alternative, two packaging options will be evaluated. Under Option 1, SNF assemblies would be packaged and sealed in multi-purpose canisters at the generator sites prior to being transported in casks to the repository. HLW would be packaged and sealed in canisters prior to shipment in similar casks. Under Option 2, SNF assemblies (without canisters) and sealed canisters of HLW would be transported in casks to the repository.

For each implementing alternative, five transportation options will also be evaluated: two national and three regional (i.e., within the state of Nevada). The first national option would be to ship nuclear fuel and HLW by truck, from the generator site to the repository. The second national option would be to ship by rail, except from those generator sites that do not have access to an existing rail line. For the three regional transportation options, two apply to shipments that would arrive in Nevada by rail, and the third applies to shipments that would arrive in Nevada by truck. The first regional transportation option would be to ship by rail to the repository. The second regional transportation option would be to ship by rail to an intermodal transfer facility for transfer to heavy haul trucks, which would then transport the shipments to the repository. The third regional transportation option would be to use legal weight trucks to ship from the generator sites directly to the repository.

As noted above, based on comments received, DOE is considering evaluating expanded inventory "modules" in the EIS to analyze the disposal of all projected SNF and HLW, as well as other highly radioactive waste types that may require permanent isolation. DOE is also considering evaluating receipt of waste at Yucca Mountain prior to full operation of the repository.

Under the No Action alternative, a geologic repository at the Yucca Mountain site would not be constructed. SNF and HLW would continue to accumulate at the 75 commercial nuclear reactor sites and at DOE facilities. The existing tunnel excavation equipment and facilities at the Yucca Mountain site (for example, the Exploratory Studies Facility and support facilities) could be reclaimed, dismantled and removed for reuse, recycling, or disposal as appropriate .

The No Action alternative will be analyzed by evaluating a generic commercial nuclear reactor site and continued storage of waste at DOE facilities. The commercial site and DOE facilities would continue to operate for 100 years to ensure public health and safety. After 100 years, it is assumed that institutional control would be lost. Storage containers at commercial sites would be routinely monitored for corrosion and repackaged as necessary to comply with safety requirements. The DOE-owned SNF and HLW would continue to be stored at the Hanford Site, the Idaho National Engineering and Environmental Laboratory, and the Savannah River Site. It is assumed storage facilities at DOE sites would be upgraded or built as necessary.

The impacts to the environment at commercial nuclear sites will be assessed generically using existing environmental documentation prepared for license applications for these commercial facilities. The impacts will be assessed for two periods of time. The first time frame would be equivalent to the preclosure phase (disposal and caretaker) at the Yucca Mountain site (up to 100 years) and for purposes of analysis it will be assumed that institutional controls, such as monitoring and maintenance, would be maintained. The second time frame would, for purposes of analysis only, consider a long-term loss of institutional control, and would parallel the 100 year analysis period for the action alternatives.

1.4 RELATED NEPA REVIEWS

The DOE and other federal agencies (i.e., the Department of Defense) have completed, are in the process of preparing, or anticipate preparing NEPA documents that could affect the scope of this EIS. The actions under evaluation in these NEPA documents relate primarily to ongoing and proposed defense waste management, environmental restoration, non-defense research and development, and work for other DOE programs as well as non-DOE actions proposed by other federal agencies. These EISs are briefly described below.

The *Environmental Assessment, Yucca Mountain Site, Nevada Research and Development Area, Nevada*, DOE/RW-0073, evaluated the Yucca Mountain in accordance with the DOE's General Guidelines for the Recommendations of Sites for the Nuclear Waste Repositories and found Yucca Mountain suitable for site characterization (DOE 1986).

The Yucca Mountain site lies partly on and partly adjacent to the Nevada Test Site (NTS). As such, proposed actions at the NTS could affect the scope of the Repository EIS. The *Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada*, DOE/EIS-0243, identifies a preferred alternative where the NTS would be made available for increased use by DOE to support national defense and nondefense programs (DOE 1996a). The preferred alternative reflects the need to maintain readiness to conduct nuclear-weapons tests, to manage a variety of radioactive wastes, and to restore parts of the NTS that have been contaminated by past DOE activities. Under the preferred alternative, the use of the NTS for other defense purposes would expand, and technological innovation in both the public and private sectors (e.g., to develop economical solar power) would also be encouraged. The Repository EIS will factor plans for increased usage at the NTS into the analysis of cumulative

effects. For example, the combined effects of transporting various radioactive materials to both the repository and to the NTS will be considered in the analyses of cumulative impacts in the Repository EIS.

The *Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Environmental Impact Statement*, DOE/EIS-203-F, analyzed the potential environmental consequences of managing DOE's inventory of SNF over the next 40 years (DOE 1995a). The Record of Decision states that SNF will be managed by fuel type at three DOE sites: the Hanford Site, the Idaho National Engineering Laboratory and the Savannah River Site. The Repository EIS will evaluate both the transportation to and the emplacement of this SNF in the geologic repository at Yucca Mountain.

The Record of Decision for the *Final Environmental Impact Statement on a Proposed Nuclear Weapons Nonproliferation Policy Concerning Foreign Research Reactor Spent Nuclear Fuel*, DOE/EIS-0218F, states that aluminum-based and TRIGA (Training, Research, Isotope, General Atomics) foreign research reactor SNF and target material containing uranium enriched in the United States will be accepted into this country to support the United States' nuclear weapons nonproliferation policy (FR 1996a). The aluminum-based SNF and the target material will be processed at the Savannah River Site for ultimate geologic disposal. The TRIGA SNF will be stored at the Idaho National Engineering Laboratory prior to ultimate geologic disposal. The potential shipment of this foreign research reactor SNF from both the Savannah River Site and the Idaho National Engineering Laboratory to the Yucca Mountain site for ultimate disposal will be evaluated in the Repository EIS.

The *Department of the Navy Final Environmental Impact Statement for a Container System for the Management of Naval Spent Nuclear Fuel*, evaluates alternatives that would provide a system of containers for managing Naval SNF following examination at the Idaho National Engineering Laboratory, prior to potential shipment to Yucca Mountain (U.S. Navy 1996). The Navy has estimated between 300 to 500 container shipments to the proposed repository would occur between the years 2010 and 2035 depending on the alternative selected. The addition of special case waste would increase the number of containers under any alternative by about 15 to 20 percent. The potential shipment of this SNF to Yucca Mountain will be included in the analysis of transportation impacts in the Repository EIS.

The *Draft Waste Management Programmatic EIS*, DOE/EIS-0200-D, is a nationwide study that analyzed the environmental impacts of managing five types of radioactive and hazardous waste, including HLW, from nuclear weapons production and related activities (DOE 1995b). The NTS was identified as a potential site for the disposal of low-level waste and low-level mixed waste; and for the treatment and storage of transuranic waste. The Waste Management Programmatic EIS also evaluated the storage of HLW prior to its potential shipment to Yucca Mountain. If the NTS were chosen as a disposal site for low-level waste and low-level mixed waste and for the storage of transuranic waste, the transportation of these wastes to the NTS will be considered in the analysis of cumulative impacts in the Repository EIS. The

shipment of HLW from DOE storage sites for disposal at Yucca Mountain will also be evaluated in the Repository EIS.

The *Tank Waste Remediation System, Hanford Site, Richland, Washington, Final Environmental Impact Statement*, DOE/EIS-0189, August 1996, was jointly prepared by DOE and the Washington State Department of Ecology (DOE 1996b). This EIS evaluated alternatives to manage and dispose of Hanford Site tank waste and encapsulated cesium and strontium. For purposes of analysis, the Tank Waste EIS assumed that up to 7,100 HLW canisters (1,800 Hanford multi-purpose canisters) of material would satisfy the potential repository's acceptance criteria and could be placed in a geologic repository at Yucca Mountain. Any decisions on management of cesium and strontium capsules have been deferred.

The *Storage and Disposition of Weapons-Usable Fissile Materials Final Programmatic Environmental Impact Statement*, DOE/EIS-0229, analyzed the potential consequences of alternatives for the long-term storage (up to 50 years) and disposition of weapons-usable fissile materials from U. S. weapon dismantlements under the responsibility of DOE (DOE 1996c). This EIS evaluated technologies for long-term storage at six DOE candidate sites including the NTS, as well as three alternatives for reactor immobilization that would produce waste forms suitable for disposal at Yucca Mountain. The Record of Decision determined that a combination of immobilization, using vitrification or ceramic techniques, and conversion to a mixed oxide fuel for use in existing light water reactors would be appropriate (FR 1997).

The Yucca Mountain site lies partly on the Nellis Air Force Range Complex. The U.S. Air Force is preparing the *Air Force Range Legislative Environmental Impact Statement* to assess the potential environmental impacts of renewal of the Nellis Air Force Range, which includes more than 3 million acres of land in Clark, Nye, and Lincoln counties in Nevada, all in the vicinity of Yucca Mountain (FR 1996b). The current withdrawal for the range expires on November 6, 2001. Alternatives to be evaluated in the legislative EIS include renewal of the land withdrawal indefinitely, with Congressional review every 15 years; renewal of the land withdrawal for 25 years; and the No Action alternative, which would result in no renewal of the land withdrawal. The proposed actions at the Nellis Air Force Range Complex will be considered in the Repository EIS in the analysis of cumulative impacts to the environment.

The Department of the Navy is preparing an *Environmental Impact Statement for the Proposed Master Land Withdrawal Naval Air Station Fallon, Nevada*, for the withdrawal of federally-owned lands around Naval Air Station Fallon training ranges in Churchill County, Nevada (FR 1995b). The proposed actions at Naval Air Station Fallon will be considered in the analysis of cumulative impacts to the environment in the Repository EIS.

2. THE SCOPING PROCESS

2.1 DESCRIPTION OF THE SCOPING PROCESS

On August 7, 1995, DOE published a Notice of Intent in the *Federal Register* announcing its intent to prepare an EIS for a repository at Yucca Mountain, Nevada (FR 1995a). DOE notified interested persons, including federal, state, and local government agencies, Native American tribal organizations, public interest groups, transportation interests, industry and utility organizations, regulators, and members of the general public, to participate in the scoping process. In addition, DOE held 15 public scoping meetings across the country between August 29 and October 24, 1995, to allow interested parties to present verbal and written comments. The scoping period officially closed December 5, 1995.

To encourage broad participation by the public, DOE notified stakeholders by mail prior to publication of the Notice of Intent and notified the media. Congressional representatives with jurisdiction over nuclear waste issues, Nevada's Congressional delegation, the Office of the Governor of Nevada, the affected units of local government, and affected Indian tribes were notified in advance of publication of the Notice of Intent. A series of information releases were mailed to stakeholders and members of the general public notifying them of the opportunity to comment. Press releases and public service announcements were submitted to selected newspapers, television stations, and radio stations. DOE representatives met with local television, radio, and newspaper reporters at each scoping location prior to each scoping meeting to provide information about the repository program, the EIS, and the scoping process. Information about the repository program was inserted into utility bills, and informational flyers and fact sheets were distributed widely at each scoping location and by request.

Specific techniques were employed to meet environmental justice goals for the Repository EIS. These included assessing each of the 15 cities where public scoping meetings were held to determine if any one ethnic group comprised at least 10 percent of the total population. If this was the case, then news publications and/or radio stations that specifically targeted these populations were contacted to notify them of the scoping meetings. Translators were offered upon request.

2.1.1 Pre-Scoping Briefings

Oversight and stakeholder groups were briefed prior to publication of the Notice of Intent. These groups included the Nuclear Regulatory Commission, the Nuclear Waste Technical Review Board, Native American tribal organizations, and the ten affected units of local government. The proposed action and alternatives, the proposed schedule of scoping meetings, and the means by which DOE intended to solicit public comment were discussed.

2.1.2 Public Meetings

Publication of the Notice of Intent on August 7, 1995, marked the beginning of the formal public scoping period for the EIS. Of the 15 public scoping meetings, five were conducted in Nevada. One scoping meeting with two sessions was held at each location: either a morning or afternoon session and an evening session to provide wide opportunities for public involvement.

At the beginning of each session a facilitator explained the scoping meeting format. This was followed by DOE describing the repository program, the EIS, and the scoping process. The public was encouraged to ask questions and discuss particularly important aspects of the repository program with DOE and technical staff. At the end of the question and answer period, the formal public comment portion of the scoping meeting began and the facilitator invited members of the public to comment on the scope of the EIS. Court reporters typed verbatim transcripts of the proceedings. Blank comment cards were available for those members of the public who preferred to provide written comments. A separate information room, containing exhibits and handouts about the repository program and the EIS, was set up at each public scoping meeting. Technical representatives were present to answer questions. In addition to the formal meetings, scoping comments could also be submitted to the DOE through toll-free phone calls, faxes, and conventional and electronic mail. Moreover, information about the repository program, the EIS, and the scoping process was available to the public on the Internet and in designated public reading rooms around the country.

In addition to the 15 public scoping meetings, DOE representatives also met with 13 Native American tribes to describe the EIS scoping process and encourage formal involvement in the process. Seven hundred eighty-five (785) people attended the 15 scoping meetings, of which 242 participants provided verbal comments. Five hundred sixty-eight (568) people submitted comments during the public comment period. Table 2-1 lists the meeting locations, dates, attendance and number of commentors. Table 2-2 lists the 21 categories of issues identified during scoping and the number of people who commented.

2.2 RESULTS OF THE SCOPING PROCESS

The EIS will evaluate the site-specific environmental impacts from construction, operation, and closure of a repository for SNF and HLW disposal at Yucca Mountain, Nevada. Other wastes that require permanent isolation and are compatible for storage in a repository environment are being considered for possible evaluation in the EIS based on public scoping comments. The transportation-related impacts of the options included in the EIS will also be evaluated and a preferred regional rail corridor will be determined. The EIS will also include evaluation of:

- radiological and non-radiological releases to the environment
- occupational and public impacts

Table 2-1. Meeting Locations and Attendance

Meeting Locations	Date	Total Attendance	Number of Verbal Commentors
Pahrump, NV	August 29, 1995	42	10
Boise, ID	September 6, 1995	35	7
Reno, NV	September 8, 1995	134	40
Chicago, IL	September 12, 1995	19	8
Las Vegas, NV	September 15, 1995	221	38
Denver, CO	September 19, 1995	50	10
Sacramento, CA	September 21, 1995	32	12
Dallas, TX	September 26, 1995	18	13
Caliente, NV	September 28, 1995	27	11
Salt Lake City, UT	October 5, 1995	30	13
Baltimore, MD	October 11, 1995	40	19
Albany, NY	October 13, 1995	34	17
Atlanta, GA	October 17, 1995	30	18
Kansas City, MO	October 20, 1995	23	10
Tonopah, NV	October 24, 1995	50	16
Totals		**785**	**242**

Table 2-2. Issue Categories Identified during Scoping for the Repository EIS

Issue Category	Number of Commentors[a]
Policy	323
NEPA Process	801
Proposed Action/Alternatives	392
Schedule and Licensing of Repository	5
Land Use	156
Air	7
Geology	51
Hydrology	29
Biology	162
Health and Safety	570
Transportation	1,036
Cultural and Historic Resources	175
Environmental Justice	20
Noise and Aesthetics	4
Performance Assessment	624
Cumulative Impacts	45
Mitigation (Financial Assistance)	280
Program/Project Cost	214
Socioeconomics	66
Accidents	25
General	1,257

a. Comments received from all sources.

- accidents, including those with low probability but high consequences
- criticality
- waste isolation, a long-term performance assessment to evaluate the ability of the repository to isolate the waste
- socioeconomic impacts including the effect on employment, tax base, and public services
- environmental justice
- pollution prevention
- impacts to soil, water, and air
- biological resources and impacts to plants, animals and habitat including threatened and endangered species
- cultural resources, the impact to archaeological/historical sites and Native American resources, and
- cumulative impacts from the proposed action and other past, present, and reasonably foreseeable future actions.

The text which follows provides a summary and compilation of issues raised during the public scoping process together with the general approach for resolution. The summarized comments are provided in Appendix A, Tables A.1-1 through A.21.

2.2.1 Policy

2.2.1.1 Policy Subissue (A)

Issue Summary A total of 323 people commented on issues of a policy nature. These issues are summarized in Appendix A, Tables A.1-1 through A.1-5. Specifically, a major group of issues focused on the limited scope of the EIS; many commentors requested the EIS evaluate the need for the repository, alternatives to geologic disposal, and alternative sites to Yucca Mountain. Others requested that the EIS evaluate the disposal of more than 70,000 MTHM of spent fuel, additional types of wastes, and alternatives if the repository cannot accommodate 70,000 MTHM, including a second repository. In contrast, some people believed that DOE should maintain the limited scope, but eliminate the No Action alternative.

General EIS Approach Although the EIS will not evaluate the need for the repository, alternatives to geologic disposal, or alternative sites, the EIS may , for purposes of analysis, evaluate the disposal of more than 70,000 MTHM of SNF and HLW and may include analysis of the disposal of other wastes, as discussed in Section 1.3. These analyses are being considered as a result of public comments provided during the scoping process. The EIS will include a No Action alternative. In response to public comment, DOE is considering evaluating expanded inventory "modules" in the EIS to analyze the disposal of all projected SNF and HLW, as well as other highly radioactive waste types that may require permanent isolation.

2.2.1.2 Policy Subissue (B)

Issue Summary Other commentors requested that the Repository EIS be deferred pending resolution of major programmatic issues including proposed new legislation, environmental release standards, and funding issues. Others questioned the short schedule for completing the EIS, with the stated concern that the results of ecosystem-based studies on the long-term consequences of the repository to future generations may not be available during preparation of the EIS. Others requested that the implementation plan describe where the results of these studies would be made public (for example, in supplemental EISs).

General EIS Approach DOE does not believe that Repository EIS should be deferred. The site recommendation must be accompanied by an EIS, and the Repository EIS will fulfill that mandate. The schedule for completing the Repository EIS by 2000 is based on the complexity and uniqueness of the program and the parallel timing of site characterization activities and license application development. The EIS will reference or summarize the results of available studies that are relevant to the long-term effects of the repository on future generations, and these references or appendices will be available for public review. Where studies have not been completed, the EIS will make assumptions that are founded in scientific evidence for purposes of analyses.

2.2.1.3 Policy Subissue (C)

Issue Summary Some commentors were concerned that Yucca Mountain was selected as the only possible site for a repository. Some cited Nevada's political weakness, and asserted that Congress and not science narrowed three possible sites to only one. Some wanted to know how the DOE planned to acquire control of the site considering that the consent of the Nevada Legislature is required. Others said that each shipment of waste entering Nevada should be taxed.

General EIS Approach In 1987, Congress directed the DOE to "provide for an orderly phase-out of site specific activities at all candidate sites other than the Yucca Mountain site" (NWPA). If Yucca Mountain is recommended by the Secretary of Energy and then by the President for development as a repository, the Governor and the legislature of the State of Nevada could notify Congress if they disapprove the site. This action would end the repository program in Nevada unless Congress enacts legislation to approve the site over the objections of the State of Nevada.

The Nuclear Regulatory Commission regulations require DOE to demonstrate that the land on which the geologic repository operations area and the controlled area would be located be either acquired and under DOE's control or be permanently withdrawn and reserved for DOE's use. Under Nuclear Regulatory Commission regulations, these lands would need to be free and clear of all encumbrances, such as those arising under general mining laws, easements for rights-of-way, leases, deeds, patents, and mortgages. These regulations and institutional controls will be discussed in the EIS. There are no provisions in the NWPA for Nevada, or counties in Nevada, to tax waste shipments entering the State.

2.2.1.4 Policy Subissue(D)

Issue Summary Commentors questioned if and under what conditions the DOE would recommend that Yucca Mountain is unsuitable for a repository. Some commentors questioned what DOE's plan would be if the site were found to be unsuitable. Others believed that the site would never be found unsuitable because of the large amount of money already spent, and they stated that the siting guidelines are revised when technical problems arise.

Some commentors wanted to know how the DOE planned to increase public confidence in the program's scientific basis and in DOE's management of the program. A few said the waste should be retrievable far beyond the 100 years planned by DOE, because the waste may become valuable in the future and because future technological advances may be able to neutralize the waste. Others were concerned that the accumulation of waste in one place, and waste transport, could offer opportunities for terrorism and weapons proliferation.

General EIS Approach DOE's site characterization and related work at Yucca Mountain has been, and continues to be, subjected to the scrutiny of Congress, the National Academy of Sciences, the Nuclear Waste Technical Review Board, the Environmental Protection Agency, the Nuclear Regulatory Commission, the State of Nevada, affected counties, and Native American Indian tribes. This scrutiny has helped to ensure the technical adequacy and credibility of DOE's evaluation, and to enhance public confidence in the scientific basis and management of the program. The EIS will evaluate waste retrievability for up to 100 years from start of emplacement (prior to repository closure) consistent with Nuclear Regulatory Commission regulations. The long-term performance assessment evaluates environmental impacts out to 10,000 years or to the time of peak dose if peak dose occurs at a later time. The potential for terrorism and weapons proliferation will be discussed in the EIS. The EIS will either discuss or reference: the Safety Analysis Report, as appropriate; the safeguard and security measures to be employed during waste transport and disposal; and for closure, prevention of the unauthorized removal of waste from the repository.

The NWPA directs DOE to evaluate the suitability of the Yucca Mountain site as a potential site for a geologic repository. If the Secretary of Energy determines that the site is suitable, the Secretary may then recommend that the President approve the site for development of a repository. Under the NWPA, any such recommendation shall be considered a major Federal action and must be accompanied by a final EIS. Accordingly, DOE is preparing the Repository EIS in conjunction with any potential DOE recommendation regarding the development of a repository at Yucca Mountain. The Repository EIS will analyze the potential environmental impacts of the construction, operation, and eventual closure of a repository at Yucca Mountain.

2.2.1.5 Policy Subissue (E)

Issue Summary Some commentors said the EIS should address construction of the exploratory tunnel and related facilities as a *de facto* repository. Commentors also said that baseline conditions should be those that existed prior to the start of site characterization. Another issue

was the safety of the repository considering that existing and proposed radiation-release standards allow for some radiation to escape from the repository.

General EIS Approach The NWPA authorized DOE to engage in appropriate site characterization activities to learn as much as possible about the site. The exploratory tunnel and related facilities are part of this site characterization program. The proposed action is to construct, operate, and close a repository. The purpose of the EIS is to assess the environmental consequences of this action on the affected environment. Thus for purposes of the EIS, the affected environment or "baseline conditions" will be those that exist, or are anticipated to exist, at the time the Draft EIS is issued for public comment.

The DOE is required to demonstrate compliance with the Environmental Protection Agency standards (yet to be finalized) for the Yucca Mountain project in its licensing application to the Nuclear Regulatory Commission. The EIS will analyze the long-term environmental impact, if any, from waste disposal.

2.2.1.6 Policy Subissue (F)

Issue Summary Other policy comments were related to transportation, uncertainty in predicting long-term performance, the relationship of the Repository EIS to other DOE or other agency EISs currently in preparation, and the liability and responsibility of potential accidents at the repository. Specifically, these commentors were concerned about: (1) how the transportation analysis would be done and what the scope of this analysis would be (e.g., would it be conducted on a mile-by-mile basis and include emergency-response measures); (2) how to predict future events and have confidence in assumptions that are made; (3) the relationship between the Repository EIS, the U. S. Navy Multi-Purpose Container System EIS, and the NTS EIS; and (4) what agencies are liable in the event of an accident involving nuclear waste.

General EIS Approach Section 2.2.11 of this document discusses the scope of the transportation analysis which will analyze representative transportation corridors; however, the impacts will not be discussed on a mile-by-mile basis. Emergency response and safeguards and security during transportation will also be discussed. The long-term performance assessment that will be conducted for the Repository EIS is discussed in Section 2.2.15 of this document. As noted previously, the performance assessment will identify events and processes that bound the potential environmental impacts from emplacing SNF and HLW. The relationship between the Repository EIS and other DOE and non-DOE EISs, including the two mentioned above, is discussed in Section 1.4 of this document. As noted in Section 2.2.19 of this document, the Repository EIS will discuss organizations having financial responsibilities for emergency response and preparedness as well as responsibilities to remediate accidents from either transportation or repository operations.

2.2.2 NEPA Process

Issue Summary Eight hundred and one (801) people commented on issues related to NEPA requirements and procedures. These issues are summarized in Appendix A, Table A.2.

Specifically, the comments related to maximizing participation in the public scoping process, preparing the Implementation Plan, conducting consultations as required by the NEPA process, the content of the Record of Decision, and performing the impact analysis. Some commentors wanted meetings and hearings to be held in their particular communities, especially if SNF or HLW would be transported through their community. Other commentors stated that insufficient notice and inadequate information were provided relative to the public scoping meetings. Others requested that either the meeting format or the scoping process be modified to encourage broader public participation, provided suggestions for the content of the Implementation Plan and the Record of Decision, and made suggestions and recommendations regarding consultations to be conducted as part of the NEPA process. Other commentors made general recommendations about conducting the impact analysis for the EIS.

General EIS Approach Section 2.1 of this document describes the scoping process for the EIS and the DOE efforts to provide opportunities for public involvement in the process. The location of meetings and hearings during the public comment period for the Draft EIS has not been selected. As discussed in Section 1.1, although an Implementation Plan will not be prepared for the Repository EIS, this comment summary document was prepared to summarize the issues identified during the scoping period for the EIS and to discuss the general approach for how these issues will be addressed in the EIS. Analyses that are planned for specific issues identified during scoping are discussed in this section.

2.2.3 Proposed Action and Alternatives

Issue Summary Three hundred and ninety-two (392) people commented on issues related to the proposed action and alternatives to be evaluated in the EIS. These issues are summarized in Appendix A, Table A.3. Specifically, the comments related to expanding the scope of the EIS to include analysis of: disposal of all projected SNF and HLW, as well as other highly radioactive wastes; evaluation of alternatives to geologic disposal; additional options for transportation routing and modes and packaging; alternatives for implementing each phase of the repository (construction, operation, and closure); and additional thermal management strategies. Issues related to the evaluation of the No Action alternative included comments that the evaluation should include impacts at waste generator sites in the event that a repository at the Yucca Mountain site would not be constructed. Other issues focused on the EIS providing a thorough and equivalent level of discussion for all alternatives and all wastes and waste characteristics.

General EIS Approach The EIS will evaluate a proposed action to construct, operate, and eventually close a repository at Yucca Mountain for the geologic disposal of 63,000 MTHM of commercial SNF and 7,000 MTHM of DOE SNF and HLW. Four alternatives will be evaluated; three implementing alternatives for the proposed action and a No Action alternative. The implementing alternatives will be based on thermal load objectives; namely, a high thermal load that considers the emplacement of greater than 80 MTHM per acre, an intermediate thermal load of between 40 and 80 MTHM per acre, and a low thermal load of less than 40 MTHM per acre. Based on the comments received, DOE is considering presenting incremental analyses of the disposal of all projected SNF and HLW, as well as other highly radioactive waste types that may

require permanent isolation.

As part of each implementing alternative, two packaging options will be evaluated. Under Option 1, SNF assemblies would be packaged and sealed in multi-purpose canisters at the generator sites prior to being transported in casks to the repository. HLW would be packaged and sealed in canisters prior to shipment in similar casks. Under Option 2, SNF assemblies (without canisters) and sealed canisters of HLW would be transported to the repository.

Each implementing alternative will also evaluate five transportation options, two national and three regional (i.e., within the state of Nevada). For the national transportation, the first option would consist of shipping all SNF and HLW by truck, from the generator site to the repository. The second national option would consist of shipment by rail, except from those generator sites that do not have existing capabilities to load and ship rail casks. For the regional transportation, there are three options; two apply to shipments that would arrive in Nevada by rail, and the third applies to shipments that would arrive by truck. The first regional transportation option would evaluate several rail corridors to the repository, leading to the selection of one preferred rail corridor. The second regional transportation option would involve the use of heavy haul truck routes to the repository, including the construction and operation of an intermodal transfer facility to receive shipments that would arrive by rail. The third regional transportation option would involve legal weight truck shipments from the generator sites directly to the repository.

Under the No Action alternative, a geologic repository at the Yucca Mountain site would not be operated. SNF and HLW would continue to accumulate at the 75 commercial nuclear reactor sites and at DOE facilities. Any existing equipment and facilities at the Yucca Mountain site (for example, the exploratory studies facility and support facilities) could be reclaimed, dismantled and removed for reuse, recycling, or disposal as appropriate.

The No Action alternative will be analyzed by evaluating a generic commercial nuclear reactor site and continued storage at DOE facilities using the following assumptions. Storage containers at commercial sites would be routinely monitored for corrosion and repackaged as necessary to comply with safety requirements. The DOE-owned SNF would continue to be stored at the Hanford Site, the Idaho National Engineering Laboratory, and the Savannah River Site. The commercial site and DOE facilities would continue to be operated for a period of 100 years to ensure public health and safety, after 100 years institutional control is assumed to be lost.

2.2.4 Schedule and Licensing of Repository

Issue Summary Five commentors asked about the schedule for, and licensing of, the repository. These comments are summarized in Appendix A, Table A.4. The comments focused on DOE's responsibility to begin accepting waste shipments in 1998, the schedule for submitting a license application to the Nuclear Regulatory Commission, and whether this schedule is the driver for DOE starting scoping hearings in 1995. Another comment related to why so many years are required between scoping and licensing.

General EIS Approach The legislative history of the repository program and DOE's efforts to meet Congressionally-mandated and other requirements of the program will be discussed in the background section of the EIS. This section will also discuss legislative mandates that have evolved over the past 14 years, as well as regulatory drivers that apply to the repository program. In 1996, the U.S. Court of Appeals for the District of Columbia [*Indiana Michigan Power Company, et al. vs. Department of Energy and United States of America, et al.*, 88 F.3d 1272 (D.C. Cir. 1996)] ruled, in response to a petition filed by various utilities, public utility commissions, and states attorneys general, that DOE is obligated to start disposing of SNF from standard contract holders no later than January 31, 1998, under the terms of the NWPA. However, the Court also found that since that date has not yet arrived, it is premature to determine an appropriate remedy because no violation of the NWPA or Standard Contract terms has yet occurred. The NEPA process for the Repository EIS (i.e., from publication of the Notice of Intent to preparation of a Record of Decision) is scheduled to take about five years to ensure that appropriate data gathering and tests are performed to adequately assess potential environmental impacts, and to allow the public sufficient time to consider this complex Program and provide input. The preparation of a license application will parallel the preparation of the Repository EIS and rely on much of the same technical information. The license application is currently scheduled to be submitted to the Nuclear Regulatory Commission in 2002. Based on comments received regarding DOE's responsibility to begin accepting waste by 1998, DOE is considering incremental analysis for receipt of waste at Yucca Mountain prior to full operation of the repository.

2.2.5 Land Use

Issue Summary One hundred and fifty-six (156) people commented on land use. These comments are summarized in Appendix A, Table A.5. The issues focused on the effects of constructing and operating the repository and related facilities (such as a rail line, heavy-haul roads, and transfer stations) and on the use and management of land. Commentors were concerned about consistency with existing land use plans, about the use of rights-of-way and eminent domain for repository components, and about potential impacts on recreational uses and grazing. Other issues dealt with coordinating regional councils, cleanup standards, public access across transportation corridors in Nevada, and potential conflicts with U.S. Air Force operations on the adjacent Nellis Air Force Range Complex. Ecosystem management at Yucca Mountain and consistency with the DOE's Land Facility Use Management Policy and the Resource Management Plan for the NTS, were also concerns.

General EIS Approach Land ownership and major land use in the region of influence for Yucca Mountain will be discussed in the EIS. The land ownership and land use along regional transportation routes and other Nevada-based repository facilities will also be discussed. Impacts to land resources in the region of influence from construction and operation of the repository will be examined in the EIS. This will include analysis of land withdrawal and potential impacts on the NTS and at the Nellis Air Force Range Complex, to public and private lands, and to State and other Federal lands. Land-use impacts from potential land acquisition and construction and operation of new rail-lines, heavy-haul roads, and transfer facilities in Nevada will also be

evaluated. The total acreage to be disturbed for each major component of the repository (surface and subsurface facilities, rail line, new roads, etc.) and during each phase of the program (construction, operation, and closure) will be discussed. The impacts of co-located Yucca Mountain and NTS operations will be evaluated in the analysis of cumulative effects.

2.2.6 Air Quality and Meteorology

Issue Summary Seven people commented on air quality and meteorology. These comments are summarized in Appendix A, Table A.6. Comments focused on how constructing and operating the repository and related facilities (rail line, heavy-haul roads, and waste-transfer facilities) could degrade air-quality, affect health from exposure to airborne radiation, and impair visibility which could reduce the safety of waste transport.

General EIS Approach Existing air quality in potentially affected air basins in Nevada will be characterized in the EIS. Class-I air-quality areas within the Yucca Mountain region of influence and other potentially affected areas, if any, in Nevada will be identified. Meteorological conditions such as severity and type of storms, temperature extremes, and precipitation will be described.

Potential impacts to air quality from routine air emissions to the atmosphere during each phase of the repository program will be estimated for potentially affected air basins in Nevada. The air emissions from the repository and related facilities in Nevada will be compared to State and Federal ambient air-quality standards and health effects will be estimated. Cumulative impacts to air quality will consider existing and anticipated future actions at Yucca Mountain, the Nellis Air Force Range Complex, the NTS, and other sources of air pollutants, such as nearby mining operations and nearby cities.

2.2.7 Geology

Issue Summary Fifty-one (51) people commented on geology. These comments are summarized in Appendix A, Table A.7. Comments focused on predicting earthquakes and the effects from earthquakes, and predicting the effect of volcanism on repository operations and long-term transport of radionuclides. The validity of geologic mapping including identifying faults and joints and the effect on the rock of underground weapons-testing at the NTS were also issues. The transport of radioactive and hazardous materials that could spill and potentially migrate into the subsurface rock at Yucca Mountain were also concerns. Other comments related to identifying paleontologic sites that could potentially be impacted by the proposed actions, to assessing the mineral-resource potential of areas withdrawn for the repository, and to indicating whether DOE would monitor and numerically model surface subsidence caused by underground excavations.

General EIS Approach The geologic conditions that could affect long-term containment of disposed radioactive material will be described in the EIS including seismicity, geologic structure, and the volcanism of the region. The results of seismic hazard analyses and the

seismic design of the facility will also be discussed. Any paleontologic sites that could be affected by construction and operation of the repository will be described and the mineral-resource potential of areas that may be withdrawn will be assessed. The groundwater quality will be discussed and data will be reviewed to determine if there are effects from past weapons-testing on the NTS or from spills and from the intentional injection of tracers during characterization of the Yucca Mountain site. Data collected to support site characterization activities (i.e., information on rock properties) will be analyzed to assess the likelihood and potential consequences of subsidence. Attributes related to geology, such as topography, soil erodability, landslide potential, and faults and subsidence zones are being included in the criteria to be used for the selection and evaluation of rail alignment and heavy haul routes. The geologic setting along rail and truck routes in Nevada and throughout the nation will not be described in detail.

The effect of uncertain long-term geologic events will also be discussed in the EIS. The potential effects on the rock at Yucca Mountain from past testing of nuclear weapons at the NTS will be discussed in the EIS using the best available data. The economic impacts, if any, of precluding development of mineral resources in areas that may be withdrawn will be discussed in the EIS as described in Section 2.2.5. The EIS will address compliance with all regulatory requirements.

2.2.8 Hydrology

Issue Summary Twenty-nine (29) people commented on hydrology. These comments are summarized in Appendix A, Table A.8. The comments focused on the regional impacts of the repository and for waste transport relative to the quality and quantity of surface water and groundwater; how the effects on surface water and groundwater would be analyzed; and that additional characterization of the deep aquifer system was required to determine the potential effect on groundwater quality in areas such as Amargosa Valley, Ash Meadows, and Death Valley National Park. Some commentors were concerned with the nature and extent of contamination, groundwater monitoring, the possibility of long-term changes in the elevation of the groundwater table, flooding, and the potential for a nuclear criticality. Other commentors were concerned about DOE being in compliance with Nevada water-rights regulations.

General EIS Approach The hydrologic characteristics of the Alkali Flat-Furnace Creek Ranch groundwater basin, where Yucca Mountain is located, will be described in the EIS. The mechanics of flow and water quality in the saturated and unsaturated zones at Yucca Mountain and in areas such as Amargosa Valley, Ash Meadows, and Death Valley National Park will also be described.

Groundwater monitoring has been ongoing for the last eight years and will continue to be conducted at the site. The EIS will discuss the need for and the extent of a pre-closure groundwater-monitoring network. The need for a post-closure monitoring network would be based in part on the results of pre-closure monitoring. As a result, the need for and details of a post-closure groundwater-monitoring network will not be included in the EIS.

The EIS will describe the possible environmental impacts from water in the repository environment. Potential mechanisms include percolation of surface water downward through the unsaturated zone along fractures and through the rock matrix, and from a potential rise in the elevation of the water table from regional and global climate changes over thousands of years. (The underground repository would be constructed in unsaturated rock about 700 feet above the water table.) The EIS qualitatively describe (1) the effects of reasonably feasible future climatic extremes on the flow of groundwater and the elevation of the water table in the vicinity of Yucca Mountain, (2) the likely cause and meaning of the elevated concentrations of tritium found in the unsaturated zone at Yucca Mountain, and (3) the likelihood of deep-seated hot water invading the repository.

The EIS will also qualitatively describe the potential impacts on water quality and water flow at springs and wells in the Alkali Flat-Furnace Creek Ranch groundwater basin.

2.2.9 Biology

Issue Summary One hundred sixty-two (162) people commented on issues related to biology. These comments are summarized in Appendix A, Table A.9. The concerns focused on impacts to critical habitat for threatened, endangered, and sensitive species and other biologic resources from implementing the repository program. Specific issues included concerns about potential changes in the surface ecosystem at Yucca Mountain from waste-generated heat and impacts to wildlife and their habitat from both repository construction and operation and from transporting waste. Other commentors were concerned about the effects on wilderness and public recreation areas from construction and operation of national and regional waste-transportation corridors and the potential loss of revenue from the loss in big-game habitat.

General EIS Approach The EIS will describe biological resources within affected areas in Nevada including threatened, endangered, and sensitive species (i.e., species of concern to the State of Nevada) and game species. Potentially affected areas include Yucca Mountain and portions of the Alkali Flat-Furnace Creek Ranch groundwater basin, potential waste-transfer sites in Nevada, and waste-transport corridors in Nevada.

The EIS will evaluate impacts to wildlife and wilderness and public recreation areas at and near Yucca Mountain from construction and operation of the repository based on currently available information. Post-closure effects to wildlife from a potential increase in heat at the surface by implementing the various alternatives will also be evaluated. Attributes related to biology, such as terrestrial habitats, floodplain and wetland communities, protected areas, federal and state threatened and endangered species, and other special status species will be included in the criteria to be used for the selection of rail alignments and heavy haul routes. Potential for loss of game habitat will be assessed.

2.2.10 Health And Safety

Issue Summary Five hundred seventy (570) people commented on issues related to health and safety. These comments are summarized in Appendix A, Table A.10. Specific concerns included requests for baseline health assessments of potentially affected areas, concerns about past radiation exposure, radiological impacts during operations and after closure, exposure pathways and scenarios that would be evaluated, and the effects of radiation on Native Americans and agriculture from human error and nuclear arms proliferation.

General EIS Approach The Repository EIS will characterize the baseline affected environment using the best available data. Past radiation exposures from activities at the NTS (e.g., from atmospheric testing) will be considered in the cumulative impacts section of the EIS using existing published studies. The radiological impacts to workers and the public including Native Americans will be analyzed in the EIS, for both the pre-closure time period, which includes transportation, and the post-closure time period. Potential worker doses will be evaluated assuming both normal operations and accident conditions. Radiological impacts to the public during all phases of repository activity (construction, operation, closure, and post-closure) will be assessed.

2.2.11 Transportation

2.2.11.1 Transportation Subissue (A)

Issue Summary One thousand thirty-six (1,036) people commented on issues related to transportation. These comments are summarized in Appendix A, Tables A.11-1 through A.11-7. Issues raised by commentors included transportation routing, transportation accidents, human health impacts related to transportation, transportation emergency response, transportation shipping containers, pre-notification, liability after transportation accidents, sabotage or terrorist attacks, and the economic impacts of transportation accidents.

General EIS Approach The Repository EIS will analyze the radiological and nonradiological impacts of shipping radioactive material to the repository. The impact analyses will include the impacts from both normal operations and accidents. The impacts from transporting radioactive material will include the risks to populations surrounding and sharing the transportation routes, to transportation workers, and to populations and the maximally exposed individual as a result of transportation accidents. The transportation accident analyses will include the risks from low probability/high consequence accidents and the risks from high probability/low consequence accidents. The EIS will include a detailed discussion of the transportation risk assessment methods and models, and the data used in the transportation analyses will also be presented. For example, shipment numbers and shipping container capacities and inventories will be presented.

Transportation issues such as pre-notification, emergency response, liability, transportation regulations (e.g., U.S. Department of Transportation and Nuclear Regulatory Commission regulations) and orders (e.g., DOE Orders), and safeguards and security issues will be discussed in the EIS. Sabotage or terrorist attacks will also be discussed.

The Repository EIS transportation analyses will include both truck and rail transport. The highway transportation analyses will be based on Department of Transportation routing regulations for the transport of radioactive materials. These regulations will be discussed in the EIS. The transportation analyses will use representative transportation routes and actual route characteristics, such as distances, population statistics, and state-level accident rates.

2.2.11.2 Transportation Subissue (B)

Issue Summary Commentors also offered criteria for the evaluation and selection of the rail alignments and heavy haul routes within Nevada. These criteria included attributes such as cost, land use, engineering feasibility, environmental impacts, transportation safety and risk, potential for shared use, availability of data, conflicts with U.S. Air Force operations, and cultural resources.

General EIS Approach Many of the criteria offered by commentors have been incorporated into the selection and evaluation criteria. For example, criteria related to environmental impacts, such as the impacts to water resources, land forms and geology, air quality and biological resources have been incorporated. The detailed criteria used to evaluate and select the rail alignments and heavy haul routes will be presented in the EIS.

2.2.12 Cultural And Historic Resources

Issue Summary One hundred seventy-five (175) people commented on issues related to cultural resources and Native American concerns. These comments are summarized in Appendix A, Tables A.12-1 and A.12-2. Commentors requested that the EIS include the results of detailed cultural-resource surveys at Yucca Mountain and along transportation routes and that the EIS evaluate historical and prehistorical sites, as well as paleontological resources. Other commentors were concerned about the effect of the Repository program on Native American cultures. People also requested that the Repository EIS fulfill commitments made in the 1986 Environmental Assessment of Yucca Mountain; that the Repository EIS be used as a forum for government-to-government relations; and that the Repository EIS acknowledge the differences between Western civilization and Native Americans with regard to nature. Among the specific comments received included the request to describe Native American land claims in Nevada, treaty obligations, federal laws relating to cultural and religious rights of Native Americans, unsettled political and legal issues, and the application of Indian law to the repository.

General EIS Approach Prior to any planned construction at Yucca Mountain, or within transportation corridors, the DOE would conduct surveys for cultural and historic resources and report the findings to the Nevada State Historic Preservation Officer and the Advisory Council on Historic Preservation. The results of available surveys, as well as studies of resources, will be discussed in the EIS.

The Yucca Mountain Project has maintained a Native American Interaction Program since the late 1980s. This interaction program involves Official Tribal Contact Representatives appointed from 17 tribes and organizations from Nevada, California, Arizona, and Utah. These

Western Shoshone, Southern Paiute, and Owens Valley Paiute and Shoshone people have provided important cultural resource protection information to the project. These interactions will be documented in the EIS.

The DOE recognizes that Native American land claims in Nevada have been an issue of much concern among Native American groups, especially the Western Shoshone. The DOE, however, must abide by recent rulings by the U.S. Supreme Court concerning control of land in much of southeastern Nevada, including the Yucca Mountain area. Applicable land claims issues, treaties, and Federal requirements concerning Native Americans and cultural and religious rights will be discussed in the EIS.

2.2.13 Environmental Justice

Issue Summary Twenty people (20) commented on environmental justice issues. These comments are summarized in Appendix A, Table A.13. Several commentors noted that the EIS must perform an environmental justice analysis consistent with federal directives and comply with federal statutes regarding environmental justice. Commentors stated the analysis should include consideration of disproportionate effects on certain communities, including poor, rural, people of color, any other subgroup of the U.S. population, and any Native American group. Commentors also indicated the EIS also should acknowledge that the Yucca Mountain site and NTS is Western Shoshone land, in consideration of the reserved right of the Western Shoshone Indian Nation.

Most of the 20 commentors indicated that the EIS should fully assess equity concerns by evaluating potential disproportionate impacts on each affected economic, ethnic or racial group along transportation routes. They requested that the assessment should consider emergency response and preparedness capabilities, and the need for training and education of each affected group.

In addition, commentors requested that the EIS consider previous disproportionate impacts citing past and current radioactive and hazardous waste activities at the NTS, and DOE's preferential financial assistance to the affected units of local government, but not certain Indian tribes. The latter was noted by commentors to be in conflict with DOE's Indian policy.

General EIS Approach The EIS will include an evaluation of environmental justice issues as they pertain to the DOE's proposed action of constructing, operating, and closing a repository at Yucca Mountain. Although DOE has not yet developed its detailed analytical approach for environmental justice, the evaluation will be consistent with both the Council on Environmental Quality and DOE guidance for implementing the Environmental Justice Executive Order 12898.

As part of developing the approach for the Repository EIS, in addition to consideration of scoping comments, DOE will also closely review many of the recently completed EISs which address management of SNF, weapons materials and highly radioactive wastes (including the Programmatic Spent Nuclear Fuel Management EIS, the EIS on a Proposed Nuclear Weapons

Nonproliferation Policy Concerning Foreign Research Spent Nuclear Fuel, the Programmatic Waste Management EIS, the Storage and Disposition of Weapons-Usable Fissile Materials Programmatic EIS, the Stockpile Stewardship and Management Programmatic EIS, the Continued Operation of the Pantex Plant and Associated Storage of Nuclear Weapon Components EIS, and the Department of the Navy's final EIS for a Container System for the Management of Naval Spent Nuclear Fuel). Based on this review, and where it makes sense to do so, DOE may use and adapt the approaches and methodologies used for environmental justice analyses by these other EISs. This is consistent with the Council on Environmental Quality regulations which encourage agencies to reduce excessive paperwork in preparation of EISs by incorporating by reference and eliminating repetitive discussions.

DOE acknowledges that there is significant disagreement among the Native American Indian community concerning the Ruby Valley Treaty of 1863 and the lands addressed under that Treaty. DOE must abide by the U.S. Supreme Court rulings. It is not the role or function of the EIS to address or attempt to resolve disputes over such Treaty rights.

Rather, the EIS will evaluate, in accordance with established NEPA precedents, the potential environmental impacts that may be associated with the construction, operation, and eventual closure of a repository at Yucca Mountain. This evaluation of the proposed action will include the potential impacts from transporting spent fuel and HLW along both national and regional transportation routes. The environmental justice evaluation that is developed for the EIS will include consideration of transportation-related effects (also see Section 2.2.11 for additional information regarding transportation analyses). As already mentioned above, DOE will be reviewing many other recently completed EISs for their approaches, methodologies, and scope of analyses. Several of these EISs consider in some detail the potential impacts associated with transportation of spent fuel, weapons materials, and highly radioactive wastes, and also discuss the environmental justice issues that may be raised by potentially extended shipping campaigns involving these materials. DOE also plans to coordinate with the U.S. Department of Transportation to obtain any guidance it may have developed for purposes of implementing the Environmental Justice Executive Order 12898.

2.2.14 Noise And Aesthetics

Issue Summary Four people commented on noise and aesthetics. These comments are summarized in Appendix A, Table A.14. Commentors stated that the EIS should assess baseline and project-induced noise levels along waste-transport routes in Lincoln County and at other County sites where repository facilities and activities would be located (intermodal transfer sites, borrow sites, highway-construction sites, and heavy-haul routes) and that impacts to the quality of life and to wildlife should be evaluated.

General EIS Approach The existing baseline noise environment and visual setting at Yucca Mountain and along transportation routes in Nevada will be characterized in the EIS. The impact on the environment from noise generated at the repository, at the intermodal-transfer facilities, and during construction of transportation routes in Nevada will be assessed. The visual impact of

the repository and of other waste-handling facilities in Nevada, and of operating a rail line in Nevada will also be assessed in the EIS. The analysis for potential impacts to wildlife was described in Section 2.2.9.

2.2.15 Performance Assessment

Issue Summary Six hundred twenty-four (624) commentors were concerned about the performance assessment to be conducted for the geologic repository. These comments are summarized in Appendix A, Table A.15. Eight specific issues were identified that related to: the type of events and processes that should be evaluated in the Repository EIS, the identification of engineered barriers and the ability of waste packages to maintain integrity over thousands of years, the methods used to conduct the performance assessment and evaluate uncertainty, the prediction of human intrusion, the identification of performance measures and institutional controls, the analytical time frame for the performance assessment, and the prediction of potential future impacts.

General EIS Approach. The Repository EIS performance assessment will assess events and processes that bound the potential environmental impacts from emplacing SNF and HLW, including those events and processes having low-probabilities of occurrence, but resulting in high consequences. Total system performance assessments prepared by DOE since 1993 evaluate the ability of the overall system to meet the performance objectives/measures identified in the applicable regulatory standards. These assessments explicitly acknowledge the uncertainty in the process models and parameters and evaluate the impact of this uncertainty on the overall performance.

The proposed engineered features to contain the waste packages will be described in sufficient detail to support the long-term performance assessment. The performance assessment will evaluate degradation of the waste packages given different thermal loads and consider infiltration rates, corrosion models, and other relevant factors. This analysis will consider both manmade and natural materials to retard the movement of radionuclides from the waste packages. Assumptions made for purposes of analysis will be documented in the EIS.

Intruder scenarios to be evaluated in the Repository EIS will be consistent with those required for potential licensing by the Nuclear Regulatory Commission. Non-fatal and fatal latent cancers will be reported in the Repository EIS. The analytical time frame for the Repository EIS will focus on a period of 10,000 years. Analysis will be extended to the time of peak dose and the results used qualitatively. Institutional controls to be implemented will also be described.

2.2.16 Cumulative Impacts

Issue Summary Forty-five (45) people commented on the scope of the analysis for cumulative impacts. These comments are summarized in Appendix A, Table A.16. Specific concerns were that the analysis consider the cumulative radiological risks and hazards from all past, current and

proposed activities involving radiological material not only at Yucca Mountain but at the NTS and other areas where radioactive material has been managed. Commentors were also concerned about the cumulative radiological effects on the human and natural environment from all past, present, and proposed activities involving radioactive material. Other commentors requested that the cumulative impacts section of the EIS address an inventory greater than the 70,000 MTHM limit imposed by the NWPA.

General EIS Approach DOE is considering options to evaluate the disposal of all commercial SNF and HLW, all DOE-owned SNF and HLW, and other wastes that are compatible with a repository environment. The cumulative impact analysis in the Repository EIS will also evaluate the impacts to the environment from past, present, and reasonably foreseeable activities at the NTS, the Beatty low-level waste disposal site, the Nellis Air Force Range, and from the potential shipment of other radioactive materials to the repository as described in Section 1.4. This analysis will include the cumulative impacts to both humans and the natural environment from transporting radioactive material from commercial and DOE sites as discussed in Section 1.4.

2.2.17 Mitigation

Issue Summary. Two hundred eighty (280) people commented on mitigation measures. These comments are included in Appendix A, Table A.17. The primary concern was that the EIS and the resulting Record of Decision and Mitigation Action Plan include and evaluate specific measures to mitigate all impacts, both from routine operations and potential accidents. In addition, commentors indicated that financial compensation should be provided to communities and individuals that could be affected by any phase of repository operations. One commentor indicated that the EIS should more fully consider the options for implementing assistance as required by Section 180(c) of the NWPA.

General EIS Approach The EIS and Record of Decision will discuss measures to mitigate adverse impacts, as necessary. General types of mitigation to be considered include: (1) impact avoidance by, for example, not undertaking certain activities, (2) impact minimization by limiting the degree or extent of certain activities, (3) impact rectification by repairing, rehabilitating, or restoring the affected environment (e.g, surface reclamation), (4) impact reduction or elimination over time, and (5) impact compensation by replacing or providing substitute resources.

Mitigation measures that are included in the Record of Decision will form the basis of DOE's Mitigation Action Plan. Pursuant to DOE regulations, the Mitigation Action Plan will explain how the mitigation measures will be planned and implemented. Following implementation, periodic status reports that address each mitigative measure will be prepared. The Mitigation Action Plan, like the EIS and Record of Decision, will be publicly available.

Section 180(c) of the NWPA requires DOE to provide technical assistance and funds to those States and Indian Tribes in which SNF and HLW will be transported. The assistance and funds are to cover procedures for safe routine transportation, as well as procedures for dealing

with emergency response situations. The EIS will discuss these requirements as well as the status of any relevant planning. However, options for implementing Section 180(c) will not be evaluated in the EIS.

2.2.18 Program/Project Cost

Issue Summary Two hundred fourteen (214) people commented on the cost of the proposed project. These comments are summarized in Appendix A, Table A.18. Specific concerns were related to conducting a total life-cycle cost estimate for each alternative for each phase of repository development (i.e., construction, operation, closure) including transportation. Other comments were concerned about who has financial responsibility for operating the repository and who would have financial responsibility in the event of an accident. Commentors were also concerned about the funding source for the program and requested that the EIS consider funding constraints in the analysis of costs including the analysis of a funding shortfall.

General EIS Approach DOE will consider estimates of the total system life-cycle costs for construction, operation, and closure of the repository as a relevant factor in making a final decision on the proposed action. However, costs will not be addressed in the EIS. The EIS will discuss both Nuclear Waste Fund and DOE funding as they pertain to financial responsibility for development, operation, and closure of the repository. The EIS will also describe organizations having financial responsibilities for emergency response and preparedness as well as responsibilities to remediate accidents from repository operations or transportation.

2.2.19 Socioeconomics

Issue Summary Sixty-six (66) people commented on issues related to socioeconomics. These comments are summarized in Appendix A, Table A.19. The issues focused on what populations should be evaluated and what attributes should be analyzed; the definition of the baseline affected environment; what data should be used as input into the socioeconomic analysis, the appropriate level of analysis and the methodology that would be used to conduct the analysis. Other commentors requested that the EIS discuss mitigation of socioeconomic impacts and that uncertainties, including data and future funding problems that might affect socioeconomic impacts, be described and the impact of these uncertainties be explained.

General EIS Approach The socioeconomic sections of the document will assess the impacts on local and regional socieconomic conditions considering attributes such as population, employment, economy, housing, and public finance. The EIS will use a baseline consistent with when the Draft EIS is released. Baseline information at the state, county and, where appropriate, local levels will be described including economic fiscal conditions and structure; population distribution; community services; social structure; and culture and lifestyle. Baseline data will be gathered from many sources that could include the State of Nevada, counties and cities in Nevada, and Native American groups.

The EIS will evaluate the socioeconomic impact in Nevada from implementing the repository program for each program phase. Potential socioeconomic impacts will be evaluated in a region of influence defined to assess localized effects around the site in addition to conducting a regional analysis to determine the effects on the economy. The EIS will identify key assumptions of the socioeconomic analyses. If major uncertainties are identified, the sensitivity of the analysis will be discussed.

Possible measures to mitigate socioeconomic impacts may be described in the EIS. Based on public input on the Draft EIS, these measures may be modified for the Final EIS. The Record of Decision will reflect DOE's commitment to certain mitigation measures.

The selection of a rail route in Nevada will consider economic, social, engineering, land use, and environmental factors. The EIS will either describe the criteria and rationale used to select the route.

2.2.20 Accidents

Issue Summary Twenty-five (25) people commented on accidents. These comments are summarized in Appendix A, Table A.20. Specific concerns were the identification of credible accident scenarios including analysis of an accident involving terrorist attacks or sabotage, the potential risk to the public from an accident, identification of evacuation routes, cleanup after an accident, impacts on the tourism business, and compensation for accident victims.

General EIS Approach The Repository EIS will identify a set of credible accident scenarios to evaluate. Accidents that could occur during the transportation phase, the construction and operation of the repository, and the post-closure phase will be assumed. For the post-closure phase, the principal accident initiators that will be considered are natural phenomena (e.g., a design basis earthquake). The suite of accidents to be evaluated will include a low probability, high consequence event to bound the potential environmental impacts. The impacts to the worker, maximally exposed individual, and off-site populations will be assessed. Intruder scenarios to be evaluated during post-closure will be those consistent with Nuclear Regulatory Commission requirements as described in Section 2.2.15.

2.2.21 General

Many commentors provided views and comments that were not related to the scope of the Repository EIS and therefore could not be used to guide the preparation of the EIS. These comments are summarized in Appendix A, Table A.21. While these comments provide a gauge of public sentiment on the program, they were not related to the content of the proposed action. Examples of comments that were placed into this category include: statements both in general opposition to and in general support of Yucca Mountain, repositories, and nuclear power; statements of distrust of the DOE or project opponents; opposition to transporting radioactive material; stated preferences for DOE to select the "No Action" alternative (absent of any environmental analysis); comments directed toward the public criticizing a perceived lack of the

public's willingness to be involved; criticism and support for the NEPA process; comments on unrelated DOE activities; and, criticism of DOE and that decisions had already been made prior to the NEPA process.

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