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NUCLEAR REGULATORY COMMISSION
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MEMORANDUM

DATE: December 8, 1986

FOR: Robert E. Browning, Director
Division of Waste Management

FROM: Paul T. Prestholt, Sr. OR - NNWSI PTP

SUBJECT: NNWSI Site Report period October 11, 1986 through December 8, 1986

I. QUALITY ASSURANCE

A. The NNWSI project FY 87 QA audit schedule is as follows:

Organization	Date	Requirement
o Los Alamos	March	NVO-196-17, Rev. 4, and Los Alamos QAPP and Implementing QA procedures.

1245

encl. to Dec. 8, 1986 Memo to REB from Prestholt, rec'd 12/15/86 - Rpt. 10/11/86 - 12-8-86

o Holmes and Narver	April	NVO-196-17, Rev. 5, H&N QAPP and implementing QA procedures, and design control procedures for ESF.
o SAIC/T&MSS	May	NVO-196-17, Rev. 5, and T&MSS QAPP and implementing QA procedures.
o USGS/Denver	June	NVO-196-17, Rev. 5, and USGS QAPP and implementing procedures.
o USGS/Menlo Park	June	Same
o Fennix & Scisson/ Tulsa	July	NVO-196-17, Rev. 5, F&S QAPP and design control procedures for ESF
o Reynolds Electric and Engineering Company (REECo)	August	NVO-196-17, Rev. 5, and REECo QAPP and implementing procedures

Firm dates for the above will be coordinated and issued in an audit notification letter 30 days prior to the audit.

B. A draft abstract of a document titled "Initial Q-List for the Prospective Yucca Mountain Repository Based on Items Important to Safety and Waste Isolation" by T. W. Laub, Sandia National Laboratories and L. J. Jardine, Bechtel National Incorporated is enclosed.

Several paragraphs from this document are quoted. The first deals with the handling of waste at the surface facility. It says:

"Items important to safety were identified using a methodology that was based on the definition in 10 CFR 60.2 and a complete preliminary preclosure safety analysis performed for the Yucca Mountain repository using a probabilistic risk assessment (PRA) approach. The credible accident scenarios (those with a frequency of occurrence greater than 10^{-5}/yr as defined by DOE guidance) at Yucca Mountain did not result in any doses greater than 500 mrem at or beyond the nearest boundary of the unrestricted area; therefore, no items were found to be important to safety. However, pending further analysis, several items associated with cask handling in the receiving portion of the waste-handling building were found to be "potentially" important to safety. Items found to be potentially important to safety are not on the Q-list but will receive a quality level I QA assignment. The level I QA program satisfies the 10 CFR 60 Subpart G QA requirements for items important to safety and are the same as those required in 10 CFR 50 Appendix B."

This paragraph says that no "credible accident scenarios" were identified that would result in doses greater "than 500 mrem at or beyond the nearest boundary of the unrestricted area." In other words, there is little likelihood of a release to the public greater than allowed in 40 CFR 191 resulting from waste handling activities at the surface facility. This is a significant finding and should be noted by the staff.

The document goes on to say:

"Since 10 CFR 60 and other NRC documents provide no explicit guidance for the definition of items important to waste isolation, the development of a definition of "important to waste isolation" and numerical criteria to identify specific items as important to waste isolation were required. This paper takes the position that items important to waste isolation are those items and activities required to demonstrate compliance with the overall system performance objective of 10 CFR 60.112. This differs from the recent NRC position (Draft Generic Technical

Position on Items and Activities in the High-Level Waste Geologic Repository Program Subject to 10 CFR Part 60 Quality Assurance Requirements, NRC, July 1986) that items important to waste isolation include the engineered barriers used to demonstrate compliance with the three numerical criteria for containment or geologic setting of 10 CFR 60.113 (i.e., waste package lifetime, allowable release rate, and pre-emplacement groundwater travel time).

"Using this paper's definition, the methodology for the determination of items important to waste isolation consisted of procedures to: (1) screen initiating processes and events applicable to Yucca Mountain during the 10,000-year postclosure period of interest, (2) develop scenarios potentially resulting in significant postclosure radioactive releases for anticipated and unanticipated processes and events, (3) assign estimated frequencies of occurrence to these scenarios, and (4) assess the consequences of radioactive releases to the accessible environment. When these procedures were carried out, the overall system performance objective was satisfied by reliance only on specific geologic units at the site and only on specific characteristics of those units. Those units and characteristics were therefore judged to be important to waste isolation and were placed on the Q-list.

"The engineered barriers were not required to demonstrate compliance with the overall system performance objective of 60.112; therefore, the engineered barriers are neither important to waste isolation nor on the initial Q-list for the Yucca Mountain repository. However, the engineered barriers contribute to defense-in-depth for waste isolation and are subject to a quality level I QA program. If future analysis shows that engineered barriers are necessary to demonstrate compliance with the overall system performance objective of 10 CFR 60.112, they will be placed on the Q-list."

These paragraphs take issue with NRC guidance concerning engineered barriers. The staff should review this position and the logic behind it.

II. GEOLOGY-GEOHYDROLOGY

A. On November 3, 1986, I participated in a field trip to Crater Flat. Marith Reheis and John Whitney, USGS lead a group consisting of USGS, State of Nevada, WMPO and SAIC geologists to the Bare Mountain range front fault and to trenches CF-2, CF-2.5 and CF-3.

Marith Reheis has been working on the Bare Mountain fault and took the group to several exposures of the fault plane. Ms. Reheis demonstrated that the fault dips at approximately 60° at the southern end and at about 35° to the north. It has been suggested that this fault is a detachment fault with a very shallow dip. It is obvious, from the exposures, that the Bare Mountain range front fault does not have the shallow dip usually associated with detachment faults.

John Whitney finished the day by discussing his mapping of trenches CF-2, CF-2.5 and CF-3. Dr. Whitney indicated that he was presenting his results at the GSA meeting in San Antonio, Texas, later in the month.

B. Since Keith McConnel, WMGT, was attending the GSA meeting in San Antonio, I suggested that he listen to Whitney's presentation and then come to Las Vegas on his way home and visit Crater Flat.

On November 17, Keith McConnell, Jerry Szymanski, WMPO, and I visited the Bare Mountain fault and the trenches noted above. Mr. McConnell was able to compare the information he gained from Dr. Whitney's talk, with the trench. He was also able to compare notes on the Bare Mountain fault and the tectonic history of Crater Flat with Mr. Szymanski.

C. Charlotte Abrams, WMGT, is proposing a field trip to Yucca Mountain and the region surrounding the Mountain in February 1987. This field trip would include a visit to the Cedar Mountain fault in central Nevada, the site of a major earthquake in the 1930's. This feature is being investigated by Dr. John Bell, State of Nevada.

I support this field trip. It is important that the staff understand the regional tectonic setting so that a reasonable assessment of the various tectonic models is possible.

III. GEOCHEMISTRY

Nothing to report.

IV. ROCK MECHANICS, FACILITY DESIGN AND EXPLORATORY SHAFT

An Appendix 7 interaction will be conducted by members of the WMEG Branch during the week of December 8, 1986. Dinesh Gupta and John Peshel represent WMEG Branch. Contractor personnel taking part in document review in Las Vegas include Jaak Daemen, University of Nevada; Swapan Bhattacharya, Engineers International; and Kanaan Hanna, Bureau of Mines. Jim Grubb, State of Nevada, will also be present. This team will review the first 5 chapters of the "Site Characterization Plan Conceptual Design Report" compiled by Hugh R. MacDougal, Sandia National Laboratory.

On Thursday evening, the 11th of December, Dinesh Gupta, John Peshel, Jim Grubb, and I, will fly to Albuquerque, N.M. to talk to Sandia National Laboratory, Parsons Brinkerhoff, and Bechtel personnel.

V. WASTE PACKAGE

Nothing to report.

VI. PERFORMANCE ASSESSMENT-ALLOCATION

During the November TPO-Project Manager meeting a presentation on the NNWSI Project Configuration Management Plan was given. Enclosed are two handouts from this meeting: the relationship between Systems Engineering and Configuration Management and Annex 8 to the NNWSI Project Management Plan. The handouts are self-explanatory.

VII. ENVIRONMENT

Nothing to report.

VIII. LICENSING AND NRC INTERACTIONS

During this reporting period an Appendix 7 interaction between WMEG and NNWSI personnel has been approved. The discussion topics are: The surface facility conceptual design, the underground facility conceptual design and some discussion of the exploratory shaft proposed prototype testing in "G" tunnel.

On December 9, 10, and 11, the group will review draft documents pertaining to the above subjects in the Las Vegas OR office. Some discussions with WMPO personnel are planned. On December 12, discussions with SNL, Parsons Brinkerhoff, and Bechtel personnel are planned in Albuquerque, N.M.

IX. STATE INTERACTIONS

A. On November 17, 1986, Dr. Donald Vieth gave a presentation to the "Nevada Commission on Nuclear Waste." The handouts from these presentations are enclosed.

In his presentation to the Commission, Dr. Vieth discussed:

1. DOE activities regarding alternatives to geologic disposal.

2. Impact of recent Congressional budget action on the NNWSI project.

3. Status of stop work orders, corrective actions, and State involvement.

During this presentation, Dr. Vieth stressed that no money is budgeted by DOE in FY 87 for alternative disposal methods.

The Commission raised the question of whether or not additional funds can be allocated to the State grant now that Nevada has been picked for characterization. Dr. Vieth replied that every nickle was allocated and that, since the State grant request goes to OMB several years in advance, the State would have to live with the Federal budget procedures.

In his presentation to the State Legislative Committee, Dr. Vieth covered the following topics:

1. Status of major elements of the program
   - Environmental consideration
   - Socioeconomic considerations
   - Transportation
   - Communications

2. Status of decision to delay the second repository program

3. Status of Fy 1987 budget

In the enclosed handout is a schedule for the production of the SCP and EIS. In answer to a question from the Committee, Dr. Vieth stated that the schedule for the EIS (draft EIS, 1/91, final EIS, 7/91) was tight but doable.

B. Enclosed are the minutes of the Nevada Legislative Committee June 24, 1986 meeting held in Carson City, Nevada.

C. Enclosed is a letter from Dr. Donald Vieth to Robert Loux, inviting the State of Nevada to participate in the Appendix 7 visit scheduled for the week of December 8, 1986.

Also enclosed is a memo from Dr. Vieth to the NNWSI participants informing the participants that they "may expect regular State participation at future formal technical interactions between the NNWSI Project and the NRC."

X. MISCELLANEOUS

A. Enclosed is the "Sandia National Laboratories NNWSI Data Catalog."

B. Enclosed is a 5 part series by Mary Manning that appeared in the Las Vegas Sun during the week of November 30, 1986.

C. On November 18, Jerry Szymanski and I took three members of the GAO staff on a tour of NTS and Yucca Mountain. The three GAO staff members were:

- J. Ken Goodmiller
- Ronald E. Stouffer
- Christopher S. Herndobler

They were visiting the NNWSI on behalf of Congressman Markey.

The GAO staff members asked questions concerning:

- Technical issues concerning the Yucca Mountain Site
- Effectiveness of the interactions between DOE and NRC

A verbal report on these discussions has been given to Dr. Michael Bell.

PTP:nan

cc: With enclosures:
J. J. Linehan
K. Stablein
S. Wastler

cc: No enclosures:

D. L. Vieth	G. Cook
J. P. Knight	N. Still
R. R. Loux	S. Bilhorn
J. Szymanski	C. Abrams
M. Glora	F. R. Cook
D. M. Kunihero	J. K. Goodmiller

Enclosures:

Five part newspaper article series
Sandia National Laboratories data catalog
Handouts: Seismic-Tectonic W.G.
NNWSI QA Update (11/5-6/86 TPO Meeting)
NNWSI Project Configuration Management Plan (OCRWM)
Relationship Between Systems Engineering and Configuration Management, 11/6/86
The Nevada Legislative Committee on High-Level Radioactive Waste (Presentation--OCRWM), 11/24/86
Nevada Commission on Nuclear Projects Meeting, Las Vegas City Council Chambers 11/17/86
Agenda, Nevada Commission on Nuclear Projects Meeting 11/17/86
Letter to Robert R. Loux, Jr. from Donald L. Vieth re: Nevada Nuclear Waste Storage Investigations Project Nuclear Regulatory Commission Appendix 7 Interaction
Letter and Memo re: State Participation in Nuclear Regulatory Commission/Department of Energy Technical Interactions
Minutes of the Meeting of the Nevada Legislature's Committee on High-Level Radioactive Waste, Carson City, NV, 6/24/86
WMPO QA Audit Schedule for FY 87

Nevada Nuclear Waste Project Office

Nevada Nuclear Waste Newsletter

Vol. 2 No. 4 November 1986

DOE Budget Slashed: Drilling Prohibited

Drilling of exploratory shafts at proposed nuclear waste repository sites is prohibited under terms of a congressional compromise on the Department of Energy's fiscal 1987 budget.

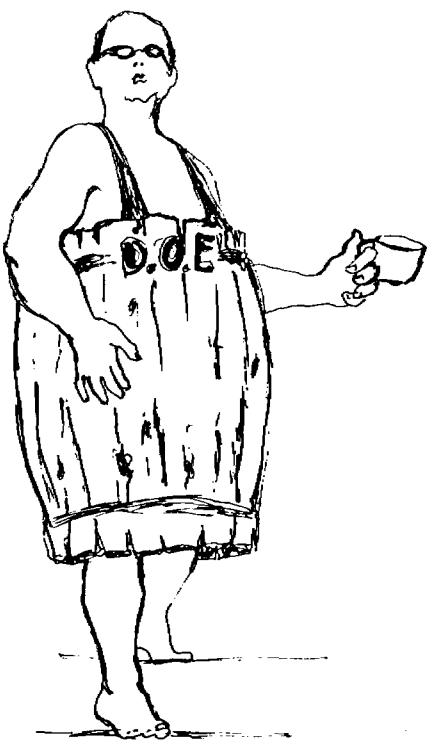
DOE, which had asked for $769 million, got $420 million under the House-Senate agreement late in the 99th Session. It could qualify for another $79 million if it could show it made good faith efforts to negotiate cooperative agreements with the states and tribes.

> "The DOE could qualify for another $79 million if it could show it made good faith efforts to negotiate cooperative agreements with the state and tribes"

The DOE intends to conduct site characterization at Yucca Mountain in southern Nevada, at Hanford in central Washington, and Deaf Smith County on the Texas Panhandle. However, the new budget agreement specifically provides there can be no drilling of exploratory shafts, or site specific activities, during the fiscal year.

Robert Loux, executive director of the Nevada Nuclear Waste Project Office, said the budget cuts indicate Congress is disturbed over DOE's handling of the entire repository program.

"It appears that Congress has finally acknowledged what the states and tribes have been saying all along — that the entire DOE site selection process as well as other aspects of the program are wrong and illegal," Loux said. "Many members of Congress appear now to be willing to open up the Nuclear Waste Policy Act and start the siting process all over, by declaring that the selection of sites for site characterization be declared void and by beginning anew a national screening program that examines all regions of the country for suitable sites.



"Additionally, there are questions whether geologic disposal of the waste (burying) is the correct solution to this national problem, and whether the DOE is capable of implementing the program. These are questions that various members of Congress have indicated strong interest in re-examining next year," he said.

The move to reduce DOE funds erupted after Energy Secretary John Herrington selected the three sites for detailed study as possible locations for the country's first high-level nuclear waste repository. At the same time, he announced an indefinite postponement of DOE's search for a second repository in the central or eastern portion of the country.

Nevada officials, supported by a General Accounting Office report and statements by DOE's own attorney, claimed Herrington violated the NWPA and that his decisions were based on election-year politics. The state filed five lawsuits in the 9th U.S. Circuit Court of Appeals.

Issue Highlights

Repository Search: What's Next?

What happens next, now that the president has approved the Department of Energy recommendation to characterize three sites in the nuclear waste repository program?

The Nuclear Waste Policy Act of 1983 (NWPA) requires DOE to conduct a site characterization program that includes construction of exploratory shafts at each candidate site. The Act also requires that DOE prepare a site characterization plan (SCP) before beginning shaft construction at any site.

The SCPs also are required by Nuclear Regulatory Commission (NRC) regulations.

The site characterization will consist of geologic, hydrologic, geochemical, seismotectonic, paleoclimatological and meteorological investigations. They will require about five years to complete.

OCRWM Bulletin, August 1986, says the basic purposes of the SCP are to:

— describe the site, and the preliminary designs of a repository and waste package appropriate to the site in sufficient detail so that the affected parties can fully understand the basis for the planned site characterization program;

— identify the uncertainties and limitations on the site — and design-related information developed during the site screening; to identify the issues to be resolved during the site characterization and the information needed to resolve the issues; and to present the strategy for resolving the issues, including the site suitability findings required by the siting guidelines;

— describe work plans needed to resolve outstanding issues, reduce uncertainties in the data, and make required site suitability findings in terms of the siting guidelines.

DOE must submit each SCP to the governor, legislature and affected Indian tribe of each state where the candidate site is located. This may be in early 1987.

In addition, DOE must hold public hearings in the vicinity of the site to inform residents of the plan and to receive their comments. One tentatively is set for March 1987 at Amargosa Valley.

The NWPA requires DOE to conduct site characterization studies in a manner that minimizes any significant adverse environmental impact. In consultation with the three states and affected tribes, DOE will develop and implement monitoring and mitigation plans focusing on those site characterization activities that DOE determines have a potential for a significant adverse impact.

During site characterization, DOE will issue progress reports every six months to the NRC, the candidate states and affected tribes. The reports will show the extent of activities, the information gained, the progress of waste form and waste package development, and will identify new issues and decision points. They also will tell of progress in developing the repository design.

When the work related to site characterization is completed, the secretary of energy will send to the president a recommendation on which site should be developed as a repository. The recommendation will be accompanied by an environmental statement supporting the selection. At this point, the state in which the final site is located may issue a notice of disapproval. Congress can override this veto by a majority vote of each house.

Once a site has been selected, DOE must apply to the NRC for construction authorization. The commission's review of the application may require about three years.

Initial repository construction will require several years. DOE hopes to begin in 1993. During construction, DOE intends to submit an application to NRC for an operating license that would allow the repository to receive waste. Under the DOE plan, the first waste for a Yucca Mountain repository would be received in 1998.

Where To Write

Readers of the *Nevada Nuclear Waste Newsletter* who desire additional information about issues or documents discussed in the *Newsletter* are encouraged to write to the offices listed below.

Nevada State Nuclear Waste Project Office/Agency for Nuclear Projects, Capitol Complex, Carson City, Nevada 89710. Phone (702) 885-3744.

Department of Energy, Nevada Operations Office, P.O. Box 14100, Las Vegas, Nevada 89114. Phone 295-3662. □

The *Nevada Nuclear Waste Newsletter* is published by the Nevada State Nuclear Waste Project Office/Agency for Nuclear Projects. Mailing address: Capitol Complex, Carson City, Nevada 89710.

The *Newsletter* is funded through United States Department of Energy Grant Number DE-FG08-85NV10461. □

Cities Oppose Nevada Repository

The Nevada League of Cities has voted to oppose location of a high-level nuclear waste repository at Yucca Mountain in southern Nevada.

The organization adopted a resolution that "strongly supports" the position taken by the Nevada congressional delegation and Gov. Richard Bryan.

The resolution said movement of nuclear waste would impact the Nevada transportation network; that location of a repository in southern Nevada could adversely impact the infrastructure of cities, including roads, railways, schools and housing; that the Department of Energy's method of selection of Yucca Mountain has been done on an arbitrary and capricious basis, and that DOE "through gross mismanagement and blatant disregard" of the Nuclear Waste Policy Act has jeopardized the integrity of the entire repository process.

It said DOE's selection process "could result in serious harm to the state's tourism economy, affect the public health and safety of Nevada citizens and visitors, and could severely impact the state and local efforts to diversify our economic base by attracting clean nonpolluting industry."

Other groups that have resolved to oppose the DOE program include the Western Governors Association, Conference of Western Attorneys General, and a working group of the National Conference of State Legislatures.

Schedule of Events

November:
Nevada Commission on Nuclear Projects.
Contact: Sally Cox or Norma Conway
(702) 885-3744

November 12-14:
National Conference of State Legislatures Working Group on High-Level Nuclear Waste, Amarillo, Texas.
Contact: Cheryl Runyan
(303) 623-7800

DOE's Hanford Choice Goes to Washington Voters

Washington State residents will have a chance to express their opinion of the Energy Department's program to site a high-level nuclear waste repository.

Gov. Booth Gardner called the Legislature into special session in August to debate a proposal for a referendum in November. Legislators adopted a ballot question that will ask voters whether they approved of the process that DOE followed in selecting Hanford as one of three sites for the final choice.

The governor, attorney general and legislative leaders who criticized the DOE siting program said the time had come for the public to have a chance to express their opinion about it. Several state legislators from Oregon attended the session to oppose the choice of Hanford as a finalist. Hanford is near the Columbia River, which forms the boundary between the two states and is a major economic resource.

> "Legislators added a provision requiring citizens be given a chance to veto ultimate presidential selection of Hanford for development of a repository."

Provisions of the bill adopted by the legislature included:

— the process selecting Hanford as a candidate site for a first repository violates the mandate of Congress;

— the process could threaten the health and safety of Washington residents;

— DOE prematurely suspended consideration of sites that would be more appropriate;

— Congress must provide funds to develop two repositories or suspend all funding of any repository program;

— suspension of a search for a second repository violated the Nuclear Waste Policy Act.

The bill said the question on the ballot will be, "Shall state officials continue challenges to the federal selection process for high-level nuclear waste repositories and shall a means be provided for voter disapproval of any Washington site?"

In addition to requesting the voters' view of the selection of Hanford for site characterization, the legislators added a provision requiring that citizens be given a chance to veto ultimate presidential selection of Hanford for development of a repository.

Governor's Statement

On July 31, 1986, Rep. Edward J. Markey (D-Mass.) released DOE documents admitting that the decision to abandon the search for an eastern repository site was motivated by election-year politics. Markey said the documents showed DOE had considered the political implications of at least six courses of action before choosing one that "would give a great deal of political benefit to DOE" from eastern states, although it would result in "severe political backlash" from potential repository sites in the West.

As Rep. Markey said, "These documents show that the Department put politics first, not science, in making its decisions." He obtained the documents after DOE officials initially told him all working drafts leading up to the decision had been destroyed.

Nevadans are greatly distressed by these revelations, because they show a repository selection process that is far removed from the one Congress envisioned when it enacted the Nuclear Waste Policy Act of 1982.

Those of us who followed the painstaking, meticulous and politically sensitive process which led to congressional passage of the Act clearly remember how Congress struggled long and hard to fashion a series of fragile compromises which allowed this controversial piece of legislation to become law.

What made the Nuclear Waste Policy Act unique and enabled Congress to succeed in passing it when all previous attempts at high-level nuclear waste legislation had failed was the fact that for the first time a truly national process for siting waste repositories was established, and scientific and technical factors were given preeminence in the ultimate selection of disposal sites.

The Department of Energy's repository site selection program seems to be out-of-control, directed as it is by federal bureaucrats more intent on making the process serve political aims than in locating the best and safest site for disposing of the nation's highly radioactive byproducts.

Decisive, meaningful action on the part of Congress will be needed if the country is to avoid yet another in the long string of failures in its attempts to arrive at a workable solution to the nuclear waste problem. Nevadans and concerned citizens from around the country will be watching closely over the next few months to see if Congress has the political will to put this crucial program back on a scientifically and technically sound track.

RICHARD H. BRYAN
Governor of Nevada

Hereditary Effects of Radiation

By Dr. Peter Spiegler

Ionizing radiations are capable of producing mutations in the individual genes of all nucleated body cells. The changes are referred to as hereditary or genetic effects if they occur in the germ plasm of cells of the reproductive organs and are subsequently transmitted to future generations.

Most mutations are generally deleterious to future generations. However, mutations cannot be uniquely attributed to radiation. Mutations occur also spontaneously, and they are more likely to be induced by chemical agents. Since the cause of mutations is not unique, it can be said only that excessive radiation will increase the frequency of genetically determined diseases.

The genetically determined disease burden of our society is very large. The UNSCEAR (United Nations Scientific Committee on the Effects of Atomic Radiation) study of 1977 indicates that approximately 10 percent of all live-born individuals in our population suffer from recognized serious genetic disorders that are manifested either at birth or during the lifetime of the individual. The precise contribution from natural background radiation to this mutationally determined disease burden in unknown, but the UNSCEAR study suggests that it is possibly in the range of 0.5 to 1 percent of the total genetically determined diseases. Part of the concern over radiation exposure is not to further increase the genetic disease burden of the society.

The study of mutations requires large pools of subjects. In the case of radiation and man, the study is not possible because large numbers of individuals subjected to excessive amounts of radiation are not available and because the time between generations is so long. Also, genes are classified as dominant or recessive. Mutations toward dominant genes will show up in the first generation of offspring, but mutations towards recessive genes may not evince themselves for several generations. The offsprings of the survivors of Hiroshima and Nagasaki have been watched and studied but nothing conclusive has been observed. Even that population is considered to be too small for an accurate study.

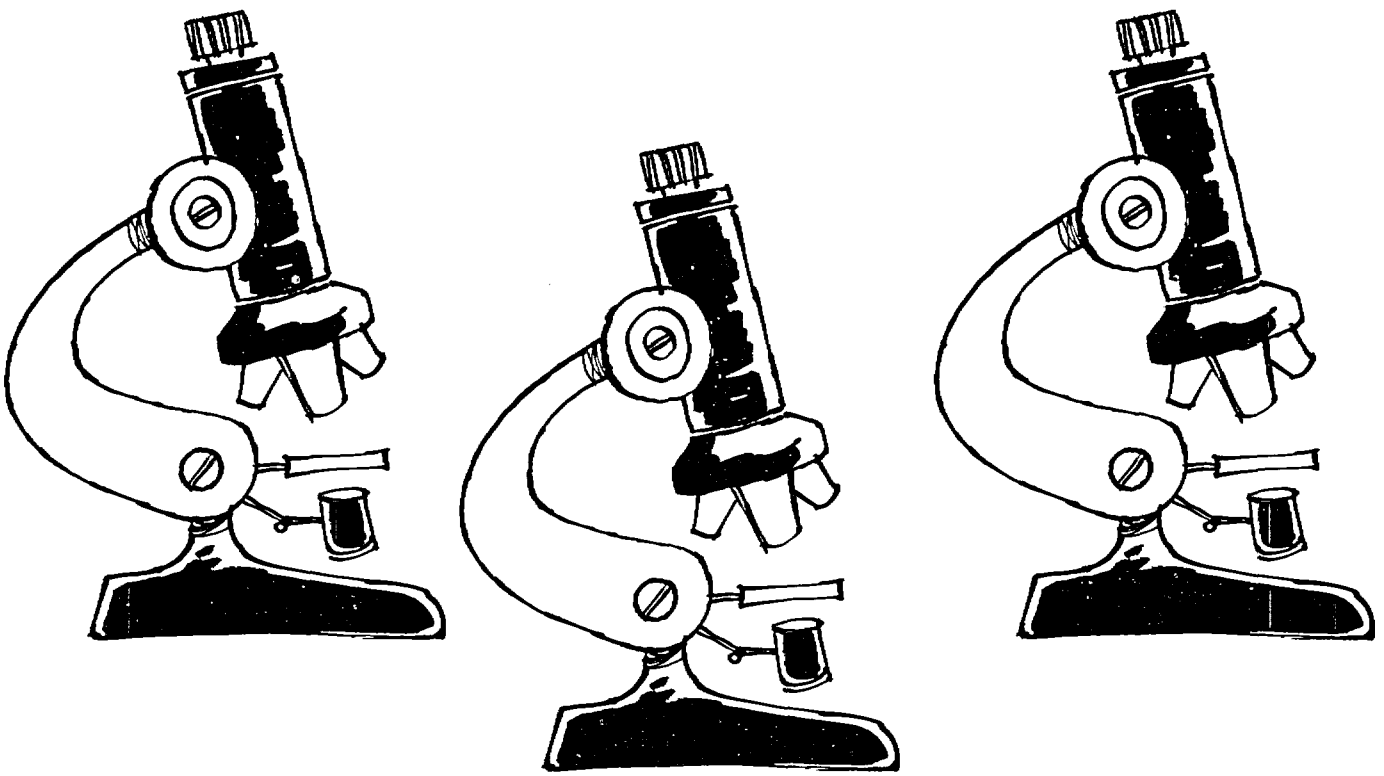
For this reason, much of the present knowledge on radiation induced mutation is based on work with animals (mostly the fruit fly, drosophila, and various laboratory mice), The laboratory work indicates that radiation induces mutations in all species studied at all doses and dose rates. The laboratory data has been used to calculate the number of mutations/unit radiation dose/unit weight of DNA and those data have also been used to extrapolate to man. However, such extrapolation can be fraught with errors and radiation scientists usually try to be very guarded and equivocal in their statements.

For humans, radiation damage in chromosomes (the bodies inside the cell that carry the DNA molecules) has been studied extensively by irradiating whole blood samples and then extracting the little lymphocytes, which are further treated with chemicals that stimulate cell division. In the most accurate and extensive experiments, radiation damage has been observed at doses as low as five rads. However, a very large number of lymphocytes had to be observed under the microscope.

Nevertheless, the technique is considered as a useful biological dosimeter for doses greater than 20 rads. (The rad is the unit of radiation used most often by the radiological physicist and the radiation biologist. For x and gamma radiation 1 rad = 1 rem. The rem was mentioned in a previous article as a unit of radiation used by the health physicist).

The technique could have been used to assess the radiation dose of people who did not have a personal dosimeter and who were suspect of receiving excessive radiation doses at the recent catastrophe at Chernobyl.

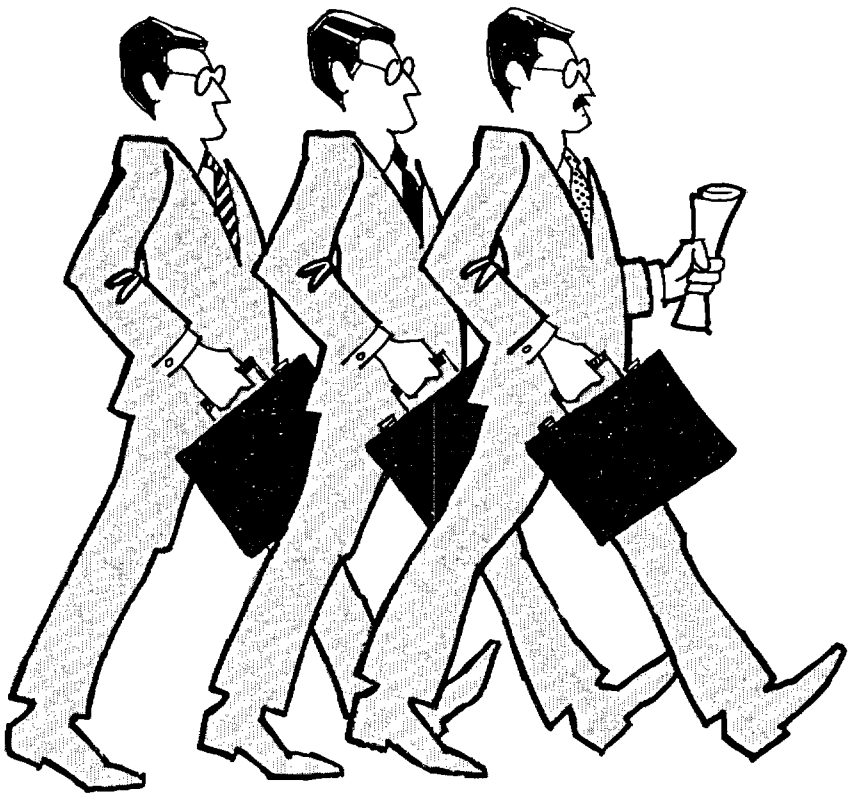
Dr. Spiegler is a radiation physicist.



DOE Loses Bid to Transfer Wave of Repository Lawsuits

On Oct. 29, 1986, the ninth U.S. Circuit Court of Appeals denied the Department of Energy's request to transfer a group of lawsuits to the District of Columbia Circuit Court of Appeals. The court's action triggered filing of motions addressing procedural matters in anticipation of deciding the first wave of cases that challenged DOE's nuclear waste repository siting guidelines.

Eleven cases brought by various states and public interest groups are pending in this round of litigation, with at least eight separate intervenors.



Three cases, also in the first wave, are awaiting decision in the First Circuit Court of Appeals. These cases challenge the validity of the Environmental Protection Agency's standards for the protection of the environment from the storage of high-level nuclear waste in a deep geologic repository.

> "These cases challenge the validity of the E.P.A. standards for the protection of the environment from the storage of high-level nuclear waste."

All of the second-wave cases have been consolidated by the court under Nevada's first case filed on May 28, 1986, the day the secretary of energy announced the nomination, recommendation and approval of three sites for characterization (Newsletter, July 1986). Subsequent to Nevada's filings, the state of Texas filed two cases and a Texas public interest group filed another. Washington State filed four cases. Idaho and Oregon subsequently filed petitions, as did the Sierra Club, National Parks and Conservation Association and coalition for Safe Power. Six eastern and central states have intervened in the various second-wave cases.

Briefing is completed on Nevada's challenge to DOE's refusal to permit the use of Nuclear Waste Fund grant monies for the purpose of judicial review of agency decisions. The administrative record was filed in three other actions brought by the state, and a briefing schedule will be set by the Ninth Circuit. The state joined other parties in a motion for the appointment of a special master to hear the challenges to the sufficiency and validity of the environmental assessments of the candidate sites published by DOE on May 28.

Recent Publications

The following is a partial list of recently published reference materials which have relevance to nuclear waste issues:

(U.S.) Department of Energy, ***Transportation Institutional Plan*** (final) Washington, D.C., DOE Office of Civilian Radioactive Waste Management, July, 1986).

(U.S.) Department of Energy, Financial Assistance Policy Guidelines (preliminary draft) (Washington, D.C., DOE Office of Civilian Radioactive Waste Management, July, 1986).

(U.S.) Department of Energy, ***Information Services Directory*** (Washington, D.C., DOE/RW-0038, DOE/OCRWM, August, 1986).

(U.S.) Department of Energy, ***Request for Proposal for From-Reactor (i.e. Transportation) Casks*** (available from DOE Idaho Operations Office, Idaho Falls, Idaho, July, 1986).

Sloan, Jim, Series of Articles about the Proposed High-Level Nuclear Waste Repository in Nevada. Published in the Reno Gazette-Journal between July 27-August 3, 1986 (reprints available from the Nevada Nuclear Waste Project Office).

Office of Technology Assessment, ***Transportation of Hazardous Materials*** (Washington, D.C. OTA-SET-304, July, 1986).

Errata:

In the July Newsletter article, "Nuclear Power Plants: Measuring the Pros and Cons of Nuclear Powered Electricity and its Waste," it was pointed out that large amounts of hydrogen and oxygen gases result from the breakdown of water molecules by the high radiation field. In a loss of coolant accident leading to a core meltdown, the chemical reaction between the molten fuel and the water is a much more important generator of hydrogen and oxygen gases, especially if the fuel cladding is made of zirconium.

In the article, "Radiation Damage Has Early and Late Effects," the insert should have read as follows: "An individual will receive a whole-body dose if exposed to an extended source of penetrating gamma rays or a broad beam of X-rays. A whole-body dose greater than 1,000 rem is fatal within minutes to hours.

Lincoln County: Are We Being Railroaded?

For over two years, local governments in southern Nevada have played an important part in state planning and oversight relative to the U.S. Department of Energy's (DOE) proposal for a high-level nuclear waste repository at Yucca Mountain. This is the third in a series of articles that profile each of these local governments and describe the nature and scope of each jurisdiction's involvement in repository planning and monitoring efforts.

LINCOLN COUNTY AND THE CITY OF CALIENTE: TRANSPORTATION IS A MAJOR CONCERN

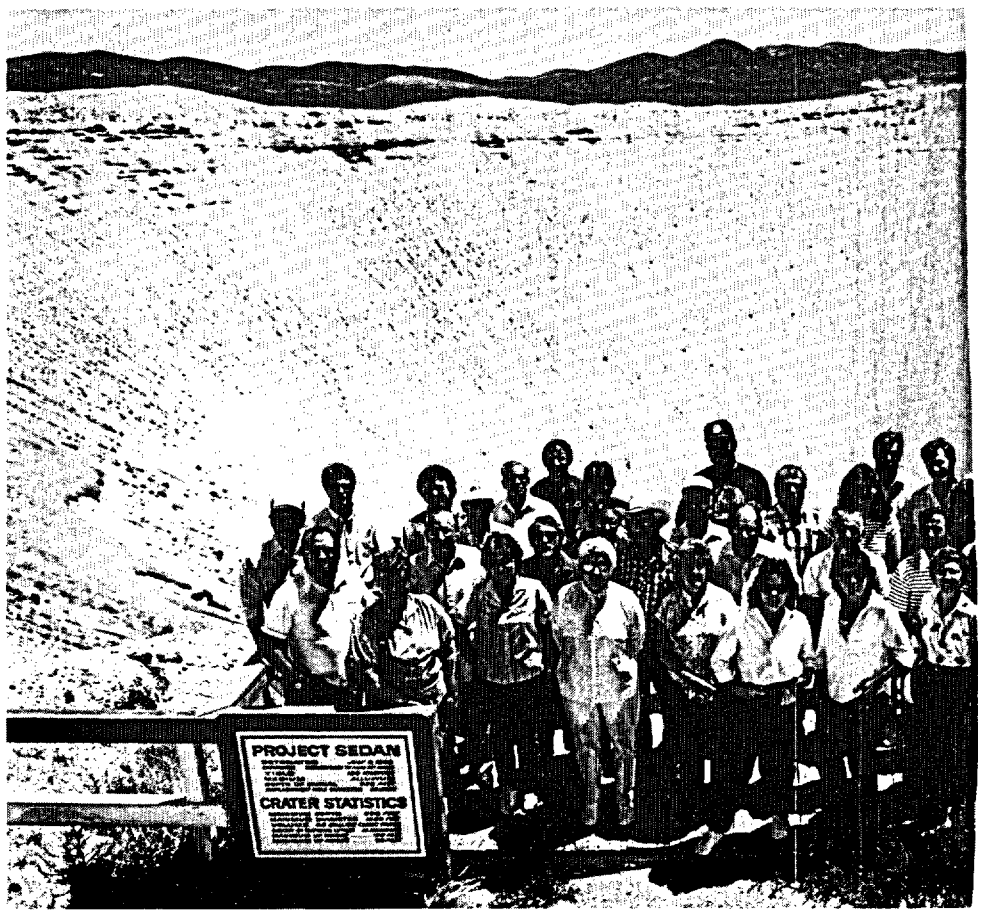
Should a repository be located at Yucca Mountain, much of the highly-radioactive materials destined for disposal at the site would be shipped by train via the Union Pacific rail corridor through Lincoln County and the City of Caliente, according to the U.S. Department of Energy's (DOE) current transportation projections.

Lincoln County, the third largest County in the State, encompasses 10,635 square miles in southeastern Nevada. Population estimates for 1984 indicate that the county contains 4,550 people. On the surface, these figures translate to an extremely low population density of less than one half person per square mile. However, the county's population is concentrated in a region encompassing the towns of Pioche and Panaca and the incorporated city of Caliente. Caliente alone contains 1,180 people (or almost 26% of the county's population).

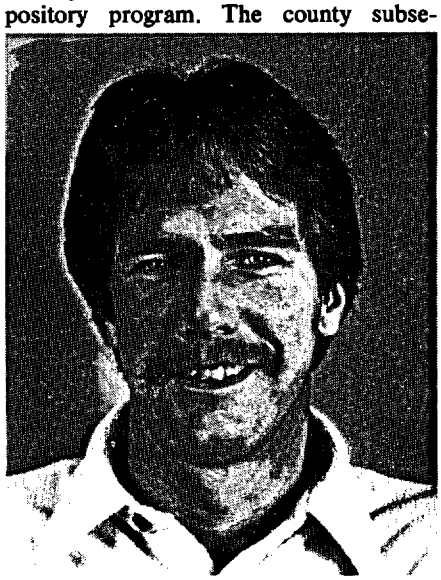
High-level nuclear waste shipments to a repository in southern Nevada will likely enter the state to the east of Caliente on the Union Pacific rail line which bisects Caliente and winds its way south through rugged canyons, gorges and some of the most flood-prone terrain in the state.

Caliente, because of its unique location with regard to the rail corridor, is likely to be significantly affected by the repository-related nuclear waste shipments. The city is literally astride the Union Pacific rail line. Residences, shops and even the city offices are only feet from the tracks which run through the center of town.

The prospect of more than 800 train loads of highly radioactive materials passing through the area prompted county and city officials to begin to look closely at repository-related impacts and to develop the planning capacity necessary to adequately address those impacts. In 1984, the Nevada Nuclear Waste Project Office (NWPO) began providing grant funds to Lincoln County to enable the county to participate in the state's monitoring and oversight effects relative to DOE's repository program. The county subsequently employed the Nevada consulting firm of Resource Concepts, Inc. (RCI) to evaluate county and city needs with regard to the high-level waste disposal program and to coordinate county/city efforts with those of the NWPO.

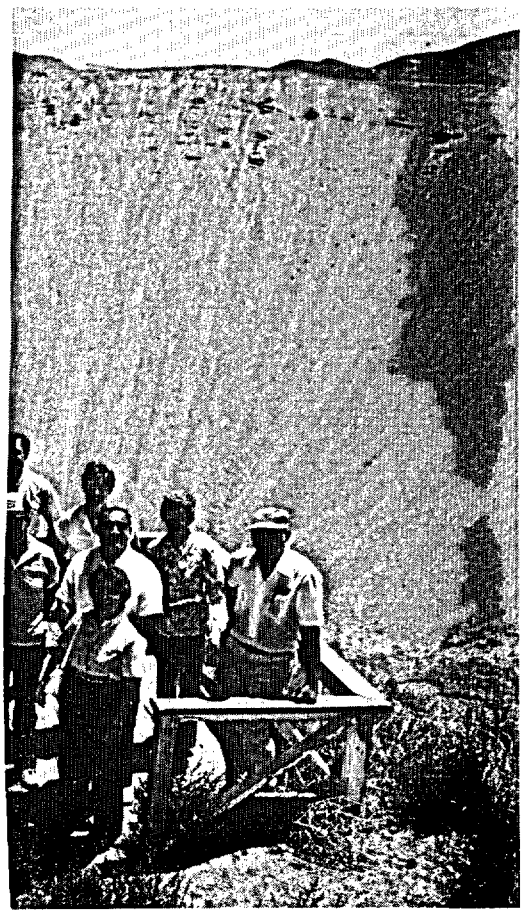


Members of the Lincoln County/City of Caliente Joint Impact Alleviation Committee and i the Yucca Mountain repository site in July. The tour was arranged by the committee to pro repository program, and to address city/county concerns about airborne radiation dangers


Mike Baughman, resource economist for the firm of Resource Concepts, Inc.

In 1985, Lincoln County entered into a memorandum of understanding with Caliente whereby the city became the lead entity in the repository oversight effort. Mike Baughman, resource economist for RCI, facilitated the development and execution of the agreement and has been the primary representative for the city and county on the informal state/local government planning group established by the NWPO to provide meaningful involvement for local jurisdictions in state high-level waste program oversight activities.

Recognizing the importance of involving key county and city representatives in repository-related planning, Baughman helped to establish a joint city/county impact alleviation committee, which includes three members appointed by the Lincoln County Commission and three members appointed by the Caliente City Council. The committee has proven to be a



rested citizens visited the Nevada Test Site and le the opportunity to learn more about DOE's a result of weapons testing activities.

useful model for interjurisdictional cooperation and planning.

During the past 2½ years, the impact alleviation committee with technical support from Baughman and RCI has undertaken several important projects aimed at establishing crucial baseline information necessary for subsequent impact assessment activities. These projects include an inventory of county and city emergency response capabilities, a county-wide labor force survey, and a survey of the Union Pacific rail corridor through Caliente.

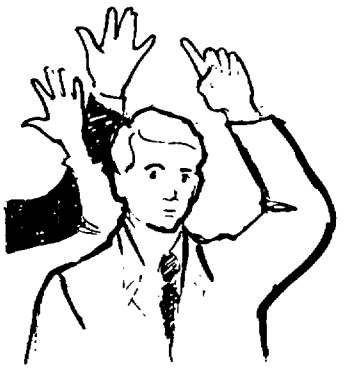
Baughman, who has extensive experience in economic development and planning, has been instrumental in organizing and implementing city/county activities with regard to the repository program. Mike holds a Graduate Degree in Economics and has been with RCI since 1979, first as a staff economist and later as a principal with the firm. He has been instrumental in assuring full city/county participation in the state's planning for its socioeconomic and transportation assessment efforts, and has provided an effective Lincoln County/City of Caliente voice in the federal high-level waste program.

Here's What You Can Do...

The Department of Energy is moving into the site characterization phase of its search for a national high-level nuclear waste disposal facility. As an individual, what can you do to learn more about the repository program, and how can you become involved in the process?

Nuclear waste is a big issue. Most people know very little about it. If you are interested in the possible construction of the country's first repository in Nevada, here are some ways you can affect the siting process:

1. **LEARN** all you can about high-level radioactive waste disposal.
   - Visit your library, which is supplied with all pertinent information on the subject. There are books and periodicals that provide good background reading on radiation, the history of nuclear waste management, and related matters. In Nevada, the Nuclear Waste Project Office and DOE maintain reading rooms.
   - Read daily newspaper and newsmagazine accounts of the most recent developments in the nuclear waste issue. Tune in television and radio newscasts.
   - Ask your nearest university, community college or school district office about available courses about nuclear energy and high-level waste, and repository-related subjects such as geology and hydrology.
   - Attend DOE and NWPO information meetings and hearings. Both agencies offer speakers and slide shows for various gatherings.
   - Ask to have your name placed on DOE and NWPO mailing lists.
2. **COMMUNICATE** with friends, neighbors and public officials.
   - Write letters to the editor expressing your views about nuclear waste disposal. State your views on local access television and radio programs.
   - Send letters to your governmental representatives at the local, state and national levels.
   - Talk to friends, people in your club, and co-workers. Like you, they may decide to get involved.
3. **PARTICIPATE** in organized activities concerning nuclear waste.
   - Attend meetings of the State Commission on Nuclear Projects. It reserves time for public comment on the repository issue.
   - Join an organization that is actively involved in the issue.



   - Be prepared to testify at public hearings. There will be hearings on DOE's Site Characterization Plan, which describes how the department will proceed with detailed studies at Yucca Mountain in southern Nevada. The dates and locations will be widely publicized.
   - File with DOE a public comment outlining your views. Each comment should contain your name and address, specific problems you see with the Environmental Assessment or Site Characterization Plan, and your suggestions about how to improve the process.

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(202) 252-5722

Congress of the United States
Office of Technology Assessment
Washington, D.C. 20510

NRC's Asselstine:

Repository Program is in Jeopardy; Pause Needed

Department of Energy decisions on the first and second-round repository sites are undermining the Nuclear Waste Policy Act and jeopardizing the disposal program, according to James K. Asselstine of the U.S. Nuclear Regulatory Commission.

"It seems to me that the repository program is in disarray and that the prospects for success are in serious jeopardy," he told the quarterly meeting with affected Indian tribes and potential host states.

"I remain convinced that the Nuclear Waste Policy Act provided a workable framework for developing a safe and environmentally acceptable system of repositories, but I fear that these recent decisions as well as the manner in which DOE has elected to implement certain features of the law are undermining that framework and sowing the seeds for possible failure down the road.

"The decision to postpone indefintely site-specific work on a second repository threatens to upset the delicate regional balance that was struck in the 1982 Act. As a result, the debate in Congress is becoming increasingly polarized," he said.

He said the east-west debate is fueled in part by concerns that political considerations may have prevailed over technical judgments in making siting decisions.

"DOE continues to adhere to a schedule for the first repository which is looking increasingly unrealistic and which raises legitimate concerns that DOE may be unable to do a thorough job of site characterization and to develop a complete and adequate license application.

"There appear to remain legitimate concerns about DOE's site comparison and selection methodology and the adequacy of information used to make its site selection decisions. Underlying these concerns is a continuing dissatisfaction with DOE's site selection guidelines.

"Finally, there are strong and legitimate concerns about DOE's working relationship with the potential host states and the affected Indian tribes. All of this has resulted in a substantial number of lawsuits and an erosion of confidence in DOE's ability to make sound and objective technical decisions, and to ensure that the repository program is guided by conservative and prudent decisions on the technical merits," he said.

Asselstine said the loss of trust in DOE's repository program would be a "potentially disabling blow." To correct the situation, he recommended a pause in all site-specific work to allow for a detailed review of several key issues. They include:

— the definition of a realistic, workable, and technically conservative schedule for developing the repositories;

— the need for, and timing of, more than one repository, including consideration of the geographical distribution and repository capacity limitation questions;

— the adequacy of DOE's site selection guidelines, its site comparison and selection methodology; and

— the availability and benefits of alternative methods for managing the repository development program.

"Some effective means must be found, and found soon, for restoring the credibility and effectiveness of the program if we are to avoid still another failure in this country's efforts to achieve a safe and reliable solution to the high-level waste disposal problem," he said.

The Nuclear Regulatory Commission must grant a license before the repository can be authorized and constructed. Asselstine said DOE will not have "an insignificant burden" in demonstrating that its license application meets the requirements for creating the first-of-a-kind repository. Asselstine said he sees four "pitfalls" that could have an impact on the timing and outcome of the licensing proceeding. They are:

— the possibility that DOE will not submit an essentially complete, high quality application for a good site, which is supported by the information needed to address the key technical issues;

— the failure to resolve differences among the various federal agencies with responsibilities for the repository program;

— the possibility that there will be sharp divisions within the scientific community on the key technical issues;

— the emergence of strong and concerted opposition to DOE's application by the potential host state, affected Indian tribes and the public.

He said if DOE is to assure a high quality application and avoid sharp divisions within the scientific community, it must "learn

The east-west debate is fueled in part by concerns that political considerations may have prevailed over technical judgments in making siting decisions.

to take a critical and pessimistic approach to site investigation."

"A key element to this approach is to recognize that there are potential problem areas with each site, and to identify those problem areas early in the site investigation process," he said. "In the past, DOE has tended to view the sites under investigation very optimistically and to ignore or discount potential problem areas," he said.

He said DOE must build a consensus within the technical community on each of these items. He said a key element to this is "the ability to explain your methodology and to present the information needed to defend your analysis and conclusions." He was critical of the site draft Environmental Assessments and said that the current NRC staff review indicated "some serious open questions regarding the adequacy of the final EA's."

Asselstine said DOE must also apply a "rigorous and effective" quality assurance program to its site investigation and research activities. He said this is crucial to DOE's ability to demonstrate the validity of its findings and analyses in the repository licensing hearing. He said DOE is "committed to having fully qualified QA programs in place" before the issuance of site characterization plans, but that recent stop-work orders affecting work at Yucca Mountain and Hanford indicate DOE is "still experiencing difficulty in developing and complementing an acceptable QA program."

As for reducing the potential for concerted state, tribal or public opposition during the license hearing, DOE simply has to learn to work more closely with the affected states and Indian tribes," he said.

He said DOE had been "unwilling or unable" to do more to address the concerns of the potential host states and tribes on the site selection guidelines, and he saw problems in the reactions to DOE's draft EA's for first-round sites. He said the state and tribe concerns "do not appear to be satisfied by the final EA's." He said he views the concerns as being of different character from the general view that "we don't want it here."

He recommended more informal meetings to keep the states and tribes informed of what is going on and to solicit their views. However, he said the states and tribes must be allowed to be "active participants and not just observers." He said DOE is expanding its use of this type of informal exchange, but "I believe there is considerable room for further improvement."

Getting the Word Out

Conveying objective, accurate and clear information to Nevadans about the high-level radioactive waste repository siting process is the goal of both the State of Nevada and the U.S. Department of Energy (DOE).

To accomplish this, both the state and DOE have been working on public information plans during the past few months. Representatives of the Nevada Nuclear Waste Project Office (NWPO) and the DOE Nevada Nuclear Waste Storage Investigations (NNWSI) Project have held informal discussions to explore joint approaches to keeping the public informed.

Planning for DOE public information activities has focused on addressing the issues of greatest concern to Nevadans. These issues include tourism and economic development, transportation of radioactive materials, public health and safety, and potential fiscal impacts on state and local governments. These were identified as major concerns during public briefings and hearings, formal comments on the draft Environmental Assessment on Yucca Mountain, meetings, informal remarks to DOE staff, correspondence, and other public statements.

The NNWSI Project plans to address these concerns in a range of public information activities, which will be detailed in an Outreach and Public Participation Plan. The plan is now being drafted and will be released for public comment this fall. Those comments will be considered in the final plan, which will be released late this year and updated annually. The basis of the plan is that the DOE will seek to hold joint information activities as often as possible with the state and local governments, and be responsive to requests from groups and the public for repository-related information,

Some of the proposed activities include:

— public hearings and briefings on major program reports and events. Public information packets containing event-specific materials, fact sheets and other information about Yucca Mountain will be prepared for the meetings;

— other information meetings and workshops sponsored by the NNWSI Project Office. These information meetings will be held frequently around the state in coordination with state and local governments;

— NNWSI Project participation at meetings sponsored by other organizations. NNWSI Project personnel will speak when requested by civic and social groups, state and local government officials and organizations, and others;

— site tours.

In addition to working wih the NNWSI Project, the state NWPO will continue to offer its own public information services and materials. They include newsletters, fact sheets, slide-video presentations, speakers for various gatherings, and media appearances. Also, the state Commission on Nuclear Waste invites the public to attend its bimonthly meetings, where time is reserved for citizen comment.

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Congress of the United States
Office of Technology Assessment
Washington, D.C. 20510

DOE Cancels Key Meetings; Budget Uncertainty Claimed

Because of budget uncertainties, the Department of Energy Nevada Operations Office (DOE/NVO) canceled two important meetings involving state agencies and affected local governments.

A briefing on the environmental effects of site characterization for state agencies, scheduled for August 28, was scrapped after DOE headquarters in Washington advised DOE/NVO staff the meeting would not go forward.

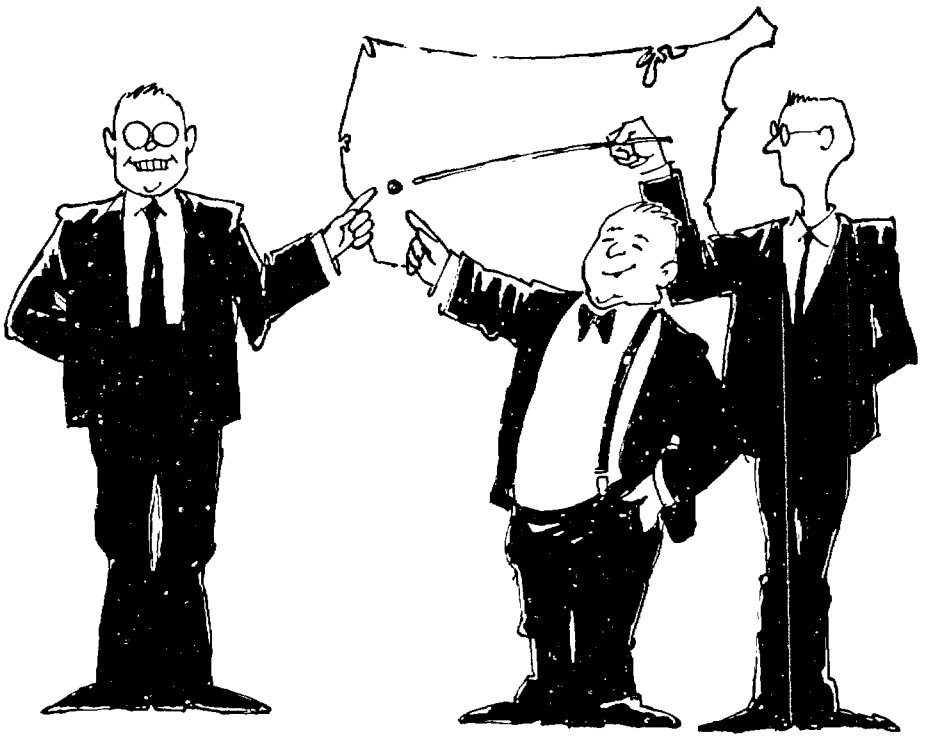
A planned September 8 meeting between DOE/NVO socioeconomic staff and the state/ local planning group also was canceled. It was intended to promote coordination between the state and DOE regarding socioeconomic impact assessment activities, and to afford state and local government representatives the opportunity to comment on DOE/NVO's working draft of the site characterization monitoring and mitigation plan for Yucca Mountain.

Sawyer: Report Discredits DOE Repository Siting

A Nevada official says a congressional charge that the Department of Energy deliberately distorted information for locating nuclear waste sites shows the entire siting program should start anew.

An October investigative report by Reps. Edward Markey, D-Mass., and Jim Weaver, D-Ore., said DOE distorted a scientific report to make two of the three finalist sites look better than was justified. Markey is chairman of the subcommittee on energy conservation and power of the Energy and Commerce Committee. Weaver is chairman of the oversight and northwest power subcommittee of the Interior Committee.

"The committee investigation bears out what we have been saying all along — that the DOE has lost all its credibility and cannot be trusted to carry out the siting program as specified under the Nuclear Waste Policy Act of 1982," Grant Sawyer, chairman of the Nevada Commission on Nuclear Projects, said.



In May, President Reagan approved Energy Secretary Herrington's recommendation to conduct detailed studies of sites on the Hanford reservation in Washington, Yucca Mountain adjacent to the Nevada Test Site, and at Deaf Smith County on the Texas Panhandle. He eliminated potential sites in Utah and at Richton Dome, Mississippi.

The three finalists, one of which appears destined to host the country's first high-level nuclear waste repository, claimed DOE had "preselected" them as favorable sites and then tailored their studies to confirm that conclusion. They said the final choices were based largely on political considerations rather than technical merit.

In a letter to Herrington, the congressmen said the department "distorted and disregarded its own scientific analysis in order to support selection of the Hanford site and to avoid selection of the Richton Dome site." They said DOE deleted statements in the analysis that called for the selection of Yucca Mountain, Richton Dome and Deaf Smith County.

The report said DOE's method of ranking the five sites resulted originally in placing Hanford last, while Richton dome was ranked in the top three with Yucca Mountain and Deaf Smith. Through data

Nevadans: DOE Playing Repository Politics

Nevada officials have called for a halt in the nuclear waste repository search, and an investigation of the Department of Energy's conduct of the siting program.

Gov. Richard Bryan; former Gov. Grant Sawyer, chairman of the state Commission on Nuclear Projects, and Robert Loux, executive director of the state Nuclear Waste Project Office, said election-year politics guided DOE's decision to halt indefinitely the second-round repository program and to determine that Nevada, Texas and Washington sites are suitable for a first repository.

Bryan said the DOE's own documents confirmed his suspicion that Nevada's Yucca Mountain already has been selected as the repository site. The internal departmental documents were revealed by Rep. Edward Markey, D-Mass., chairman of the House Energy and Commerce Subcommittee. He said they "show the department put politics first, not science, in making its decisions."

Bryan called for the replacement of "bureaucrats responsible for the deception and management" of the repository selection program. He said the Nuclear Waste Policy Act specifies two repositories in order to spread the waste burden over different regions of the country, "but for purely political reasons the Department ignored the law."

Sawyer, testifying before the Senate Subcommittee on Energy Research and Production, said Energy Secretary John Herrington's site selection decision was "nothing more than a charade to allow the department to end site characterization with only a single site that has been prejudged and predetermined to be the lucky winner."

He said if Herrington's assessment is correct that waste inventories are building so slowly that there is no urgent need for a second repository, "then perhaps there is no need to rush into a first repository as well." He said the selection program should be halted to allow scientists to study possible alternatives to deep geologic disposal of waste.

Loux told a Senate Interior and Insular Affairs subcommittee that DOE has used the Waste Policy Act only to "preserve and protect the preselection" of the western candidate sites.

"Nevadans find it more than coincidental that the sites that were under active consideration prior to the passage of the Act are the only ones under active consideration some four years later," he said.

Members of the state congressional delegation agreed the repository program should be halted pending an investigation of the DOE's handling of the siting.

manipulation, Hanford was brought into the top three, the congressmen said.

"It is clear that the initial drafts told it like it is, and subsequent drafts told it like DOE wanted it to be," the letter said.

The congressmen, describing DOE's conduct as "appalling," said draft documents obtained by the subcommittees "clearly show that DOE cooked the books."

"Draft after draft shows that DOE systematically deleted and suppressed information unfavorable to their final decision," they said. "DOE doctored the results."

Sawyer said that while the committee report "deals largely with DOE's effort to elevate its own Hanford reservation, it discredits the methods used to rank all the potential sites, including Yucca Mountain," he said.

"We cannot have confidence in a government department that would resort to such manipulation to achieve its own ends," he said.

"Many people in congress want to reopen the 1982 Act and remove DOE from the picture," Sawyer said. "There is a feeling the entire program should return to the beginning. That would involve screening sites in the East as well as the West as potential locations for the first repository. This could eliminate the current sites. It also could require a study of possible alternatives to bury the waste deep underground. The eventual decision would be based on scientific judgment, not politics."

State Socioeconomic Impact Assessment Begins

A Technical Review Committee comprised of nationally recognized experts met for the first time on July 9-10 to critique the proposed research design for Nevada's socioeconomic impact assessment study relative to the effects of a high-level nuclear waste repository at Yucca Mountain.

The committee is chaired by Dr. Gilbert White of the University of Colorado and includes experts in the fields of economics, sociology, psychology, anthropology, community development, public policy, transportation, hazard assessment, and the physical sciences. It provided an intensive two-day review of the draft study design prepared by the state's prime contractor, Mountain West Research-Southwest, Inc. of Phoenix, Ariz.

The Reno meeting brought together for the first time key members of the study team that was created by Mountain West for this project, members of the Technical Review Committee, and members of the state/local planning group which serves as a steering committee for the Nevada study.

Following the meeting, a revised study design document was proposed for Technical Committee review.

Because of the long lead time required for methodological development in certain aspects of the study, and because of the pressing need to begin to collect baseline data as soon as possible, the Mountain West research team has been authorized to commence actual field work relative to certain project tasks prior to the issuance of the final study design. Study teams comprised of economic, demographic, sociological and anthropological researchers began preliminary data collection efforts in Nye, Clark, Lincoln and Esmeralda Counties in late September.

Joseph Strolin, chief of planning for the Nevada Nuclear Waste Project Office, said the first major product of the socioeconomic study will be an assessment of the potential effects site characterization at Yucca Mountain will have on local communities, surrounding counties and on the state as a whole. Strolin said that, because people can be expected to view site characterization as a precursor to an actual repository, the impacts of characterization could well be felt beyond the communities close to the site.

"In addition to generating accurate and up-to-date baseline data on economic and demographic conditions in Nye County and identifying what effects site characterization is likely to have in communities like Amargosa Valley, Beatty and Pahrump, we also hope to begin to get some sense of the wider impacts a repository could have on southern Nevada and on the state in general," Strolin said.

The state plans to have a site characterization impact assessment report completed by June, 1987, and the larger, two-year study of the potential effects of repository construction, operation and long-term radioactive materials storage accomplished by June, 1989.

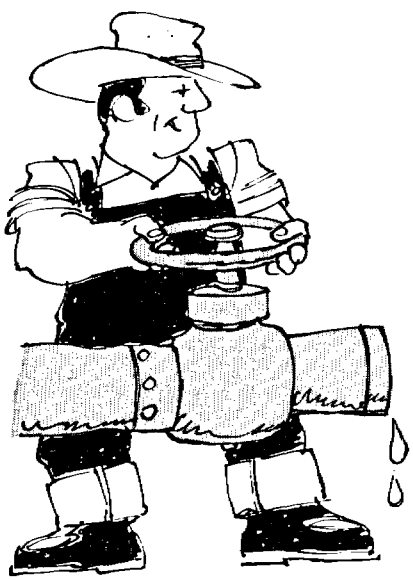
State Challenges DOE Water Claim for Repository

A state attorney says the Department of energy may have improperly assumed it has the rights to water to supply a possible high-level nuclear waste repository at Yucca Mountain.

In its Environmental Assessment, DOE said it would supply the facility with water from Well J-13 on the east slope of the mountain within the Nevada Test Site. The government estimated 350 acre-feet of water a year will be needed for repository siting, construction, operation and decommissioning in its EA.

"The federal government has taken a very cavalier attitude about water, Deputy Attorney General Harry Swainston told the state Commission on Nuclear Projects.

He noted that the federal implied reservation of water doctrine did not apply to secondary uses of the Nevada Test Site such as the storage of nuclear waste in a repository. It must request permits from the



state engineer to use water. It did not appear to him that DOE had acquired the necessary state water permits to satisfy the repository water needs.

Swainston explained to the Commission that water laws more than 100 years old differentiate between public lands use and water use. Although the federal government has retained ownership of 88 percent of Nevada land, the water has been severed from the land for public and private appropriation under state water law. The water underlying the Amargosa Valley has been acquired by farmers, homeowners and businesses.

Swainston said that if the groundwater basin is fully appropriated and DOE is forced to condemn existing pumpage rights to satisfy its needs, the farmers in the Amargosa Desert could lose their crops on at least a part of the 2,000 acres under cultivation.

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or:

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[ ] The Nuclear Waste Policy Act of 1982: What does it do?
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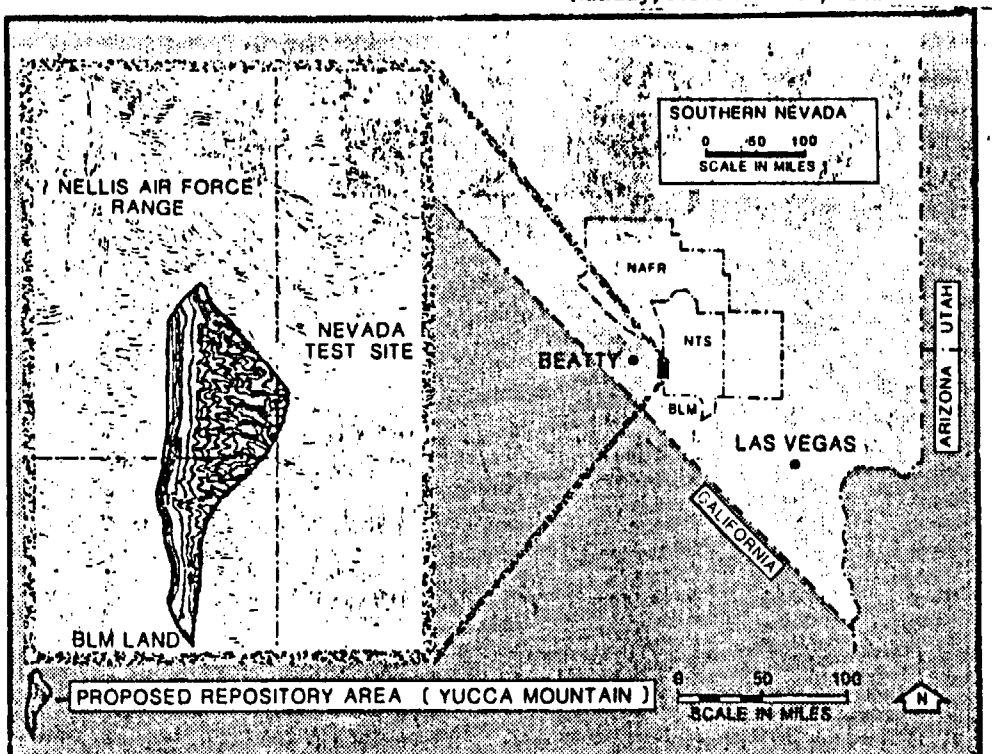
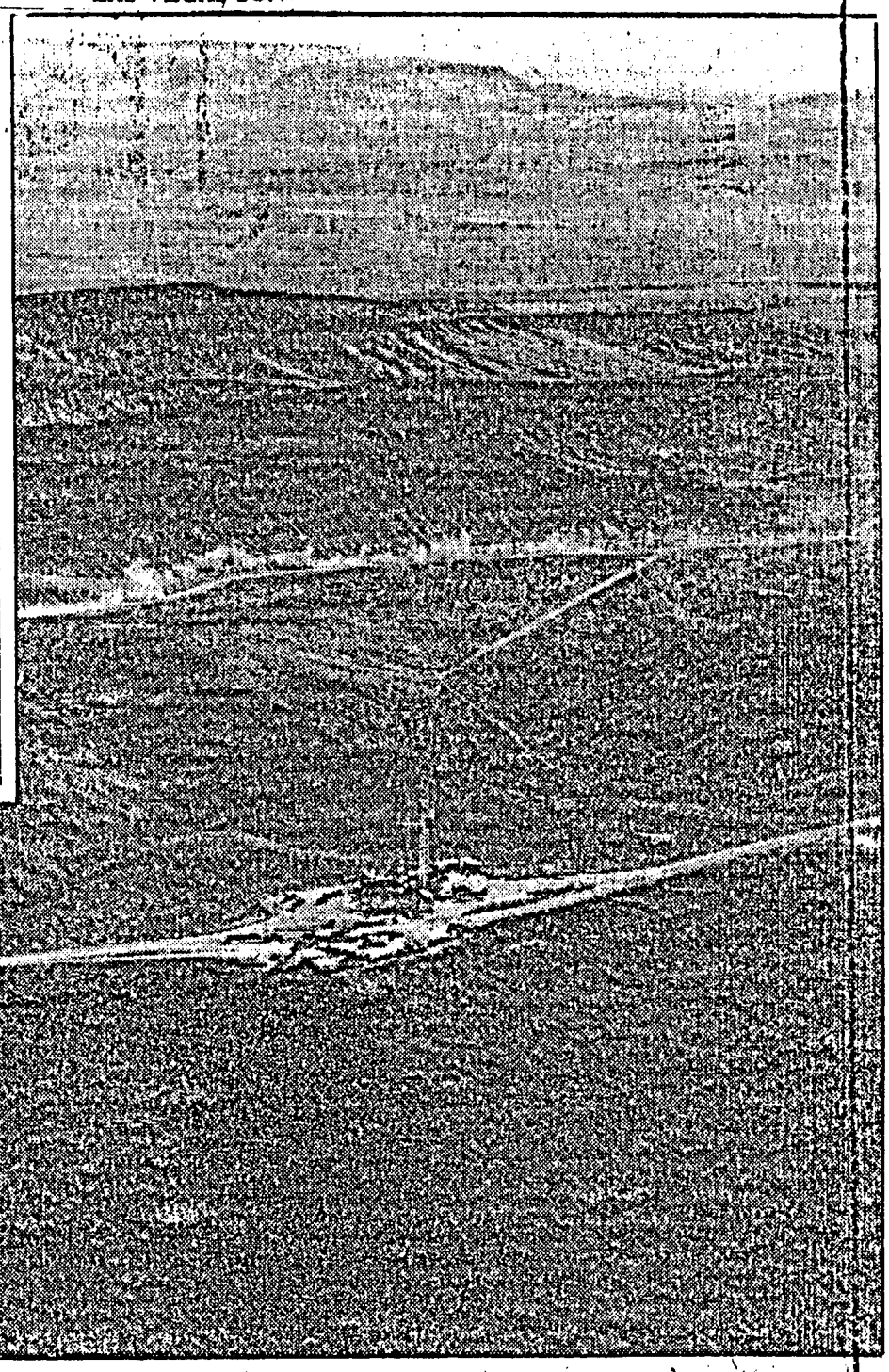


Yucca Mountain is located on the southwest border of the Nevada Research & Development Area, part of the U.S. Department of Energy's Nevada Test Site.



Geography, geology big factors for Yucca Mountain

Map at top shows Yucca Mountain's strategic location on the western border of the Nevada Test Site northwest of Las Vegas and east of Beatty. At right, is photograph showing how Yucca Mountain looks today from west to east. Equipment is being used for tests.

First of a five-part series

DOE taking gamble on Yucca Mountain

BURYING NUCLEAR WASTE: RISKY BUSINESS FOR NEVADA?

Editor's Note: SUN Staff Writer Mary Manning read thousands of pages of government documents and reports after the final government environmental assessment for Yucca Mountain, a possible site for the nation's first high-level nuclear waste repository, was released by Energy Secretary John Herrington on May 28, 1986. This is the first of a five-part series.

By MARY MANNING
SUN Staff Writer

From an airplane, Yucca Mountain at the southwest corner of the sprawling Nevada Test Site looks like a dead dinosaur buried in a sea of desert sand.

If the federal government chooses, it may breathe life into the volcanic tuff mountain in 1998 by opening a mine deep within its bowels to store thousands of tons of tired nuclear fuel laced with radioactivity harmful to life for hundreds of thousands of years.

The U.S. Department of Energy picked Yucca Mountain for many reasons: Few people lived nearby, little farming, scarce water sources, dry Great Basin weather and it edges the federally-owned, top secret Nevada Test Site where classified Stealth bombers and Strategic Defense Initiative — "Star Wars" — technology play on the range.

Actually, the U.S. Air Force and the Bureau of Land Management owns most of Yucca Mountain, about 100 miles northwest of Las Vegas.

The federal government eyed the test site's bleak, barren mountains to store 70,000 tons of nuclear fire in the desert's belly at 15 different sites after the National Academy of Sciences agreed storing radioactive wastes in the ground was the safest method in a 1957 report.

Government geologists date the oldest rocks on the test site at least a billion years or older.

From 100 to 40 million years ago, mountain building waned and volcanic rocks took shape from 40 to 10 million years ago. Yucca Mountain was formed 10 to 15 million years ago.

Minor volcanic activity continued as the Great Basin formed, "most recently producing thin, locally restricted sheets and cones of basaltic material in Crater Flat, just west of Yucca Mountain," about two miles away, the DOE's environmental assessment said.

Then why would the federal government want to gamble on a remote mountain near a volcano field for the nation's first high-level nuclear dump?

Part of that answer lies in Yucca Mountain's ground water, deeper than 1,640 feet in some places, allowing room for a mined repository in unsaturated rock. That means there's a long way between surface and water. And, without water, government scientists are betting if radiation ever escaped Yucca's rocks, it couldn't contaminate the environment without water.

Water is "the single thing" that could cause DOE to walk away from Yucca Mountain, Dr. Donald Vieth, DOE's Nevada nuclear waste repository project director, said.

Federal scientists estimated it might take 20,000 years for radioactive water to trickle into the environment from Yucca Mountain. Nevada re-

(See WATER, Page 4B)

Water problems could force DOE away from Nevada

(Continued from Page 1B)

searchers put contamination at 900 years.

What is not mentioned in the environmental assessment — or any publicly accessible government report — is open reverse faults, resulting from earth movements along the Western Overthrust Belt. The Atomic Energy Commission published this fact in NVO-40, then removed any references to these faults, which conduct water away from the test site. That report is more than 16 years old.

Yucca Mountain also came to DOE attention not for scientific reasons, but because government scientists didn't want independent scientists and agencies regulating the nuclear dump — such as the Nuclear Regulatory Commission — or wandering across top secret areas of the test site.

That sent scientists exploring if nuclear testing and nuclear burial could exist cozily side by side in a May 18, 1978 compliance report.

"A significant concern exists regarding the administration of *both* waste management and the test program at the NTS (Nevada Test Site)," the report finished by four government labs said.

In 1977, DOE included land use as an alternate basis for initial selection, meaning scientists sought lands already contaminated by government activities. Since the government owned the test site, it became a logical choice for exploring, DOE's final environmental assessment said.

The earlier report urged DOE to put nuclear waste in the southwest corner of the test site, to protect the nuclear testing program, as a boost to test site workers in case of a test ban and to move the repository out of accidental fallout pathways in northern areas of the top secret proving grounds — and public acceptance.

"Also, in the event of a test ban treaty, a waste repository at, or near, the NTS could aid in maintaining a viable work force at the NTS in a manner that a Readiness program alone could not," the report said.

"A change in the current public acceptance of nuclear weapons testing at NTS which could be induced by the opponents of nuclear waste storage who actively oppose *anything* nuclear," it added.

However, the government reviewers were especially concerned about future increased regulatory activities if a nuclear waste dump came to the test site.

"This concern centers around the possible future roles of regulatory, state, and other public bodies at the NTS, as well as intervention by dissidents," the report said. "DOE must assure that NRC (Nuclear Regulatory Commission) licensing of nuclear waste storage does not include any authority over the established nuclear weapons program."

Yucca Mountain is part of Death Valley's ground water system, located inthe Alkali Flat-Furnace Creek Ranch ground-water basin, midway between Ash Meadows and Oasis Valley basins.

"Some of the spring discharge areas in the Death Valley National Monument are near tourist facilities, although exact sources of discharge are unknown," the DOE's environmental assessment said.

The U.S. Geological Survey proposed using the test site because its water basins are closed, the water table is deep, water flows long distances before radioactivity is released, rock materials chemically or physically remove radioactivity from the water and yearly rainfall is less than six inches.

When the National Waste Terminal Storage Program began in 1976, salt was the prime host rock that piqued DOE's interest on its search for a repository. It is still the prime choice of West Germany to bury its highly radioactive wastes. Other rock forms explored included crystalline rock, granite and shale.

And, when the hunt for a suitable nuclear graveyard began — 10 years before the Nuclear Waste Policy Act of 1982 was passed by Congress — Yucca Mountain wasn't mentioned.

MONDAY: Dangers of radiation from nuclear waste.

Bump renews debate over dangers of radiation

BURYING NUCLEAR WASTE: RISKY BUSINESS FOR NEVADA?

Editor's Note: SUN Staff Writer Mary Manning read thousands of pages of government documents and reports after the final government environmental assessment for Yucca Mountain, a possible site for the nation's first high-level nuclear waste repository, was released by Energy Secretary John Herrington on May 28, 1986. This is the second of a five-part series.

By MARY MANNING
SUN Staff Writer

Nuclear waste supporters from the Department of Energy to power plant managers say media stories scare people whenever they refer to "radiation" or "nuclear." Those are "buzz" words to nuclear boosters.

Spokesmen cautious about radiation exposure, like Karl Morgan, Carl

Second of 5 parts

Johnson, Rosalie Bertelle and Alice Stewart warn that the less exposure to radiation, the better.

The DOE's environmental assessment — more than 2,000 pages long — refers to radiation risks as "remote" from a high-level nuclear waste repository at Yucca Mountain, about 100 miles northwest of Las Vegas.

However, Nevada officials — from Gov. Richard Bryan to Democratic Congressman Harry Reid to Clark County Commissioners and Las Vegas City Councilmen — don't take the government's word that solid nuclear waste stored in what DOE describes as crash-proof containers is safe.

How risky is this nuclear waste business for Nevada?

DOE said it picked Yucca Mountain near the Nevada Test Site because the volcanic tuff mound rests in one of the least-populated areas in the country with little rainfall and a very deep water table, so even if a storage cannister pops open from intense heat or is dropped and bursts open during 10,000 years of storage, radiation won't go anywhere.

After all, the DOE claims, scientists have not found a clear-cut link between radiation and health effects.

In 40 years of piling up the 40,000 tons of nuclear wastes stored in pools of water at 102 U.S. power plants today, scientists have been slashing the amount of radiation exposure to both the public and nuclear industry workers, reducing it five times the amount allowable in the 1940s.

(See CHERNOBYL, Page 6B)

Atomic decay causes several kinds of radioactivity

Once spent fuel has been removed from a nuclear power plant, it contains the remains of split atoms — fission products — some highly radioactive.

These fission products decay — or lose radioactivity — by projecting two types of radiation called beta and gamma.

Beta and gamma radiation dominate the radioactive products of spent fuel for the first 500 to 1,000 years in high-level nuclear waste.

Then alpha radiation dominates for thousands of years after that.

- Alpha radiation consists of particles positively charged. These particles can be stopped by a single sheet of paper — or human skin. They are dangerous if inhaled or swallowed. They are produced in nuclear waste called "transuranic," which means heavier than uranium.

- Beta radiation is made up of high-speed electrons. Beta radiation penetrates further than alpha radiation and can penetrate about an inch or water or human flesh. A thin sheet of aluminum can stop their progress. They also harm living cells, if inhaled or swallowed, or enter an open wound.

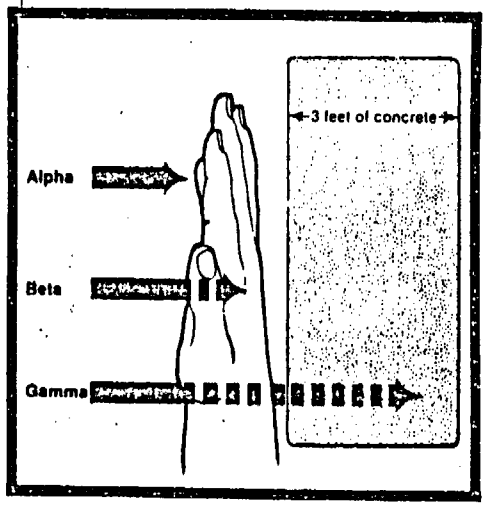
- Gamma radiation produces high-energy electronmagnetic waves and can pass through the human body like X-rays. In fact, gamma rays and X-rays behave identically. Dense materials, such as concrete or lead can shield living cells from gamma radiation. High-level nuclear waste sending gamma rays in all directions must be handled by remote control.

Spent fuel could be reprocessed to remove a major portion of the transuranic elements.

In the distant future, nuclear waste loses its radioactivity, decreasing to natural levels.

Other natural radiation comes from cosmic rays and other radioactive substances in the earth. Man-made activities, including television, living in brick houses and drinking water from deep wells, add to radiation exposure.

People receive doses of radiation measured in units called millirems.



The average person receives from 100 to 200 millirems of radiation a year from natural and artificial sources, depending on where people live and what they do. A single dose of 600,000 millirems received all at once would kill half of the people exposed.

— Mary Manning

Chernobyl accident brought new radiation fears

(Continued from Page 1B)

That is, until 1983, when the U.S. Environmental Protection Agency changed the rules of the game.

Since that year, EPA rules say radiation will cause 100 cancer deaths per 100,000 instead of 100 cancer deaths per 10,000.

That change means people can be exposed to 10 times the radiation allowed before 1983. The EPA regulation was changed quietly, without much fanfare, in December of that year.

A similar change has been proposed by the Nuclear Regulatory Commission this year for nuclear industry workers, but has not been approved.

Then on [illegible]il 26 the Soviet Union's nuclear reactor at Chernobyl exploded and spread its radiation into the world's consciousness.

Since then, scientists have cast a careful eye on radiation consequences.

Dr. Robert Gale, UCLA bone marrow transplant specialist flown to the Soviet Union by American Dr. Armand Hammer, said recently in Las Vegas he will help Russian scientists track up to 150,000 exposed persons for the rest of their lives to find out how low-level radioactive fallout affected them. This research is especially important, because radiation risks have been based on the atomic firestorm that swept Hiroshima and Nagasaki on Aug. 6 and Aug. 9, 1945.

Gale said he does not expect more than 25,000 persons to die worldwide from the Soviet radioactivity that blanketed the world as Chernobyl's reactor burned out of control for days. There have been 30 deaths of those closest to the Russian disaster.

Cancers produced by Chernobyl's fallout, but not killing victims, are unpredictable, Gale added.

Dr. Carl Johnson, South Dakota health officer, completed a study of Mormons living downwind of the Nevada Test Site and noticed increased leukemia deaths from the atomic bomb fallout.

Johnson supports moving radiation health studies from the DOE to the Department of Health and Human Services. Johnson led an outcry over plutonium contamination at Rocky Flats, Colo., where the government makes nuclear bombs, that brought him to legal blows with the government. The government settled out of court.

K.Z. Morgan, known as the "father of health physics" who worked for the Atomic Energy Commission at Oak Ridge, Tenn., in the 1940s and 1950s, said the DOE has consistently downplayed dangers from its nuclear activities, including above-ground atomic bomb tests in Nevada's desert during the 1950s.

While DOE estimates claim 18 people living downwind from the Nevada Test Site will die from those nuclear weapons tests, Morgan said it could be 68 victims exposed to radiation who will die from cancer.

The debate has been raging and will continue into the next century until scientsts better understand nuclear forces.

What DOE radiation experts don't tell the public — but every nuclear scientist and physician knows — is the less radiation bombarding your body, the better.

What DOE ignored in its environmental assessment of Yucca Mountain is risks of exposure to people while nuclear wastes travel from reactors to the final radioactive grave.

With Nevada's major industry tourism, travelers flock to the Silver State all year round to gamble, see top entertainers, ski, boat and roam the wide open spaces.

On maps included in DOE's environmental assessments, all roads lead through Las Vegas on the way to Yucca Mountain.

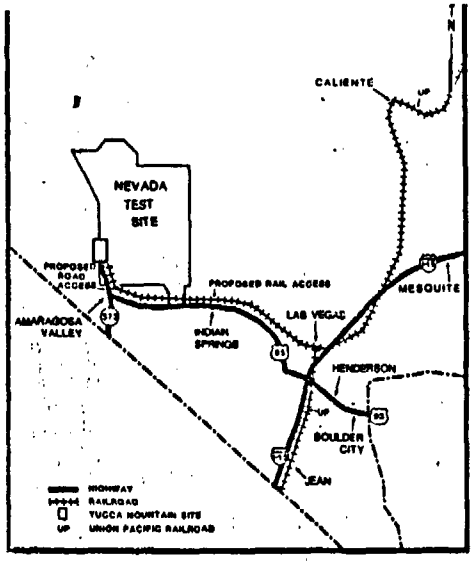
State and local officials are already meeting to submit alternate routes to DOE, similar to those used when the government removed spent nuclear fuel from the test site to its Idaho national laboratory this year.

Instead of looping around one of the busiest — and most dangerous — freeway interchanges near downtown Las Vegas, DOE hauled loads of the fuel rods through rural Nevada.

Gov. Richard Bryan and the City of Las Vegas negotiated the rural routes in May, 1986.

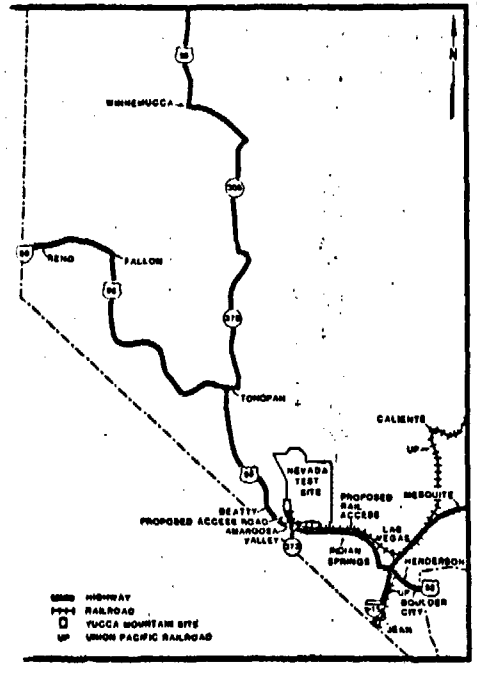
Yet when DOE released its environmental assessment, all railroad and truck routes for thousands of shipments of high-level nuclear waste pouring into Yucca Mountain for 35 years snake through Las Vegas.

TUESDAY: Nuclear Waste Downtown — State and local officials worry about a nuclear accident in downtown Las Vegas or less than a mile from a major Strip hotel. DOE claims it's been shipping highly radioactive nuclear fuel rods and defense materials for 40 years — without one death or injury.



Waste routes

All rail and road routes lead through Las Vegas on the way to Yucca Mountain, 100 miles northwest of the city.



Transport of nuclear waste key concern

Editor's Note: This is the third of a five-part series by SUN Staff Writer Mary Manning on Yucca Mountain, a possible site for the nation's first high-level nuclear waste repository.

By MARY MANNING
SUN Staff Writer

BURYING NUCLEAR WASTE: RISKY BUSINESS FOR NEVADA?

Whether people support burying nuclear waste at Yucca Mountain or oppose it, all of them worry about getting it there.

Transporting nuclear waste through backyards rings the alarm most often in testimony at the Department of Energy's public hearings.

Even states with no chance of becoming a national nuclear dump worry about trucks and trains loaded with nuclear cargo. "Not in my backyard," has become the standard cry.

Las Vegas City Councilman Ron Lurie and Clark County Commission Chairman Thalia Dondero led the local fight to prevent 7,300 tons of New Jersey dirt laced with spilled low-level radioactive radium paint from arriving in downtown Las Vegas on Union Pacific rail cars.

"We can't risk our tourism image with a nuclear dump," Lurie said, after the state and local governments successfully halted the Las Vegas stop of radioactive dirt on its way to Beatty's commercial low-level nuclear dump.

Yet if DOE chooses Yucca Mountain for the nation's first high-level nuclear dumpsite, current routes by truck and rail all lead through Las Vegas, past multi-million dollar Strip hotels and around a dangerous freeway interchange in downtown Las Vegas, then by hundreds of homes on the way to the proposed repository, 100 miles away.

Rail routes follow tracks through downtown Las Vegas.

In fact, Las Vegas officials were horrified to discover DOE planned to bring nuclear fuel rods from the southern routes across two-lane Hoover Dam and the narrow bridge that boasts nearly 15 million visitors a year.

Congress approved a second bridge for such hazardous cargoes about two miles away from the world famous dam, but has not funded the project.

Clark County and its cities are working with the state to present alternate routes to DOE, if Southern Nevada becomes the unlucky winner in the radioactive waste sweepstakes.

"In case all else fails, you better have plan B," Lurie said at a recent meeting, urging local and state transportation officials to work together to present DOE with unpopulated alternate routes.

Clark County Comprehensive planner Dennis Bechtel said the county has hired an independent study firm with the help of state funds to probe all impacts on Southern Nevada from a high-level nuclear dump.

Instead of proposing alternate routes on current two-lane roads through Nevada to reach Yucca Mountain, Southern Nevada officials may ask for new roads and rail tracks to ship thousands of loads of nuclear waste away from any people, Bechtel said.

Currently, the U.S. Department of Transportation prefers all dangerous cargoes travel interstates, sending hazardous and toxic loads less than one mile from major Strip hotels, downtown Las Vegas and hundreds of homes on the way to Yucca Mountain.

Whether local governments will receive attention from DOE is another matter. Nevada has learned a lesson from New Mexico's experience and has taken a cautious — some say an antagonistic — path with DOE.

DOE's "showcase" salt repository in

(See NEVADA, Page 2B)

Nevada cautious about DOE routes

(Continued from Page 1B)

New Mexico's desert near Carlsbad Caverns is the first giant nuclear vault ever built and attracts tourists who can see heaters bombarding deep man-made caverns as radioactive waste canisters eventually will.

New Mexicans outside of Carlsbad, where the 10-year-old WIPP — Waste Isolation Pilot Project — was built tell of broken promises offered by DOE and nervous compromises.

The state believed it had veto power, but then found out the government had locked the project into New Mexico's landscape. A court fight, ending in an out-of-court settlement, brought a "consultation agreement," but cooperation never developed between the state and federal governments.

New Mexico didn't get new roadways leading to the remote desert burial ground, but the government did tar a two-lane road from the highway to the repository.

Carlsbad's Chamber of Commerce welcomed the repository after mining companies going out of business sent unemployment skyrocketing, but no nuclear wastes will be buried there until DOE redesigns its burial canisters. The proposed containers exploded when organic matter decomposed inside them and DOE filmed them.

The city of Las Vegas has been successful in rerouting nuclear wastes moved from the Nevada Test Site to DOE's national laboratory in Idaho.

Last May 30, with the help of Gov. Richard Bryan, DOE and the city agreed to send 17 spent nuclear fuel rods through Central Nevada and away from the downtown expressway, less than 200 yards from major Las Vegas hotels and within feet of residences.

"We don't want to ram anything down anybody's throat, whether it's the state, the city or the county," DOE spokesman Chris West said at the time. "That was a classic case of being able to work it out."

However, until the SUN asked about those nuclear shipments, DOE had not notified the city about the fact the rods would travel on Southern Nevada's jammed freeways.

National truckers have grabbed the spotlight with recent hazardous materials accidents. DOE plans to hire a contractor to haul thousands of shipments to the nuclear repository of its choice.

Truck inspectors have discovered the top three problems as bad brakes, driver fatigue and inexperienced or incompetent drivers.

For example, in California's large inspection program, the brakes on 50,000 of nearly 280,000 trucks stopped in 1985 were so poor that the rigs were labeled "imminent hazards."

A case of incompetent driving took place on Dec. 2, 1982, near Los Banos, Calif., when a tractor semi-trailer carrying 18 surface-to-air missiles barged into a fence and a utility pole, overturning. Nine of the missiles spilled onto the ground. Investigators disclosed the 23-year-old driver had been convicted of 13 prior traffic violations. Before the accident, he admitted drinking beer. He said he had dozed off at the wheel.

Another incident in December 1983 closed down Interstate 80 near Denver for 9½ hours during rush hour traffic when missiles sprawled across the torturous mountain pass near the Eisenhower tunnel.

The last thing Las Vegas, Clark County or Nevada officials want to experience is an accident on Interstate 15 and Oran Gragson Expressway. "All visitors need to hear on the six o'clock news is about a nuclear accident in Las Vegas," Lurie said.

WEDNESDAY: Although the government's own law sets a limit of 70,000 tons of nuclear waste for the first repository, officials announced no second repository east of the Mississippi River and Nevada DOE spokesmen admit Yucca Mountain can be expanded although bordering on major earthquake faults and volcanic fields.

Nuclear waste dump politics dismay Nevada leaders

Editor's Note: This is the fourth of a five-part series by SUN Staff Writer Mary Manning on Yucca Mountain, a possible site for the nation's first high-level nuclear waste repository.

By MARY MANNING
SUN Staff Writer

When the Nuclear Waste Policy Act of 1982 was signed by President Ronald Reagan on Jan. 7, 1983, two nuclear repositories were scheduled for the United States.

In fact, the act set a limit of 70,000 tons of high-level nuclear wastes for the first dump.

When Energy Secretary John Herrington announced May 28 that Yucca Mountain, Hanford, Wash., and Deaf Smith County, Texas were the three top nuclear dump contestants, he also closed the door on the second repository.

Herrington and Bernard Rusche, director of the Department of Energy's Office of Civilian Radioactive Waste Management, said government studies had overestimated the amount of nuclear waste produced in the nation's 102 power plants (plus defense wastes — at least 10,000 tons — which they didn't mention).

Even if the first repository reached its 70,000-ton limit, Herrington said it could be expanded to take up to 100,000 tons, canceling the need for a repository east of the Mississippi River.

Nevada Republicans like Sens. Paul Laxalt, Chic Hecht and Rep. Barbara Vucanovich denounced the government's tactics on ending a hunt for a second repository in an Eastern or Southern state.

The Republicans joined the state's five lawsuits — filed by Gov. Richard Bryan, a Democrat, and GOP Attorney General Brian McKay — but did not oppose the dump.

Bryan and local government officials, who oppose Southern Nevada becoming the nation's dumping ground, noted that the Silver State hosts no nuclear reactors and does not use nuclear power.

"Enough is enough," Bryan said, citing Nevada's role in the nation's nuclear weapons testing for the past 40 years. On top of that, Beatty — 45 miles northwest of the test site — boasts one of three commercial low-level radioactive dumps until 1992, when regional dumps must open across the nation to share the nuclear burden.

(See ARGUMENTS, Page 4B)

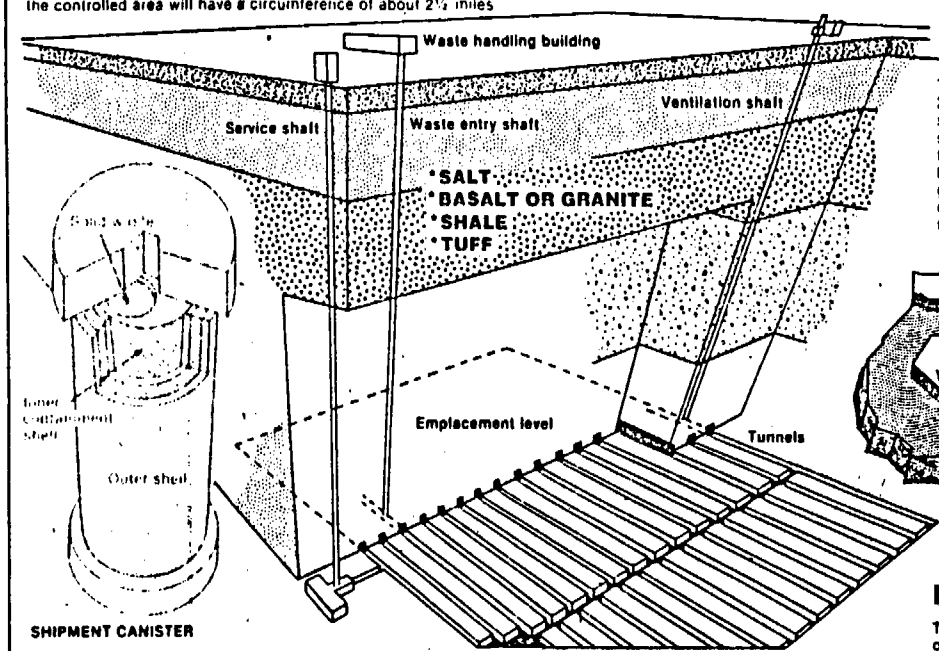
BURYING NUCLEAR WASTE: RISKY BUSINESS FOR NEVADA?

How to store nuclear waste

The planned nuclear waste repository – designed to contain up to 70,000 metric tons of high-level nuclear waste – will resemble a large mining complex. The repository combines two types of industrial facilities – a waste handling facility at the surface, and a large mine constructed two to four thousand feet below the surface. The boundary for the controlled area will have a circumference of about 2½ miles.

The unloading and handling of shipments of high-level nuclear waste will take place in an central controlled area of about 2,000 acres. Canisters of solidified high-level waste will be unloaded from shipping containers and transferred to shielded cells. After inspection for leaks, the canisters will be lowered through the waste shaft to the emplacement level, and moved to their final location by a shielded transport vehicle.

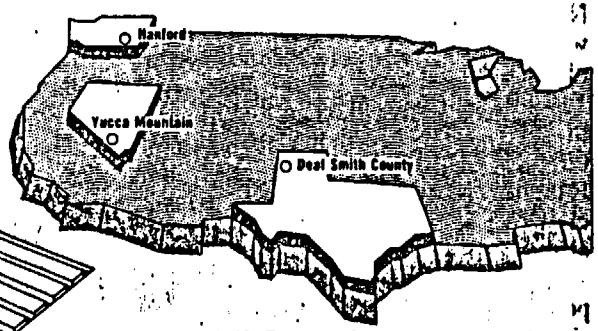
The underground emplacement area will occupy approximately 2,000 acres, reached by separate shafts with elevators for personnel and equipment and for lowering waste canisters. Other shafts will provide ventilation. The canisters of waste will be transported to a tunnel for emplacement. The canisters will be buried in holes drilled in the tunnel floor. In addition to the geologic barriers that surround the repository, various types of engineered barriers will be used – as each storage area is filled, the tunnels and shafts will be backfilled and sealed.



SHIPMENT CANISTER

High level nuclear waste will be shipped in heavily shielded canisters via truck or railcar

These are the four main types of rock formations that the Department of Energy has deemed most suitable for the storage of nuclear waste



Proposed U.S. nuclear waste sites

The Department of Energy will choose in 1994 the location of the first nuclear waste repository in the U.S. from three possible sites: Yucca Mountain, Nevada; Deaf Smith County, Texas; and Hanford, Washington.

SOURCE: Dept. of Energy InfoGraphics © News America Syndicate 1986

Arguments continue over safety of tuff

(Continued from Page 1B)

However, the tuff that formed Yucca Mountain could be the biggest threat to protecting the environment from sudden bursts of radioactivity.

DOE's environmental assessment for Southern Nevada correctly noted Yucca Mountain's volcanic tuff is similar to Rainier Mesa, site of many nuclear weapons blasts in underground tunnels.

The most recent nuclear blast at Rainier occurred on April 10, after a two-day delay. To date, DOE miners and scientists have not been able to recover more than $20 million of monitoring equipment bathed in radiation when something "went awry" after the nuclear explosion 2,000 feet underground.

Three workers trying to re-enter the tunnel were exposed to radioactive iodine 131 in two attempts to reach the equipment in May and June. Iodine 131 seeks human thyroid glands, causing cancers 10 years or more after exposure.

While workers have recovered some tapes, films and disks from equipment, the contaminated Rainier tunnel is too "hot" to stay inside to rescue equipment.

The government does not know what happened during April's "Mighty Oak" nuclear blast, or why Rainier spewed radiation into underground caverns protected by two sets of gigantic steel doors which apparently worked.

In another accident in February 1984, one man was killed and 13 other crew members injured when Rainier Mesa collapsed beneath them after another underground nuclear weapons test.

DOE has not been able to explain why Rainier's volcanic tuff collapsed, although its dense structure fractures easily.

Dr. Donald Vieth, Nevada nuclear waste project manager at DOE's Nevada operations office, said Yucca Mountain is, technically, a good site for burying the nation's high-level radioactive garbage.

In fact, storage space beneath the mountain can be expanded, he added, toward the north.

State project director Robert Loux and his technical staff question DOE's assurances that Yucca Mountain is an old, inactive place.

A scientific event in Oklahoma two years ago shook a complacent geologic world about overestimating the age of faults.

Geologists had studied the Meers fault, a scar left over from earthquakes more than 10 million years old, they thought. Using a new technique to date chemicals in the rock, they learned two years ago that although Meers looked old, it actually faulted much sooner than 10 million years, making it a young formation.

Yucca Mountain skirts a volcano field that could burst into fiery life if Mono Lake's rumblings erupt as Mount St. Helens did, critics say.

Besides, the state argued, the Nuclear Waste Policy Act still limits the first repository to 70,000 tons of radioactive waste, and Congress hasn't amended it.

Sen. Lloyd Bentsen, D-Texas, also recently pointed out that the revised Clean Water Act may end a search for a high-level nuclear dump at any of the western sites.

Bentsen noted that the act required no further degradation of water quality and by mining, then storing radioactive packages — Yucca Mountain drains into the underground Amargosa River, Hanford into the Columbia River and Texas into the Oglala aquifer — DOE would pollute vast potential sources of scarce water in the West.

DOE maintained in its final environmental assessment that Yucca Mountain's rock can keep radioactive water safely away from people and surfaces for at least 20,000 years, but further tests are planned.

However, those tests will be delayed for at least a year after Congress chopped $320 million from the nuclear waste program, halting field studies at all three nuclear waste sites.

THURSDAY: DOE claims Yucca Mountain can keep nuclear materials away from people for up to 10,000 years. State officials and critics say the environment is in danger from uranium, plutonium and a bagful of radioactive stuff deadly beyond 25,000 years.

Dilemma of nuclear waste dump: No state wants it

Editor's Note: The is the final of a five-part series based on a goverment environmental assessment for Yucca Mountain, a possible site for the nation's first high-level nuclear waste repository.

By MARY MANNING
SUN Staff Writer

Once the Department of Energy released its final environmental assessments for proposed nuclear waste sites, government officials walked into a firestorm of complaints and lawsuits.

DOE officials admitted ignoring Nuclear Regulatory Commission "quality assurance" procedures. Dr. Donald Vieth, DOE's Nevada nuclear waste project director, said it was a matter of documenting field samples. The problem? DOE researchers couldn't tell one rock sample from another.

By August, Sen. Edward Markey, D-Mass., revealed the agency had destroyed background documents on the three top contenders in the nuclear repository sweepstakes — Yucca Mountain, Hanford, Wash. and Deaf Smith County, Texas.

BURYING NUCLEAR WASTE: RISKY BUSINESS FOR NEVADA?

The Environmental Policy Institute, an independent Washington, D.C. watchdog agency, said DOE's seven nuclear weapons plants would be forced to close if NRC regulations were met for health and safety at the dump. In 1985 President Reagan decided to allow mixing commercial and defense high-level radioactive wastes in the nation's first repository.

What worries nuclear waste opponents is DOE's track record in handling radioactive materials in the past.

Documents declassified this year showed Hanford released radioactive tritium and iodine 131 in air and water in the 1940s and 1950s.

Cleve Anderson, a former nuclear waste manager for General Electric Co. at Hanford, said in Las Vegas that such contamination happened all the time and crossed the Canadian border, where U.S. government planes quit tracking it.

Anderson appeared before the Nevada Nuclear Waste Projects Commission and the Nevada Legislature's Committee on High-Level Nuclear Waste, appealing to state leaders to force the government to remove plutonium from wastes going to the repository.

After all, plutonium with its 25,000-year half-life will be around a lot longer than the 10,000-year dump, Anderson argued. (Radioactive material decays and this process is called a half-life. For example, one pound of plutonium will be reduced to a half-pound in 25,000 years).

The government had considered recycling nuclear fuel from its reactors before 1980, recovering both plutonium and uranium, until the bottom fell out of the uranium market.

While the nuclear industry seeks to spur uranium sales today, in the not-too-distant future U.S. uranium supplies will disappear and the U.S. will have wasted billions by putting reusable radioactive

(See BURIAL, Page 6B)

Burial only latest of dumping plans

(Continued from Page 1B)

fuel in the ground, Anderson argued.

Anderson was not the first to criticize the government's short-sighted policies concerning nuclear waste. The National Academy of Sciences has urged DOE to look at alternatives other than burying useable nuclear fuel. However, the Reagan administration zeroed out funding for nuclear waste research alternatives in 1987.

Dr. Vieth said burial was considered as the most practical and economical. Recycling nuclear wastes, like shooting them into outer space or burying them in sub-seabeds, would break the nuclear industry's pocketbook, he added.

Earlier nuclear planners built three reprocessing plants to reduce 35 mal 1,000 megawatt power plant to about 70 cubic feet — the size of an average refrigerator. And radioactivity drops to 1,000 years — instead of 10,000 years in the process.

However, the U.S. enrichment program to separate clean uranium 235 atoms from the used nuclear fuel has lost customers for the past 10 years and went $7.5 billion into debt. It's cheaper to mine the ore from the ground than recover it by recycling.

Nevada Nuclear Waste Project Director Robert Loux said the state is worried that burying uranium, plutonium and the rest of the radioactive family from heated nuclear power plant fuel could run into earthquake faults, volcanos and uncharted groundwater.

Vieth terms the nuclear repository a "warehouse operation." He argues that the public faces greater dangers from chemical corrosives and explosives traveling on the Silver State's highways and buried in the desert than high-level radioactive wastes.

The two most common radioactive elements in nuclear wastes — strontium-90 and cesium-137 — are active for 30 years and 17 years, respectively, Vieth said. "That means, if I start with 100 pounds of high-level radioactive wastes, in 50 years I'll have 50 pounds," he added.

DOE faces another problem with a national repository. How does the government protect the site for thousands of years, to keep a family from picnics on a radioactive mound, or from miners digging into old shafts?

There has been no formal program of warning the public about what's buried in Yucca Mountain or anyplace else. A team of government scientists submitted some possibilities beyond signs and fences. One idea considered a team of "nuclear high priests" to guard the site.

In a May 18, 1978 compatability study performed by government laboratories urged a concerted "public relations" program, similar to one the Atomic Energy Commission launched in 1951 when Nevada Test Site nuclear weapons tests began.

"Either a demonstration or a permanent waste storage facility will generate a variety of visitors," the report said. "In our opinion, such visitors should not pass through the testing areas of NTS (Nevada Test Site) or view testing activities."

While DOE has shown great concern for its image, not much fresh scientific data has been gathered for storing nuclear waste at Yucca Mountain. Many background documents and reports done at the test site date back 10 years or more.

"What is striking is that every state objected to having it in their state, and that says something," popular astrophysicist Carl Sagan said on one of his Las Vegas visits.

Anderson recalled his days at Hanford with General Electric. When a new reactor or process was developed, top scientists gathered together and filled a room with possible accidents, a nuclear laundry list of what things could go wrong, Anderson said.

"Then, when it happened, when something went wrong, you could never find it inside the room," Anderson said. "Such an accident is never anticipated."