

Nevada Nuclear Waste Newsletter

Where Should High-Level Nuclear Waste Be Stored?

As Nevadans become increasingly aware and interested about the fact that the Federal Department of Energy (DOE) may recommend a site in the Silver State as the nation's first permanent high-level nuclear waste repository, residents of this state are asking more questions on the subject.

What is the current status of the issue?

How did we get where we are at this time?

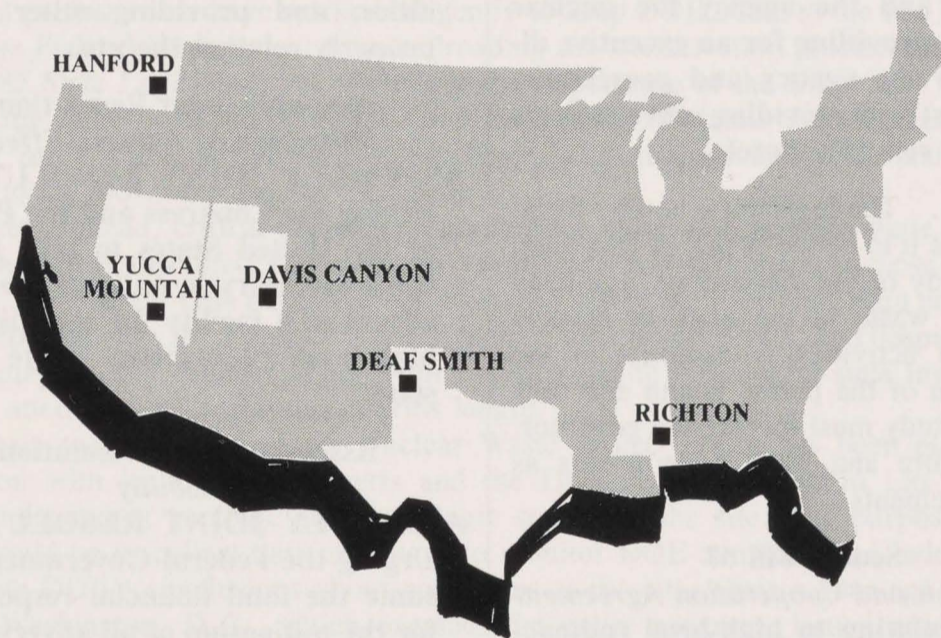
What are plans for the future?

DOE is scheduled in February of next year to nominate and recommend to the President of the United States, based upon preliminary evaluation, sites that DOE has found suitable for characterization as potential locations for the first repository. ("Characterization" is the word for detailed testing and analysis of the potential sites.)

The DOE schedule also anticipates that the President will approve the DOE recommendation of sites in 1986 and that characterization will begin next year at the approved locations. The plan calls for designation by the President in 1991 of one of the characterized sites as the first permanent repository, to then be licensed, constructed and begin receiving waste by the end of the century.

DOE has declared its intention to nominate and recommend only three sites to the President for characterization. This is despite assertion by officials of Nevada and other states, and by other authorities that scientific study of more than three sites is required by law prior to narrowing the field.

Though DOE has rejected such suggestions from many sources, it is possible that the Davis Canyon site in Utah or the Richton Dome site in Mississippi could be
(Please turn to page 8.)



U.S. Department of Energy has ranked potential repository sites in Nevada, Texas, and Washington as its leading choices for detailed testing and analysis, from which one site would be selected to receive high-level nuclear waste.

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1985 Nevada Legislation Regarding Nuclear Waste

Four bills and two resolutions concerning nuclear waste were adopted by the 63rd Session of the Nevada State Legislature in 1985. They are the following:

Senate Bill 55
Committee on High-Level Nuclear Waste
AN ACT relating to high-level radioactive waste; establishing the legislative committee on high-level radioactive waste; prescribing its powers and duties; and providing other matters properly relating thereto.

Senate Bill 56
Commission on Nuclear Projects
AN ACT relating to radioactive waste; creating the commission on nuclear projects and the agency for nuclear projects; providing for an executive director of the agency and prescribing his duties; and providing other matters properly relating thereto.

Section 1. The legislature hereby finds, and declares it to be the policy of this state, that the study of the disposal of high-level radioactive waste in the State of Nevada and related activities is essential to the preservation of the public health and welfare. This study must involve the governor, the legislature and local governments as direct participants.

Senate Bill 67
Consultation and Cooperation Agreement
AN ACT relating to high-level radioactive waste; authorizing the governor to negotiate for an agreement with the

United States concerning disposal of such waste; requiring a public hearing and the signatures of the governor and the chairman of the legislative commission to make the agreement effective; and providing other matters properly relating thereto.

Assembly Bill 40
Transportation of Hazardous Waste
AN ACT relating to hazardous waste; requiring a manifest for its transportation; allowing the use of certain money for cleaning certain sites of contamination; requiring reimbursement of the money; reinforcing local regulation of certain activities; reducing the requirement of confidentiality; providing penalties; and providing other matters properly relating thereto.

Assembly Joint Resolution 4
Mitigation of Adverse Effects
ASSEMBLY JOINT RESOLUTION—
Urging the Congress and the President of the United States to take all measures necessary to mitigate the adverse effects of a facility for the disposal of high-level radioactive waste in this state.

Assembly Joint Resolution 5
Liability
ASSEMBLY JOINT RESOLUTION—
Urging the Federal Government to assume the total financial responsibility for the mitigation of all adverse effects of any facility for the disposal of high-level radioactive waste in this state. □

Legislative Study Committee Created In 1985 Session

A legislative committee to study and evaluate the information and policies of the State regarding the potential location of a high-level radioactive waste repository was created during the last legislative session by the passage and signing of Senate Bill 55.

The seven-member committee will oversee the U.S. Department of Energy's program and the activities of the State Agency for Nuclear Projects to identify potential adverse effects from the construction and operation of such a facility and the ways of mitigating those effects. The committee will also conduct a general review of the policies relating to the disposal of high-level radioactive waste.

Periodic meetings will be held throughout the state during the next 18 months culminating in a report to the Legislative Commission and Legislature. The first meeting of the committee was held in Las Vegas on August 20.

The committee is chaired by Sen. Thomas J. Hickey (D-Las Vegas). Others on the committee are Assemblyman James W. Schofield (D-Las Vegas), vice chairman; Senators James I. Gibson (D-Henderson) and Kenneth K. Redelsperger (R-Pahrump); and Assemblymen Jane F. Ham (R-Las Vegas), John E. Jeffrey (D-Henderson) and Gaylyn J. Spriggs (R-Hawthorne). □

Nuclear Projects Commission Created By Legislation

The Nevada State Commission on Nuclear Projects was created by the passage and signing of Senate Bill 56, an action by the last legislative session.

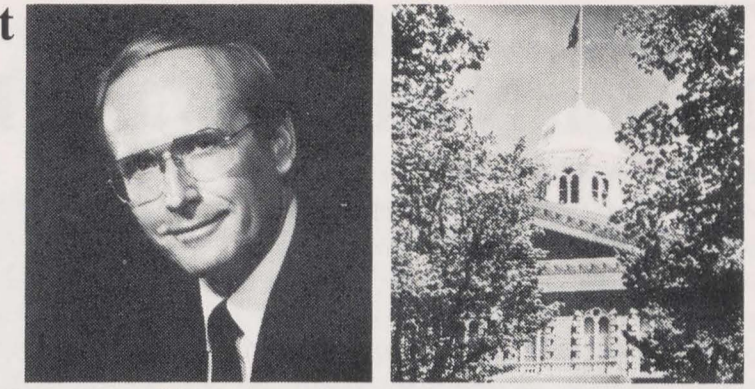
The Commission, appointed by Governor Richard Bryan, is charged with the responsibility to advise and make recommendations to the Governor and the Legislature regarding the policies of the State concerning projects involving the disposal of high-level radioactive waste.

Appointed by Governor Bryan were former Governor, Grant Sawyer; Clark County Commission Chairwoman, Thalia Dondero; Las Vegas City Councilman, Ron Lurie; Southern Nevada businessman, James Cashman III; President of the Southern Nevada Building Trades Council, Frank Caine; Commission on Judicial Discipline administrator, Anne Peirce of Reno; and community college English teacher, Michon Mackedon of Fallon.

The Commission will also provide advice and guidance to the Nuclear Waste Project Office/Agency for Nuclear Projects which has been in existence since December, 1983. Additionally, the Commission will submit a list of three candidates for executive director of the agency to the Governor who shall make the final appointment.

It is anticipated that the Commission will elect a chairman and other officers at its first meeting. □

Governor's Statement



The proposal by the Federal Department of Energy to locate the country's first high-level nuclear waste repository in southern Nevada is undeniably an issue of significant concern to most Nevadans. Whether we support or oppose this effort, we can—and must—agree that one aspect of this undertaking presents a substantial area of common ground for all Nevadans. All of us agree that the health and safety of Nevada's citizens, and our state's unique environment, economy and way of life, must be protected.

Since 1983, the Nevada Nuclear Waste Project Office has been formally engaged in the process of assuring that this overriding concern is addressed in all aspects of the U.S. Department of Energy's activities relative to its high-level waste planning. Bob Loux and his staff of professionals have worked diligently to keep DOE's feet to the fire in order to prevent the Federal Government from railroading the site selection process into Nevada.

The 1985 State Legislature acknowledged the importance of the Office and the significance of the issue by formally establishing the agency in statute and augmenting it by providing for a Commission on Nuclear Projects to support the office and to afford guidance to the Governor and the Legislature.

In the years ahead, critical decisions regarding the siting of a nuclear waste repository will be made. It is absolutely essential that Nevada be a full participant in those decisions.

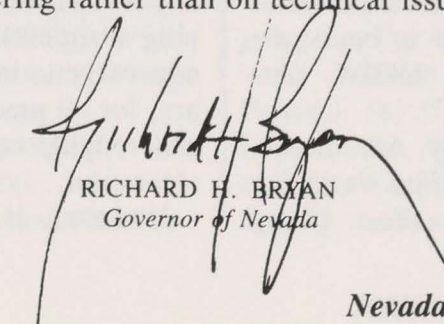
To date, meaningful state participation in key U.S. DOE decisions has been nonexistent. Despite repeated calls for a greater voice in matters affecting the state, and despite the very clear language in the Nuclear Waste Policy Act requiring meaningful state involvement, DOE has attempted to keep states at arms length.

For nearly two years, the State Nuclear Waste Project Office has been planning, in conjunction with its technical experts and the DOE regional office in Las Vegas, to conduct independent geologic and hydrologic studies at the site. The purpose of these studies would be to collect data necessary to monitor DOE activities and independently substantiate DOE's conclusions about conditions at the site. Over a year ago, the DOE office in Washington, D.C., which oversees the entire program, issued guidelines for financial assistance which prohibit states from carrying out any independent data collection activities.

The state was left with no alternative but to file court action against the department in order to obtain the funds needed to conduct state oversight activities as provided for in the Act. Until now, our concerns with the department have centered around the subjectivity of DOE's entire site screening process and the apparent politicization of the selection procedure. By attempting to deny Nevada funds for independent, on-site data collection, the department appears to be tacitly admitting that its technical investigations won't withstand close scrutiny and that it intends to try to pursue a political rather than scientific process for selecting a nuclear dump site.

We in Nevada must not settle for anything less than our full rights and responsibilities under the Nuclear Waste Policy Act. That means having the opportunity for full participation in key repository-related decisions which have the potential for affecting our citizens for centuries to come.

I trust that the Nuclear Waste Project Office and the newly created Commission on Nuclear Projects will continue to pressure the Department of Energy to fully involve Nevada in its repository decision-making process. If that process is, as DOE claims, based on objective, scientifically justifiable criteria—and not on political and ease of siting considerations, as many of us fear—DOE should logically champion a broad role for potential host states and should welcome close scrutiny of its activities. By insisting on running a "closed shop" with regard to repository program decisions, DOE lends credence to accusations that its entire effort is based on predetermined siting decisions and rests on political gerrymandering rather than on technical issues of site suitability. □


RICHARD H. BRYAN
Governor of Nevada

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.

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

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Local Government Involvement: Nevada a Model for the Nation

When Congress pieced together the final version of the Nuclear Waste Policy Act during the frantic days before adjournment in December 1982, it did not deal with at least one important issue in a bill that many view as a masterpiece of legislative compromise and integration of divergent elements and interests.

Although Congress clearly intended for local governments to play a part in decision-making relative to the country's high-level nuclear-waste repository program, it did not delineate a specific role for cities and counties that may be affected by the repository site-selection process or, later, by the construction and operation of such a facility.

Nevada was among the first of the potential repository host states to recognize this omission and to act to provide a voice for its local governments in this important decision-making process.

Acting in concert with the Interim Subcommittee on High-Level Nuclear Waste established by the 1983 Legislature, the Nuclear Waste Project Office organized potentially affected southern Nevada counties and cities into an informal advisory group.

Comprised of the planners from Clark County, Nye County, Lincoln County, and the Cities of Las Vegas, North Las Vegas, Henderson, Boulder City, and Caliente, this ad hoc group provides the State Office with advice and direction on key aspects of the repository program affecting local governments.

In order to facilitate local involvement in the State program, the Nuclear Waste Project Office applied for and received pass-through grant funds from the U.S. Department of Energy for affected localities.

Funds are made available from the State to enable local governments to develop administrative and planning capacities needed

to actively participate in decision-making relative to federal nuclear-waste activities and to assess potential impacts associated with a repository at Yucca Mountain.

Nevada's effort to involve local governments early and substantively in the State's oversight of the federal high-level waste-disposal program is considered a model for other states to follow.

One report, prepared by the consulting firm of Creighton and Creighton for the Utility Nuclear Waste Management Group (a consortium of major electric utility companies) relative to DOE's handling of the repository program called the Nevada model for involving localities "particularly ideal" and suggested that it be used in other states to assure meaningful involvement of cities and counties in the process nationwide. □

Transportation: Major Nuclear Waste Issue

Is nuclear [waste] transport safe or is it America's next nuclear gamble? On the basis of hundreds of government and industry reports, interviews, surveys and extensive Council on Economic Priorities original research, we conclude that transportation, as presently practiced, is unsafe.

—Marvin Resnikoff, Ph.D., of the Council on Economic Priorities

More than 5,000 spent fuel elements have been shipped over the past two decades without a single accident causing release of radiation. In view of this history, a study on nuclear waste by the League of Women Voters states that "compared to the transport of other hazardous materials, radioactive shipments have a gold-star record."

—Excerpt from the September 1982 issue of *Science Concepts*

4 **T**hese two statements epitomize the debate over the issue of high-level radioactive waste transportation from nuclear reactors and other locations where spent nuclear fuel and highly radioactive materials are currently stored to proposed high-level waste-repository sites.

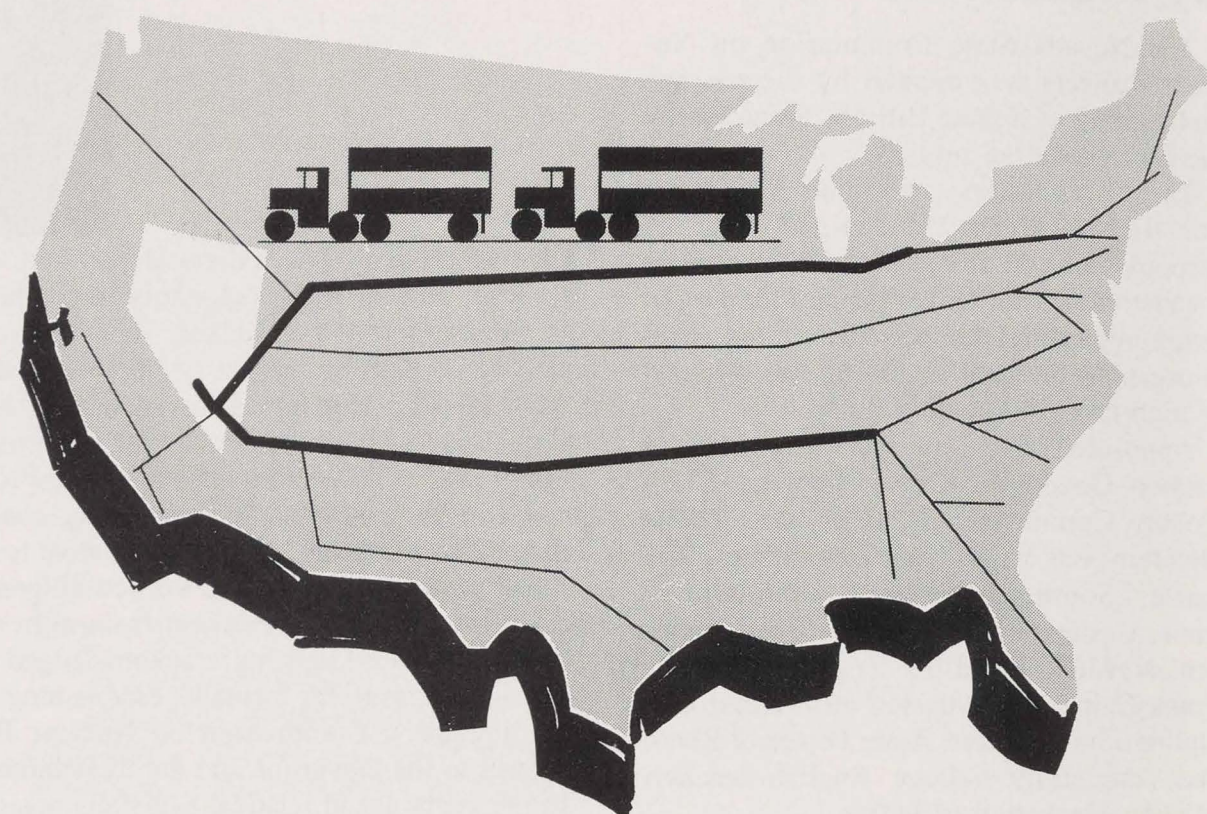
The Department of Energy (DOE) has based its planning for repository-related waste transport on the assumption that because spent-fuel shipping containers or casks are so well engineered and virtually impregnable (according to DOE), the chance of a shipping accident involving the release of radiation is almost non-existent. As a result, DOE's transportation-risk estimates have been based on a no-release premise.

Critics fault DOE for taking an overly optimistic (non-conservative) approach to risk analyses and point to the fact that there are numerous accident or sabotage scenarios where radiation leakage from shipping casks would be possible.

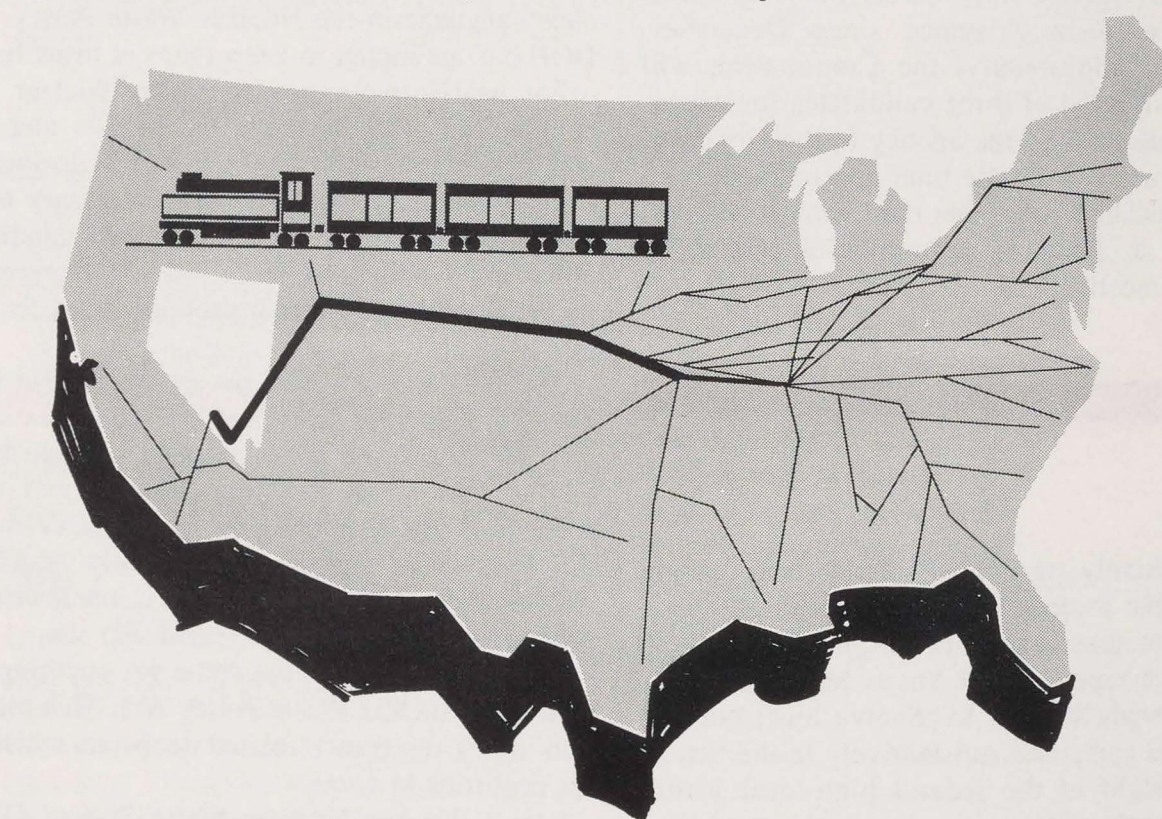
These critics point to inadequacies in structural and crack tests for casks and note that the containers that will ultimately be used to ship waste to a repository are likely to be lighter, less heavily shielded, and more prone to significant accident damage.

This debate is important to Nevada—and to states through which high-level nuclear waste will pass on its way to a potential Western repository—because it bears directly on the adequacy of DOE's site-selection process.

The Nuclear Waste Policy Act directs DOE to consider transportation variables when comparing candidate sites. Using



More than 6,400 truckloads of high-level nuclear waste would flow into Nevada each year if all such shipments were made by truck. Over the 30-year operational life of the repository, there could be as many as 180,000 such shipments.



U.S. Department of Energy estimates that it will require approximately 830 rail shipments per year to move high-level nuclear waste to the repository. Over 24,900 such shipments would be made over the 30-year repository operational period if all such shipping were done by rail to Nevada

DOE's reasoning (i.e., that there is virtually no chance of a radiation-releasing shipping accident), transportation becomes a non-variable in site selection because risks are, for all practical purposes, insignificant and roughly equal for all sites under consideration.

However, if the possibility of a worst-

case (or even moderate-case) accident is factored into the analyses, things such as distance, population characteristics of routes, terrain, weather conditions along routes, emergency-response capabilities of communities bordering shipping corridors, etc., suddenly become important factors in selecting a site.

Differences in risks (and costs needed to address those risks) become apparent when a Western location (such as Nevada or Washington) is compared to a potential Eastern site.

Nevada's Nuclear Waste Project Office has been involved in numerous activities designed to guarantee that DOE adequately considers transportation issues in its siting decisions. Together with local governments in southern Nevada, the Office has worked to encourage DOE to conduct route-specific transportation analyses and not rely on the overly general and generic assessments DOE has provided to date.

The State Office and affected local governments commented extensively on the treatment of transportation issues in DOE's draft EA for the Yucca Mountain site. Comments were critical of DOE for failing to examine Nevada-specific transportation variables and for performing a less-than-adequate comparative risk and cost analysis.

The Department of Energy is currently engaged in developing "plans" governing the business (i.e., procurement, cask design and development, etc.) and "institutional" (i.e., relations among DOE, states, interest groups, and other publics) aspects of its proposed transportation system.

A draft *Transportation Business Plan* was issued for public comment in August 1985. A separate draft *Transportation Institutional Plan* was released in September 1985.

The comment period for the *Business Plan* closed on September 30, 1985. State and local (Nevada) government comments generally supported DOE's efforts to engage in a comprehensive planning approach for transportation-related issues.

However, DOE was criticized for needlessly separating its planning for "business" elements from planning for "institutional" factors when, in fact, these should be interrelated components of a single planning process.

The Nuclear Waste Project Office also faulted the *Business Plan* for failing to provide roles for affected states, tribes, and local governments in aspects of systems acquisition and transportation operations that are of key importance (i.e., adequacy of cask design and production criteria that minimize chances for accident-related releases of radiation, selection of shipping modalities, route designation, etc.).

The draft *Institutional Plan* is still being reviewed. Comments will be prepared and submitted prior to the December 31, 1985, deadline. □

Nevada Begins Assessment of Potential Repository Impacts

On September 13, 1985, the Nevada Nuclear Waste Project Office (NWPO) formally issued a Request for Proposals (RFP) for a major socioeconomic study to identify potential impacts to the state and to local communities should a nuclear-waste repository be constructed at Yucca Mountain in southern Nevada.

The issuance of this RFP followed months of joint planning by NWPO staff and representatives from southern Nevada counties and cities to set parameters for the proposed study and to assure that local as

well as statewide factors would be fully considered in the study design.

A major focus of the study will be to quantify impacts in terms of real costs to local communities and to the state.

A major federal project such as a high-level radioactive waste repository has the potential for affecting Nevada in numerous ways. Given the location of the proposed site in rural Nye County, the repository project may bring with it job opportunities and capital into an area of the state that is chronically affected by the boom-bust cycles of mining and, to a lesser degree, agriculture.

However, the repository project is also

Congress Deliberates Renewal of Price-Anderson Liability Act

Due to expire in 1987, the Price-Anderson Act has provided for insurance to cover accidents from the nation's nuclear power plants for the past 30 years. In Congressional deliberation on its renewal, the issue of the applicability of the Price-Anderson Act to federal high-level nuclear waste transportation and storage has been the subject of much debate.

Nevada's Governor Bryan along with Governor White of Texas and Governor Gardner of Washington have agreed on four basic principles that must be incorporated in any legislation regarding liability for accidents involving transportation and storage of high-level radioactive wastes:

1. The federal government must be held strictly liable for any accidents;
2. Victims must be fully compensated;

likely to attract an influx of new workers and their families—something that could place serious strain on a small county's ability to provide education, health care, law enforcement, and other necessary services.

The fact that the proposed repository site lies in rural Nye County does not mean that other parts of Nevada will be unaffected. Highly radioactive materials will have to be transported via rail lines and highways throughout the state.

Communities situated along major waste-shipment corridors may experience significant social and economic impacts, among them reduced property values, out-migration of residents, lost economic opportunities as a result of fears over the possibility of nuclear accidents, etc.

The planned Nevada socioeconomic impact study is designed to provide State and local planners with clear and quantifiable answers to questions about the social and economic effects of a nuclear repository on the State, its local governments, and its citizens.

In the cover letter transmitting the RFP to prospective responders, the NWPO stipulated that it is not looking for traditional, run-of-the-mill economic analyses. Rather, the State is seeking innovative approaches that pertain specifically to the unique characteristics of Nevada and its localities. A major focus of the study will be to quantify impacts in terms of real costs to local communities and to the State, and then identify ways to mitigate or lessen the effects that negative impacts may have at all levels of government. □

Tectonic, Hydrologic Aspects of Yucca Mountain Cause Concern

In comments compiled by the Nevada Nuclear Waste Project Office on the U.S. Department of Energy's **Draft Environmental Assessment for Yucca Mountain** (the "draft EA"), deep concern was expressed about the tectonic and hydrologic aspects of the site. The concern is that the site may not be capable and, therefore, suitable for containing and isolating radioactive waste for 10,000 years.

Yucca Mountain is located adjacent to the southwestern boundary of the Nevada Test Site in southern Nevada. It is located within a physiographic province called the Great Basin. The Great Basin is an area of rugged bedrock mountain ranges and intervening alluviated valleys.

Surface water is usually confined to the valleys, but ground water is interbasinal. The mountains were formed by block faults, some of which are still active. Many of the larger earthquakes in the western U.S. have occurred in the Great Basin.

Yucca Mountain is a typical fault-block mountain range, bounded on both sides by large displacement faults and further broken internally by smaller faults and fractures. The rock materials of Yucca Mountain are multiple layers of volcanic ash flows called tuff. Young cinder cones and lava flows occur immediately west of the site.

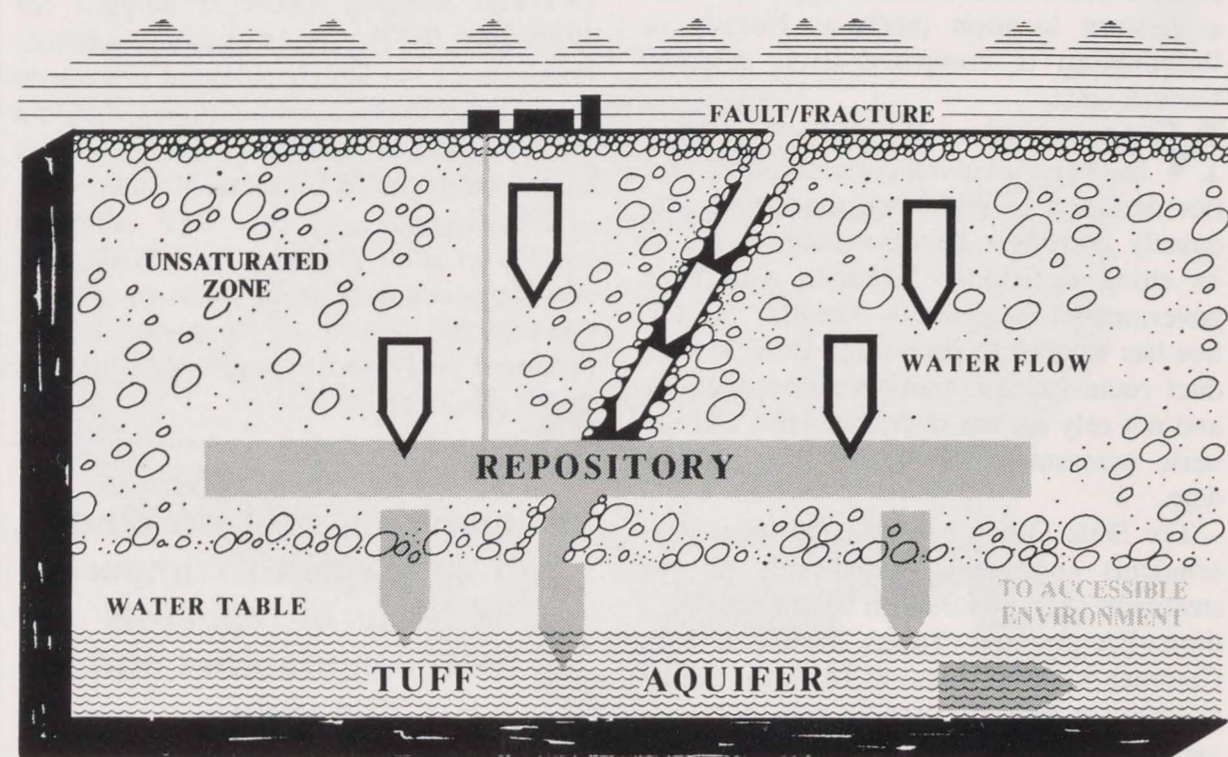
The site can be characterized as geologically and hydrologically complex. It is possibly the most complex of the sites under consideration for the first repository.

Yucca Mountain is located in a tectonically active region of southern Nevada. The site is located within the Walker-Lane Disturbed Zone and its projected extension, the Las Vegas Shear Zone. The Walker-Lane Zone is a major structural feature in the western Great Basin. Some scientists speculate that these tectonic zones may be responsible for the volcanic activity observed adjacent to the site.

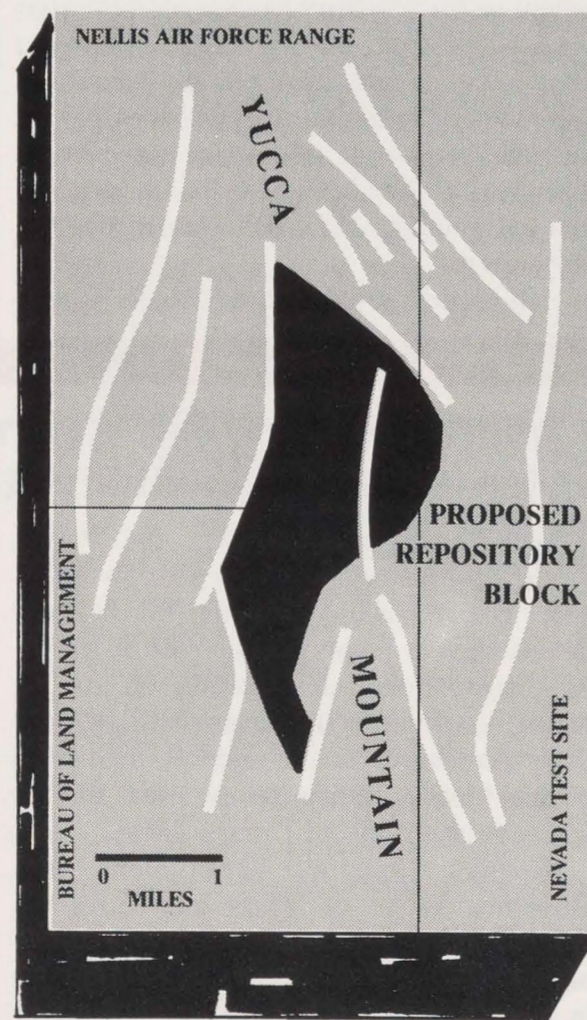
Mapped strike-slip faults at the north end of Yucca Mountain are similar to other strike-slip faults observed along these tectonic zones. Another strike-slip fault in the Great Basin was responsible for the 7.3 magnitude Cedar Mountain earthquake, one of the largest earthquakes in the region in recent history.

The Department of Energy's conclusion in the draft EA is that the nature and rates of expected tectonic activity are not sufficient to threaten the waste-isolation capability of Yucca Mountain.

The EA does not consider the many 6+ magnitude earthquakes that have historically occurred in the Great Basin in relation



The State of Nevada contends that water may flow rapidly along faults or fractures in the illustrated unsaturated zone of Yucca Mountain, through the repository to the Tuff aquifer and then to the accessible environment.



Irregular white lines represent major mapped faults of the Yucca Mountain Area, some of which may be potentially active.

to the site. Yucca Mountain is located adjacent to the Southern Nevada Seismic Belt, an east-west zone of diffuse earthquakes.

A majority of earthquakes within this belt cannot be associated with any particular fault. The boundary of this belt is arbitrary at best and may include the site. Magnitude 6+ earthquakes have been identified in this belt, but not at the site.

Given the location of this belt and the past earthquake history, a postulated 6.8 magnitude earthquake may not be a conservative estimate for Yucca Mountain. The DOE concludes that earthquake activity is not a major concern since only a few earthquakes (all less than magnitude 4) have been recorded in the Yucca Mountain area.

The draft EA indicates that last movement on the faults at Yucca Mountain occurred over 250,000 years ago, and there is no "unequivocal" evidence to suggest movement within the last 40,000 years.

However, field observations from trenches cut across these faults display geological indicators that suggest movement within the last 40,000 years, possibly as young as 10,000 years. These indicators suggest that the faults may be potentially active and may be capable of an earthquake and resulting ground movement within the life of the repository.

The repository is proposed for construction in the unsaturated zone beneath Yucca

Mountain, approximately 400 feet above the water table. In the draft EA, calculations of moisture flow through the unsaturated zone are based upon a conceptual model that utilizes rock matrix flow as the predominant mechanism.

Given the rock conditions beneath Yucca Mountain, this mechanism would produce very slow travel times for radionuclide release from the repository to the accessible environment. The accessible environment is a boundary of 5 km in any direction from the repository set by the EPA for calculating repository performance.

However, researchers from Nevada's hydrologic community believe that because Yucca Mountain is extensively faulted and fractured, fracture flow is also a flow mechanism in the unsaturated zone. Water flow through fractures is well documented in the tuffs of Rainier Mesa on the Nevada Test Site and has been shown to be quite rapid.

The State believes that DOE should devote more research to fracture flow at Yucca Mountain and should revise the EA to acknowledge the possibility of fracture flow and its implications on meeting travel times and performance assessments. Acknowledging the presence of fracture flow would produce more conservative ground-water travel times.

Experience in siting investigations has shown that even with the simplest of sites, technical surprises emerge as the investigations become more intense. With sites known to be geotechnically complex, such surprises can increase many fold, delaying program schedules while questions are resolved and lessening confidence that a site can ultimately be licensed and operated.

Because of this physical complexity, there is concern about DOE's ability to adequately and thoroughly characterize the site and demonstrate with confidence the site's ability to contain and isolate waste from the environment. □

DOE Publishes 'Mission Plan'

The Secretary [of Energy] shall prepare a comprehensive report, to be known as the mission plan, which shall provide an informational basis sufficient to permit informed decisions to be made in carrying out the repository program.

With those words, Congress incorporated the requirement for a comprehensive informational and planning vehicle into the framework it established for siting, constructing, operating, and ultimately sealing (forever) repositories for the disposal of the nation's high-level nuclear waste.

The Act directed the Department of Energy (DOE) to submit a draft of the Mission Plan to the states, affected Indian tribes, the Nuclear Regulatory Commission, and other U.S. government agencies for comment no later than March 1984. A "final" version of the plan was to have been submitted to Congress no later than May 1984.

DOE issued a "working draft" of the Mission Plan for comment by states, tribes, and other interested parties in December 1983. A formal, two-volume draft was released for public review and comment on May 9, 1984. The final, or official, version of the document was submitted to Congress in June 1985.

The Mission Plan, in its current version, contains DOE's "best estimate of the objectives and strategies of the Civilian Radioactive Waste Management Program and of the facilities, institutional activities, management approach and information needed to implement the program." In short, the plan is intended to be the evolving blueprint by which DOE proposes to implement the Nuclear Waste Policy Act.

In testimony last September before Congressional committees reviewing the document, Nuclear Waste Project Office Director Robert Loux highlighted State concerns with key elements of the final plan. Loux noted that, according to Mission-Plan

schedules, the Department of Energy intends to make a preliminary determination that certain sites are, in fact, suitable for development as repositories before detailed testing and data collection occurs during site characterization.

Loux pointed out that the "preliminary determination of suitability" is an action Congress required as part of the Nuclear Waste Policy Act (Sec. 114(f)) to assure that DOE would have alternative sites from which to choose after characterization work is completed. He noted that if DOE is permitted to make that determination prior to site characterization, there is no guarantee that even one suitable site will survive the in-depth testing phase.

Loux also said that allowing DOE to make its determination early in the site-evaluation process could mean that the Department would be able to select two less-than-suitable sites plus its "preferred" site for characterization, knowing in advance that two of the sites will not qualify as repositories.

Such a scenario could mean that the Nuclear Regulatory Commission and Congress are ultimately presented with one site that may be only marginally adequate. Under such circumstances, the alternatives are limited to (1) approving DOE's choice or (2) incurring major schedule delays and additional costs in revisiting the entire characterization process.

Another concern voiced by Nevada and other affected states and tribes involves the overly ambitious timetable for opening the first repository. DOE indicates in the Mission Plan that it intends to adhere to a 1998 date for beginning repository waste-storage operations.

Given the delays already incurred by the program and the likelihood of additional schedule slippages in the future, there is a real possibility that the rigid 1998 deadline will cause DOE to rush critical technical and scientific evaluations needed during site characterization. □

Glossary of Terms for Tectonic, Hydrologic Article

Tectonics—The study of the broader structural features of the earth and their causes.

Physiographic province—A region of similar structure and climate that has had a unified geomorphic history (i.e., history of its surface features).

Interbasinal—Occurring between basins or valleys.

Fault—A fracture or fracture zone in the earth's surface along which there has been

displacement (i.e., movement) of the sides of the fracture relative to one another.

Fault block—A block of rock bounded on at least two sides by faults.

Strike-slip fault—A fault in which the net slip or movement is horizontal.

Dip-slip fault—A fault in which the net slip or movement is vertical.

Unsaturated zone—That area of the subsurface that is above the level of the water table. Rocks within this area are less than

completely filled with water.

Matrix flow—The flow of water through more or less solid rocks (i.e., the migration of water through the pores of the rock itself).

Fracture flow—The flow of water through cracks or fractures in rock formations (fracture flow is much more rapid than matrix flow, but only occurs where the rock contains numerous interconnected cracks).

STORAGE (Continued from page 1.)

added to or substituted for one or two of the sites in Nevada, Texas, or Washington State. That is because sites in those five states were identified by DOE in its *Draft Environmental Assessment* one year ago as the leading candidates from an original list of nine states for the first repository.

Another possibility is that DOE could advance one or more from its list of sites in 17 other states—all in the East—under consideration for nomination and recommendation to the President later for characterization leading to establishment of the nation's second high-level nuclear waste repository. (In the "jargon" of the selection process, states with potential sites for the first repository are known as "first round" and the others are referred to as "second round.")

In its *Draft Environmental Assessment* of the Yucca Mountain site in Nevada, published in December 1984, DOE said:

"In conclusion, the DOE believes that the Deaf Smith [Texas], the Hanford [Washington state] and the Yucca Mountain [Nevada] sites offer, on balance, the most advantageous combination of characteristics and conditions for the successful development of a repository and should therefore be recommended for characterization."

Nevada and many other states challenged that conclusion, but DOE has maintained its position. Furthermore, DOE has indicated a preference for the Nevada site even among those three. For example, *The Nevada Appeal* reported in its issue of October 14, 1985:

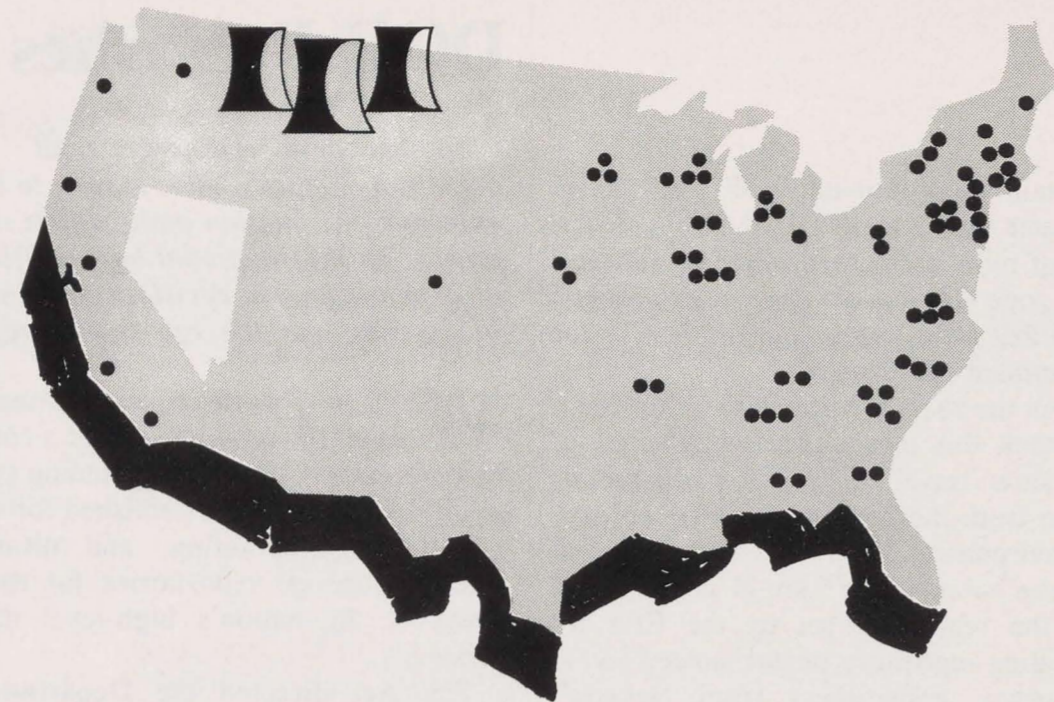
"TONOPAH—Nevada's Yucca Mountain is technically the U.S. Department of Energy's first choice for a high-level nuclear waste repository," a DOE planner said Saturday.

"In a speech to the Society of Professional Journalists in Tonopah, Dr. Donald Vieth, the chief agency planner for the selection of a repository site, said the Yucca Mountain site is technically the best location for the nation's first high-level repository."

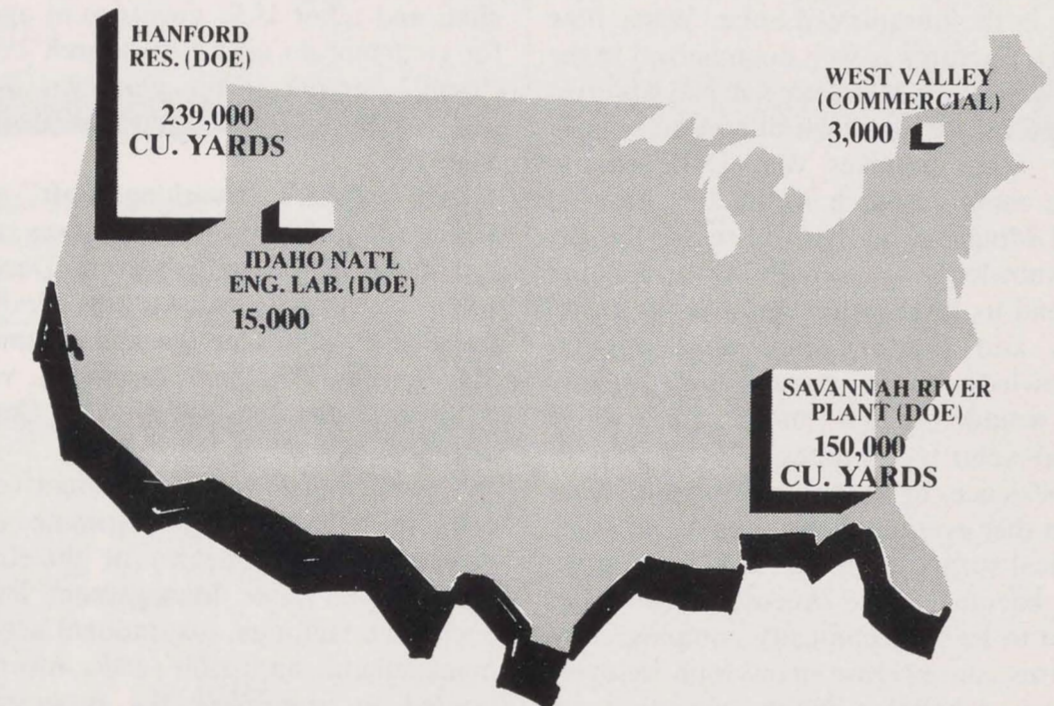
The Nevada State Nuclear Waste Project Office, and many others, contend that technical studies to this point are insufficient to support a finding of suitability for the Yucca Mountain site. Declaration of suitability cannot precede extensive geological study, it is held by those who differ with DOE.

Questions regarding faults, earthquake dangers, and possible contamination of underground water sources are among unresolved technical concerns regarding the Yucca Mountain site. Transportation, liability, and socioeconomic issues also are yet to be studied in detail.

The Government Accounting Office



Most of the nuclear waste to be disposed of in the repository is produced by electricity-generating atomic power plants located primarily in the eastern part of the United States. Individual plants or clusters of plants are represented by each dot on the map.



Highly radioactive waste products of nuclear defense activities are currently stored in these four principal locations. The President has determined that much of the waste will be disposed of in the first permanent commercial repository.

(GAO) has cautioned that if only three sites are characterized and all are disqualified or eliminated, the waste disposal program could be set back ten years while alternate sites are identified and characterized. Therefore, GAO has recommended several options to avoid that dilemma, including additional testing prior to approval for characterization or characterization of more than three sites.

Meanwhile, DOE proposes to build one or more monitored retrievable storage (MRS) facilities to relieve current storage problems at nuclear power plants.

DOE has identified three potential sites for an MRS facility, all in Tennessee. Some observers believe, and many Tennesseans dislike the prospect, that the MRS facilities may hold overflow waste from on-site storage of reactors for a long time, especially if

activation of the first permanent repository is delayed. Congress has yet to approve construction of an MRS facility.

Background

Origins of the problem of nuclear waste may be found in the dawn of the Atomic Age more than 40 years ago. By-products of the atomic and nuclear generating processes have accumulated in temporary storage facilities since the 1940s.

Though most of the high-level nuclear waste of the early days was associated with defense, today about 50 percent of the nation's total waste is from that source. And the other half of the accumulation is from commercial generation of electricity since the introduction of that era in the 1950s. There are approximately 90 operating reactors in the United States, most of them in the East.

Today, there are estimated to be more than 10,000 metric tons of high-level nuclear waste in temporary storage in the United States. The amount of such waste that must be disposed of by the year 2020 is expected to rise dramatically to some 130,000 metric tons.

Temporary storage facilities include underground tanks in South Carolina and Washington state, and water-filled tanks in which spent fuel rods from nuclear generating plants are submerged on-site. Temporary storage must continue until the first permanent repository is in operation. A second such permanent facility is anticipated to follow.

The need to move from interim measures to permanent solutions led to the adoption by the United States Congress of Public Law 97-425, the Nuclear Waste Policy Act of 1982. It was signed into law by President Reagan on January 7, 1983.

The act includes provisions for:

Development of deep-mined geologic waste repositories for the disposal of high-level radioactive waste and spent nuclear fuel, and

Establishment of a program of research, development, and demonstration regarding the disposal of high-level radioactive waste.

It is under that act that the activities of the Department of Energy, leading to estab-

lishment of the first permanent repository, are primarily conducted.

The act also establishes the Nuclear Waste Fund, which derives its revenue from an assessment of 1.0 mil per kilowatt-hour of electricity generated by nuclear power. This is the source of funding to carry out the provisions of the act.

Plans
In the absence of change as the result of persuasion, action by the President, federal legislation, or court action, the DOE schedule calls for accomplishment of the following major events on this timetable:

February 1986: Nominate/recommend three sites for characterization.

Early 1986: Approval or disapproval by the President of the recommendations of sites for characterization.

August 1986: Start exploratory shafts on sites approved for characterization. These shafts would be drilled 1,800 to 4,000 feet deep, depending on the site, and will provide access to potential sites for mine-like structures through which studies will be carried out.

January 1988: Completion of shaft construction and initiation of testing at depth.

December 1989: Completion of exploratory shaft testing for draft Environ-

mental Impact Statements, and associated recommendations.

June 1990: Issue draft Environmental Impact Statements.

December 1990: Issue final Environmental Impact Statements.

January 1991: Issue Site Selection Report, recommending selected site to the President.

March 1991: President recommends site to Congress. (State may submit notice of disapproval to Congress.)

May 1991: License application to Nuclear Regulatory Commission (NRC) for selected site.

August 1993: Receive NRC construction authorization and begin construction of repository.

December 1997: Receive license from NRC to operate.

January 1998: Begin operations.

(From beginning of operations until approximately 2020, some 70,000 metric tons of nuclear waste would be brought to the repository where it would be implanted and eventually sealed from access. Scientists estimate that the material would remain radioactive and hazardous for 10,000 to 100,000 years.)

Litigation Develops Over Nuclear Waste Repository Siting Project

On December 14, 1984, the State of Nevada filed suit challenging the Secretary of Energy's refusal to grant the Nevada Nuclear Waste Project Office funds to investigate hydrologic and geologic conditions at the Yucca Mountain site.

One of the State's attorneys, Special Deputy Attorney General Mal Murphy, argued before the Ninth Circuit Court of Appeals on August 12 that Nevada, having a candidate site for the first repository, is entitled pursuant to sections 116 and 117 of the Nuclear Waste Policy Act to fully participate in the siting process.

That participation, Murphy argued, contemplates the approval of the State's grant request to conduct reasonable independent tests at the Nevada Site to check investigative methodologies and to verify technical conclusions reached by the Department of Energy.

The Department of Justice attorney, Martin Matzen, argued that the Secretary of Energy has a good deal of discretion to deny the State's request for funds to conduct monitoring and testing activities. He suggested that the Court should give great deference to the Secretary's decisions rela-

tive to the denial of grant requests from the Nuclear Waste Fund.

The Nuclear Waste Fund is a billion-dollar trust fund that has been created by contributions from the generators of the nuclear waste, as required by the Nuclear Waste Policy Act. Presently, the generators are contributing approximately \$1 million per day to the fund.

The appellate court is expected to render a decision soon on the controversy. All of the states that may be considered for either the first or second repository as well as Tennessee (which has been identified as having potential sites for a monitored retrievable storage facility), are anxiously awaiting the Court's decision.

Friend-of-the-court briefs were filed supporting Nevada's position by the States of Washington, Utah, Minnesota, and Texas. Thirty-four utilities joined in filing a friend-of-the-court brief in support of the Secretary of Energy.

Guidelines

Nevada also filed a Petition for Review with the Ninth Circuit Court of Appeals on

May 28, 1984, challenging the general guidelines for the recommendation of sites for nuclear-waste repositories published by the Department of Energy on December 6, 1984.

Nevada argued that the guidelines failed to establish objective standards as to the screening process, methodology for ranking potential sites, weighing post-closure versus pre-closure considerations, and transportation.

Nine other states have filed similar petitions challenging these and other aspects of the guidelines. The Environmental Policy Institute has also filed a petition. All of the petitions including Nevada's have been consolidated in the Ninth Circuit Court of Appeals and are presently awaiting the outcome of a motion to dismiss filed by the Justice Department in the Washington State and EPI petitions.

The basis of the government's motion is that the guidelines do not represent a final action of the Secretary of Energy that is reviewable under the NWPA. The Ninth Circuit Court is expected to render a decision on the motion soon.

U.S. Congressional Committees With Jurisdiction Over Nuclear Waste

House

Energy Conservation and Power Subcommittee
House Energy and Commerce Committee
Edward J. Markey, Chairman
H2-316 House Office Building, Annex II
Washington, DC 20515

Energy and the Environment Subcommittee
House Interior and Insular Affairs Committee
Morris K. Udall, Chairman
1327 Longworth House Office Building
Washington, DC 20515

Energy Research and Production Subcommittee
House Science and Technology Committee
Marilyn Lloyd, Chairman
B374 Rayburn House Office Building
Washington, DC 20515

Senate

Energy Research and Development Subcommittee
Senate Energy and Natural Resources Committee

Pete V. Domenici, Chairman
SD-317 Dirksen Senate Office Building
Washington, DC 20510

Nuclear Regulation Subcommittee
Senate Environmental and Public Works Committee
Alan K. Simpson, Chairman
SD-410 Dirksen Senate Office Building
Washington, DC 20510 □

DOE's Draft Environmental Assessments: Step Towards Narrowing the Field

We nuclear people have made a Faustian bargain with our society. We offer energy that is (potentially) cheaper than energy from fossil fuels. . . . But the price that we demand of society . . . is a vigilance . . . that we are quite unaccustomed to. [Are we] prepared to exert the eternal vigilance needed to ensure the proper and safe operations of [our] nuclear energy system?

—Dr. Alvin Weinberg, former director of Oak Ridge National Laboratories (1971)

During the past 12 months, the U.S. Department of Energy (DOE) began the public airing of evidence and data designed to determine if, in fact, one (or more) of the sites it is investigating as possible locations for the country's first high-level nuclear waste repository will meet the criteria for "eternal vigilance" that Dr. Weinberg spoke about and which Congress defined in more operational terms in the Nuclear Waste Policy Act.

Prior to choosing at least three sites for detailed, in-depth evaluation and testing (site characterization), the Act requires DOE to prepare environmental assessments (EA) to determine which of the potentially acceptable sites should be investigated further. Each EA must contain:

□ An evaluation as to whether the site is suitable for characterization under the siting guidelines (which were developed by DOE pursuant to the Act for the purpose of screening potential sites);

□ An evaluation as to whether the site is suitable for development as a repository under each such guideline that does not require site characterization to apply the guideline;

□ An evaluation of the effects of site characterization activities on public

health and safety, and on the environment;

□ A reasonable comparative evaluation of each candidate site with other sites and locations that have been considered;

□ A description of the decision process by which the site was recommended; and

□ An assessment of the regional and local impacts of locating a repository at the proposed site.

In the draft report issued for the Nevada site, DOE concluded that "on the basis of the evaluations [contained in the draft EA] . . . the Yucca Mountain site is not disqualified under the guidelines." The draft EA also concluded that Yucca Mountain is suitable for site characterization because "the evidence does not support a conclusion that the site will not be able to meet each of the qualifying conditions. . . ." Using a three-tiered ranking methodology, the draft EA showed the Nevada site to be among the top three of the five sites that were compared. On the basis of these findings, DOE indicated that it intends to nominate Yucca Mountain as one of the three sites chosen for characterization.

In a 800-page comment document, which contains the views of 7 local governments and 15 State agencies, the State Nuclear Waste Project Office provided DOE with an extensive evaluation of the draft EA for Yucca Mountain. Major findings of the State review included the following:

□ Information in the draft EA strongly supports the argument that the selection of the Yucca Mountain site for characterization had been predetermined for some time;

□ Omissions and deficiencies of con-

tent cast considerable doubt on the validity of the analyses contained and the conclusions reached in the draft EA;

□ Critical land and water issues are treated inadequately in the draft EA;

□ Socioeconomic impact analyses in the draft document ignore risk, assume unchanging demographics, proceed from the premise that all markets function with perfect efficiency, use models of questionable validity, and do not address relevant differences between Clark and Nye Counties (while ignoring the rest of the State entirely);

□ Information contained in the draft EA suggests that four disqualifying conditions may be present: (1) the potential for large earthquakes and active faulting at the site, (2) movement of ground water through the proposed repository location at a rate faster than permitted by DOE's own guidelines, (3) conflicts between a repository at Yucca Mountain and future weapons testing at the Nevada Test Site, and (4) possible degeneration of water quality and quantity for human consumption and irrigation in the Amargosa Valley area.

□ There are numerous other technical areas in the draft EA where DOE's positive findings are not supported by the available evidence, including the areas of mineral resource potential, potential for volcanic activity, potential for major climate changes, the geochemistry of the host rock and its ability to insure the isolation capability of the site, and others.

The Department of Energy is currently revising the draft EA based on the comments it received. A final version of the document is due to be released in late December 1985 or early 1986. □

Recent Publications

Comptroller General of the United States, *Report to Congress, The Nuclear Waste Policy Act: 1984 Implementation Status, Progress, and Problems* (Gaithersburg, Md.: U.S. General Accounting Office, Sept. 30, 1985).

Creighton & Creighton, Inc., *A Report to The Utility Nuclear Waste Group, The U.S. Department of Energy's Implementation of the Consultation Provisions of the Nuclear Waste Policy Act* (Saratoga, Calif.: Creighton & Creighton, Inc., August 1985).

(U.S.) Department of Energy, *Draft Environmental Assessment, Yucca Mountain Site, Nevada Research and Development Area, Nevada* (Washington, D.C.: U.S. Government Printing Office: 1984-459-432).

(U.S.) Department of Energy, *Draft Transportation Business Plan* (Washington, D.C.: U.S. Government Printing Office: 1985-461-208:20110).

(U.S.) Department of Energy, *Draft Transportation Institutional Plan* (Washington, D.C.: U.S. Government Printing Office: 1985-461-208:20127).

(U.S.) Department of Energy, *Mission Plan for the Civilian Radioactive Waste Management Program* (Washington, D.C.: U.S. Government Printing Office: 1985-461-208:20059).

(U.S.) Environmental Protection

Agency, "Environmental Standards for the Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes," in *Federal Register, Rules and Regulations* (Washington, D.C.: U.S. Government Printing Office, Vol. 50, No. 182, Sept. 19, 1985), pp. 38066-38089.

State of Nevada Comments on the U.S. Department of Energy Draft Environmental Assessment for the Proposed High-Level Nuclear Waste Site at Yucca Mountain (Carson City, Nev.: Nevada State Nuclear Waste Project Office, March 1985).

Western Interstate Energy Board, *Spent Nuclear Fuel and High Level Radioactive Waste Transportation* (Denver, Colo.: Western Interstate Energy Board, June 1985).

'A Nuclear Waste Primer'

The Preface of *A Nuclear Waste Primer*, published by the League of Women Voters Education Fund, states the following:

The aim of this publication is to offer the nonexpert a brief, balanced introduction to nuclear waste. It outlines the dimensions of the problem, discussing the types and quantities of waste. It then defines the sources, types and hazards of radiation and sketches the history and current status of waste management. Finally, it reviews the choices for managing

radioactive wastes over the short and long term, describing in some detail the Carter administration's program to manage nuclear wastes.

Our purpose in producing this primer is to clarify the issues, to provide reliable, objective information and to highlight key points of view so that citizens can understand the overall problem, weigh the alternatives and act responsibly to influence the course of national waste management policy.

A Nuclear Waste Primer was researched and written by Marjorie Beane, Director of the Nuclear Energy Education Program, LWVEF Energy Department. . . .

A revised edition of *A Nuclear Waste Primer* is scheduled to be published this month. Copies of the revised edition may be obtained by writing to the League of Women Voters of the United States (Attn.: Publications Sales Dept.), 1730 M St., N.W., Washington, D.C. 20036. Ask for Publication No. 448 and remit for each copy \$5.95 (\$3.00 for League members) plus 50 cents for handling for each order. Bulk rates are available upon request to the League.

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Selected Events, Meetings, Deadlines

Dec. 2-3, 1985: Quarterly meeting of first-round states (Mississippi, Nevada, Texas, Utah, and Washington; plus Louisiana) and affected Indian Tribes representatives with Department of Energy (DOE) representatives in Atlanta, Ga.

Dec. 20, 1985: Deadline for comments to DOE on its *Draft Institutional Transportation Plan*.

January 1986: DOE scheduled to submit *Environmental Assessments* and formal proposal to Congress for construction of Monitored Retrieval Storage (MRS) site.

Early 1986: DOE scheduled to release its (final) *Environmental Assessments* for candidate first repository sites.

February 1986: DOE scheduled to issue its Nominations and Recommendations of candidate sites for first repository characterization.

Early 1986: President of the United States anticipated to issue decision regarding sites recommended by DOE for characterization.

March 1986: DOE scheduled to release its *Site Characterization Plan* (SCP). □

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Carson City, Nevada 89710

Questions and Answers

Radioactivity is a natural process. Atoms of most substances are internally balanced, or stable. They have no tendency to change, or break up into simpler atoms. But some complex atoms, like uranium, are unstable. They regain stability by expelling particles or bursts of energy, a process called radiation-activity, or *radioactivity*.

The particles and energy emitted by these unstable atoms are invisible, odorless, tasteless, soundless—our senses cannot warn of their presence. But even modest amounts of radiation can cause sickness, cancer, and birth defects. The hazardous particles and energy bursts are:

- Alpha particle (two protons and two neutrons expelled from an atom's nucleus)
- Beta particle (an electron expelled from an atom)
- Gamma ray (a burst of wave energy like an x-ray).

Radiation is a health hazard because it can penetrate human tissue and "ionize" the atoms in living cells. The ionized atoms possess altered electrical charges, and, therefore, a different chemical behavior, which can upset normal body chemistry. The result is *radiation sickness*.

There are different types of radiation, and they have different abilities to do bodily harm. Also, body tissues differ in their resistance to radiation.

To take these differences into account, radiation doses are measured in a unit called "rem" (Roentgen Equivalent in Man). A roentgen is a unit of measure of the ionizing effects of radiation. Doses over 10 rems can cause radiation sickness. A dose of 500 rems will kill half the people exposed. A typical American receives 208 millirems (thousandths of a rem) a year.

Everyone is exposed daily to small amounts of natural radiation, which apparently cause no

harm. But when man's activities expose people to concentrated radiation or to minor radiation for long periods, a hazard can exist. This is the reason for controlling the storage of radioactive waste, and regulating its disposal.

Nuclear waste is a product generated as a result of human activity. Nuclear waste is classified into four categories depending on its origin, level of radioactivity, and potential hazard: high-level waste, low-level waste, transuranic waste, and tailings.

High-level waste is the most highly radioactive waste. It is characterized by high-level radiation which decays (loses radioactivity) rapidly. High-level waste must be handled by remote control behind heavy protective shielding. It is mainly produced by nuclear reactions in the fuel of nuclear power reactors.

Low-level waste is less radioactive than high-level waste. Low-level waste is defined by law as waste that is not classified as high-level waste, transuranic waste, or spent nuclear fuel. Low-level waste does not require extensive shielding. It is produced by many commercial, medical, and industrial processors.

Transuranic waste contains man-made elements that are heavier than uranium. It emits medium energy radiation and decays slowly. Most transuranic waste results from reprocessing nuclear fuel. Transuranic waste requires disposal similar to high-level waste because of its long decay period.

Tailings are radioactive rock and soil, the by-products of uranium mining and milling. They principally contain small amounts of radium which decay to emit radon, a radioactive gas.

Spent fuel is fuel that has been burned (irradiated) in a nuclear reactor to the point where it no longer contributes efficiently to the nuclear chain reaction and must be replaced.

Pellets containing uranium oxide are the fuel

for nuclear plants generating electrical power. These solid pellets are sealed in metal tubes approximately twice the diameter of a pencil and about 12 to 13 feet long. The tubes are bundled together into assemblies, each containing between 50 and 270 tubes, depending on the design of the reactor in which they are to be used. About one-third of the assemblies in a typical power reactor are spent and replaced each year.

When it leaves the reactor, spent fuel is thermally hot and highly radioactive. Much of this heat and radiation decays away after about five years of storage, but spent fuel remains potentially dangerous for much longer periods of time. However, spent fuel is not explosive.

At the present time, spent fuel is stored in pools of water at the power plants. The total spent fuel stored in power-plant pools at the beginning of 1981 was about 27,000 fuel assemblies, weighing 7,720 tons. Those fuel assemblies occupy 104,000 cubic feet of space—about the equivalent of one football field 2 feet deep.

Each nuclear power plant generating a million kilowatts of electricity produces about 33 tons (or 390 cubic feet) of spent-fuel assemblies each year. By the year 2000, the accumulation of spent fuel from commercial nuclear power reactors is projected to total about 950,000 cubic feet—or about nine football fields 2 feet deep.

By volume, many times more wastes are now produced as a result of defense uses of nuclear energy than by the commercial nuclear power industry. However, the total radioactivity of existing commercial wastes exceeds that of defense wastes.

As of 1980, the amount of high-level defense waste in storage totaled 670,000 cubic feet in solid form. The total amount of defense waste is estimated to be 1,130,000 cubic feet (if solidified) by the year 2000. □

Nevada Nuclear Waste Newsletter

Nuclear Waste Project Office
Agency for Nuclear Projects
Capitol Complex
Carson City, Nevada 89710

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Nevada Wins Funding Lawsuit Against DOE

An opinion by the 9th U.S. Circuit Court of Appeals supports Nevada's challenge of the Secretary of Energy's refusal to grant funding for technical studies at the proposed Yucca Mountain site of a nuclear waste repository.

The opinion Dec. 2, 1985, agreed with the State's position in all respects and was hailed as a resounding victory for the right of all states that have a potential candidate site for a repository to fully participate in the evaluation of site suitability.

The court invalidated as unlawful certain provisions of DOE's Internal General Guidelines on Nuclear Waste Repository Program Grants which sought to "minimize" primary data collection by states and limit state evaluation of any primary data already collected by DOE.

The court interpreted the policies of the Nuclear Waste Policy Act of 1982 and concluded that "Congress intended the generator-fed Nuclear Waste Fund, not the state, to pay the costs of any state 'participation'—such as evaluative testing—in the choice of sites."

"The independent oversight and peer review which only the states are poised to provide would immeasurably 'promote public confidence' in general and among Nevada residents in particular," the court said.

The court recognized, "as the Act recognizes, that the dangers inherent in nuclear waste disposal mandate a close, independent scrutiny of DOE's siting decisions."

Elaborating upon the ways the DOE's Guidelines unduly restrict Nevada's statutory rights, the court noted that:

"By 'minimizing' independent collection of primary data, and then restricting state tests of primary data that DOE has collected, the Phase III

Guidelines eviscerate the independent oversight role that Congress envisioned for the states. Permitting DOE to 'guard the chicken coop' alone



Weighing the differences between the State of Nevada and the Secretary of Energy's refusal to grant funding for technical studies at Yucca Mountain was a battle that was fought in the courtroom.

would violate the statutory finding that state participation and oversight of DOE is 'essential in order to promote public confidence in the safety of disposal of [nuclear] waste.' "

The court relied heavily upon the policy considerations addressed by Congress in resolving whatever ambiguity the secretary may have thought existed with respect to Nevada's participation in the repository siting program. It noted that the secretary's construction of the Act "is inconsistent with the statutory mandate and a frustration of congressional policy."

As a consequence of the court's ruling, Nevada is not only entitled to funding of its proposed hydrologic and geologic studies, but also the opinion will serve as guidance in future disagreements relative to the state's participation in the program.

Despite the opinion, DOE did not immediately turn over the disputed funds. It did, however, revise the guidelines. Nevada returned to court seeking an order to send the funds promptly. The court refused, saying DOE was not being "dilatatory." Meanwhile, the state has been complying with the new guidelines. □

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United States Air Force Criticizes Yucca Mountain Nuclear Repository Site

The U.S. Air Force, in its comments on DOE's draft Environmental Assessment for Yucca Mountain, criticized the location of Yucca Mountain as a potential high-level nuclear waste repository site. The focus of the Air Force criticisms centered on potential restrictions of flight corridors caused by the proximity of the proposed bombing and gunnery range.

According to the Air Force, Yucca Mountain is located under instrument departure and recovery routes used by aircraft entering and exiting the Nellis Range. Traffic is considered heavy during periods of red flag and green flag exercises and moderate at other times. Live ordnance is frequently carried on the departure route by local units and infrequently during red flag and green flag exercises.

The Air Force further indicated that military aircraft is restricted to these routes because of FAA-authorized commercial jet routes southwest and northeast of the Nellis Range. They concluded in their comments that since alternate routing of traffic to the Nellis Range was not feasible, any restrictions to ingress/egress caused by the Yucca Mountain repository could severely limit the usability of major portions of the Nellis Range for tactical operations.

The DOE, in preliminary responses to the Air Force comments, indicated that the Nuclear Regulatory Commission regulations regarding the licensing of facilities containing high-level radioactive material

has no restrictions on over-flights by either commercial or military aircraft.

The consideration of air space restrictions for military aircraft will be dependent on whether the aircraft is carrying live ordnance. For aircraft not carrying live ordnance, the DOE anticipates that a full restriction on over-flights would not be established. A limited altitude restriction might be required based upon a risk assessment of aircraft accidentally striking the surface facility.

For aircraft carrying live ordnance, DOE considers there are two approaches open: 1) harden the surface facility to withstand the strike of an aircraft containing live ordnance, and 2) establish a full restricted area around the surface facility so the potential for an accident involving an aircraft carrying live ordnance is below the "standard acceptable level".

With the first approach, the impact to DOE's repository program would be higher construction costs to ensure that there is no release of radioactive material in case of an accidental aircraft strike.

In the second approach, DOE proposes to work with the Air Force to redesign the ingress/egress routes to the Nellis Range so a total restriction of air space can be placed over the repository, yet not cause an unacceptable impact to flight operations on the Nellis Range. Presently, the Air Force has not commented on these two approaches. □

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.

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Plans For Repository Study Announced

The Nevada State Commission on Nuclear Projects met March 15 to hear details of state studies of the proposed Yucca Mountain site of a high-level nuclear waste repository.

Robert Loux, director of the state Nuclear Waste Project Office, and four of his staff executives outlined plans for studies dealing with geologic conditions at Yucca Mountain, socioeconomic problems connected with the repository, transportation of high-level waste through Nevada to the repository, and public information programs.

Loux said the state won its federal court suit for about \$2 million for conducting independent studies at Yucca Mountain, but the DOE was withholding the money until the state's grant application could be reviewed under new guidelines. He also said he was awaiting release of the final Environmental Assessments to see if DOE had answered Nevada's concerns expressed after studying the draft EA.

Carl Johnson, NWPO director of technical studies, said his studies deal with the possibility of earthquakes and the potential for contaminating ground water supplies within the 10,000-year life of the repository. He also said there is a possibility of volcanic activity, based on the history of the region.

Joe Strolin, head of the planning division, said he is working on a study to determine effects the huge repository project will have on the area, including impacts on population, local government services, taxes, crime, etc.

Transportation planner Russell DiBartolo

discussed the transportation aspect, including the possible impacts of waste-laden trains and trucks on communities along the main transportation corridors.

Russell Nielsen, NWPO information planner, said there is a need to provide more information to Nevadans about the repository project. He said many people have a very limited knowledge of the nuclear waste problem.

At the Commission's February 8 meeting, members asked the DOE to permit Nevada access to criteria used to determine whether Yucca Mountain is a top choice as the country's first high-level nuclear waste repository. Loux said Nevada had been asking to see criteria used to rank top sites—including Yucca Mountain, Deaf Smith County in Texas and Hanford, Wash.—for nearly three years.

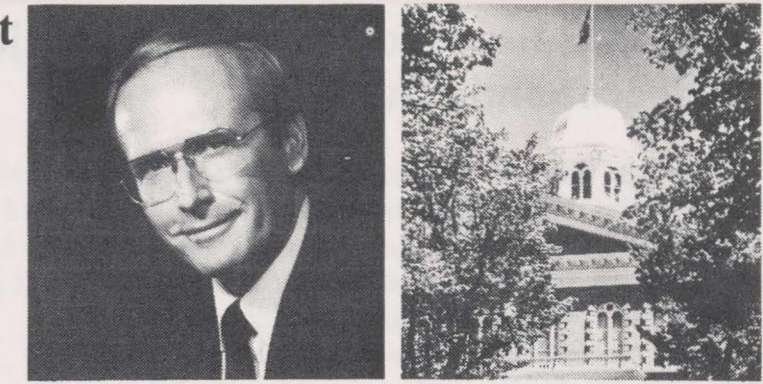
Don Vieth, chief of Nevada's DOE Nuclear Waste Project office, said not even he has access to information he said was "held cloistered" in Washington, D.C., DOE headquarters and the National Academy of Sciences.

Commission Chairman Grant Sawyer said, "It seems incredulous to me that the federal government is forming criteria and won't even let the state look at the material."

In addition to Sawyer, the commission members are Thalia Dondero, Clark County Commission Chairwoman; Ron Lurie, Las Vegas City councilman; James Cashman III, Southern Nevada businessman; Frank Caine, president of the Southern Nevada Building Trades Council; Anne Peirce of Reno, Commission on Judicial Discipline administrator, and Michon Mackedon of Fallon, community college teacher.

- 4) The plan must provide mechanisms for assuring the adequacy of federal transportation planning and analyses especially as these relate to (a) the selection of sites for a repository, (b) the design and conduct of risk assessment studies, and (c) those transportation plans and analyses which pertain to Nevada—specific conditions, issues and concerns.
- 5) The plan must address the need for regional (multi-state) planning relative to high level waste transportation issues and assure that such planning is incorporated into DOE's transportation analyses.
- 6) The plan must define mechanisms by which the citizens of Nevada and all relevant "publics" within the state are adequately informed with regard to high level waste transportation issues and are provided opportunities for participating in and influencing State and federal decision-making with regard to nuclear waste transportation. □

Governor's Statement



On December 11, the newly created Commission on Nuclear Projects held its first meeting in the old Assembly Chambers of the State Capitol. At that meeting, representatives of the Legislature, local governments and the governor came together in an impressive demonstration of solidarity and resolve to address one of the most important issues Nevadans will be facing in the months and years ahead.

In a very real sense, the Commission meeting represented a culmination of the efforts of various levels of government within the state to address problems brought about by the U.S. Department of Energy (DOE) proposal for a nuclear waste repository in southern Nevada. Since the mid-1970s, there have been several attempts by the federal government to locate a high-level waste storage facility in our state. Three successive governors were called on to address the issue. There have been debates in the Legislature and in council and commission chambers of local governments.

When I took office in 1983, I formally established the state's Nuclear Waste Project Office to deal specifically and exclusively with the crucial issue of high-level radioactive waste disposal in Nevada. During that same year, the State Legislature established an interim committee to study the matter and make additional recommendations for dealing with the problem.

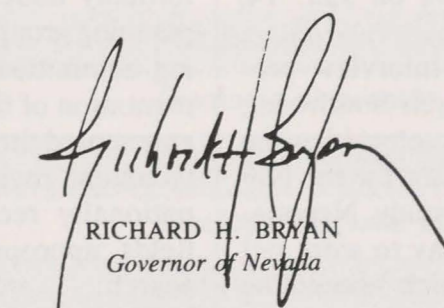
One of the first tasks of the newly created Nuclear Waste Project Office was to establish a mechanism for full and meaningful participation of potentially affected local governments in the state's program for overseeing DOE activities and in the state's planning for possible consequences of those activities. This was accomplished by creating an informal advisory group comprised of cities and counties in the southern part of the state that would be affected by a repository at Yucca Mountain and by making pass-through grant funds available to those jurisdictions to help defray the costs of participating in the state effort.

In order to assist the work of the Legislature's study committee, the Nuclear Waste Project Office provided funds for staff, meetings, travel and other resources needed to effectively carry out the committee's mission.

The formal convening of the Commission on Nuclear Projects last December represented not only the jelling of executive, legislative and local government efforts and purpose with regard to high-level radioactive waste disposal, but it also sent a very strong message to the federal government—a signal which says loudly and clearly that Nevadans are united in their approach to the nuclear waste issue and that the key entities in the state are working together to assure that the health and safety of present and future Nevadans and the well-being of our unique environment and economy are adequately protected in the face of federal efforts to establish a national nuclear disposal site within our borders.

With the establishment of the Commission on Nuclear Projects, there has now been a convergence of past and ongoing state and local activities with respect to the high-level waste issue, of executive, legislative, and local government efforts, and of public opinion concerning the importance of this issue.

In short, we now have an opportunity that is all too rare in public policy-making—an opportunity to speak with our voice and to present a strong and united front in dealing with the federal government on this extremely critical issue facing our state. □


RICHARD H. BRYAN
Governor of Nevada

Nevada Poised To Embark On Major Socioeconomic Study

"Deciding whose 'backyard' shall be chosen [for disposing of nuclear waste] raises questions of whether some people should bear the risks for others, of which people should bear the risks and if and how they should be compensated by the beneficiaries [of nuclear power], and of how accountability can be achieved in societal decision-making. Inadequate attention to these issues could produce highly inequitable policies."

—National Academy of Sciences Researcher, Roger E. Kaspersan in *Equity Issues in Radioactive Waste Management* (1983).

The problem of equity as it pertains to radioactive waste disposal is, in its broadest and most fundamental sense, one of complex social and economic dimensions. In order to effectively address this issue in the Nevada context, the State Nuclear Waste Project Office is about to initiate a major three-year study aimed at assessing the socioeconomic impacts of a repository at Yucca Mountain and the types of mitigation and/or compensation that would be required in the light of such impacts.

The Nevada socioeconomic study has been over a year in the planning. In cooperation with potentially affected local governments in southern Nevada, the State's Nuclear Waste Project Office (NWPO) engaged in a lengthy process of defining the parameters and objectives of such a study, designing and issuing a request for proposals (RFP), and selecting a contractor to manage and carry out the study.

On Dec. 13, 1985, the Socioeconomic Study Selection Committee (comprised of representatives of seven local governments, the state Legislative Council Bureau and the NWPO) met in Las Vegas to review 13 proposals received in response to the RFP. As a result of that review, two proposals were selected for future consideration, and representatives of both of the firms which authored the top-ranked proposals were invited for formal interviews on Jan. 14, 1986.

Following an extensive interview process, Mountain West Research-Southwest, Inc. of Tempe, Arizona was selected as the manager and prime contractor for the Nevada socioeconomic impact study. Negotiations are currently under way to work out details of the contract which should be awarded within the next 60 days.

The planning process that resulted in the selection of Mountain West has been an example of state and local government co-



operation at its best, according to Joe Strolin, chief of planning for the state Nuclear Waste Office and the person responsible for implementing the state's socioeconomic assessment efforts.

"I've worked in government and in the public sector for over 10 years, but I have never seen a group of state and local people work together more effectively than those who served on the scoping and selection committees for this study," Strolin said.

Strolin, together with NWPO Director Bob Loux, said that the undertaking to date has been a time-intensive one, especially for local planners whose nuclear waste responsibilities represent only a fraction of their overall work load.

"These folks brought expertise and knowledge to the RFP process that was invaluable," Loux said. "They put in numerous 12-hour days and approached the entire project with professionalism and a great deal of enthusiasm."

Once the state's socioeconomic study is formally underway, this local government planning group will become a defacto steering committee to help oversee the implementation of the project. The group will be augmented through the addition of a formal technical review committee made up of nationally recognized experts in various fields appropriate to socioeconomic research.

The study itself will involve a number of interrelated activities designed to provide a comprehensive picture of the effects a nuclear waste repository at Yucca Mountain

would have on the state as a whole, on local governments and communities, and on individual Nevadans. It will establish baseline information on social, economic and cultural conditions at various levels of social organization so as to provide a basis for determining potential repository impacts.

The actual impact assessment portions of the study will focus on repository-related effects according to various phases of the repository program (i.e. the effects during site characterization activities, the effects during actual repository construction, the effects of the repository when it is in operation, and the long-term effects of sealing the repository and storing radioactive waste at Yucca Mountain for thousands of years).

In addition to examining traditional economic impacts of a large project such as a repository, the Nevada study will also attempt to identify and quantify the more difficult to measure but potentially significant effects of a facility of this type on the social and cultural fabric of the state, local communities and individuals. Impacts that may result from the special nature of the repository itself (i.e. a nuclear waste facility) will be examined, including the possible effects of the project on Nevada's tourism industry and on the state's efforts to diversify its economic base.

The Nuclear Waste Project Office staff is confident that the Nevada socioeconomic impact assessment project will be a state-of-the-art study—one that will attract national attention. □

What Are Other Countries Doing About Nuclear Waste Disposal?

Disposal of radioactive waste is not a problem unique to the United States. Most of the industrialized nations of the world have a similar problem. Many of these countries depend more heavily on nuclear energy as a source for electrical power than the United States.

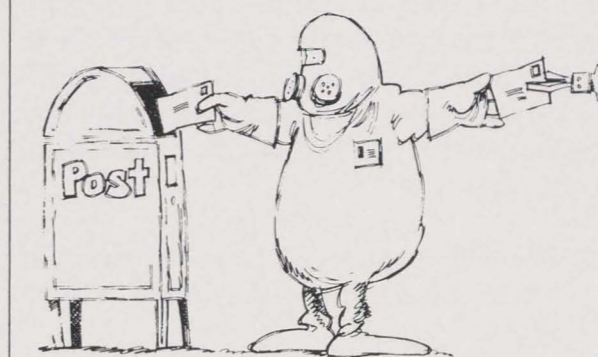
Currently most countries reprocess liquid or solid high-level radioactive waste or store waste at power plant reactors or in steel tanks away from the reactors.

The reprocessing of spent reactor fuel to recover "unburned" uranium and to separate plutonium from the fission products and heavy elements formed during the reactor cycle is a technology that exists today. Typically, a 1000-megawatt thermal reactor burns about 35 tons of fuel per year. The volume of high-level liquid waste from reprocessing of this spent fuel would be about 3,300 gallons.

The technology for the conversion of high-level liquid wastes to a solid form for long-term storage is on the threshold of industrial application on a volume basis. Development work on reprocessing began more than 20 years ago, and pilot plants are in operation or are being built in Belgium, Germany, France, India, Italy, and the USSR. The United States has presently discontinued consideration of reprocessing of commercial high-level waste.

There are a number of alternative meth-

ods being evaluated for solidification of liquid waste. Incorporation of high-level waste in a borosilicate glass (a process called vitrification) is at present the most



Some favor shipping it out . . . while others favor planting it.



advanced. A pilot industrial-scale plant for continuous vitrification has been in operation at Marcoule, France, since 1978.

Contrastly, India has adopted a semi-

continuous pot glass process which casts the glass-liquid waste mix into storage containers.

Other countries are looking at the concept of incorporating the waste into "artificial rocks". The aim is to produce a solid waste form which is sufficiently stable to ensure that incorporated radionuclides can not leach out and return to the environment.

Deep geologic disposal of spent fuel and solidified radioactive waste is being studied by many countries, but no proposals or sites for construction of a repository have been put forth. Abandoned mines have been extensively used for "in-situ" studies of rock conditions and hydrologic properties, as well as temporary storage of some waste.

Germany, Sweden, and Spain are studying abandoned mines as possible future repository sites in both salt and crystalline rock environments. Asse, Germany has temporary storage of waste in an old salt mine. Finland, Britain, and Switzerland are studying hard rock formation as potential geologic media for repositories.

While most countries of the world use reprocessing of their radioactive waste as a short-term solution to the disposal problem many consider geologic disposal as the long-term solution to the disposal problem. Reprocessing is considered a stop-gap solution until safe, permanent disposal is found. □

Treatment Practices For High-Level Wastes

Country	Current Practice	Future Plans
Belgium	Reprocessing and vitrification of waste	Geologic disposal in clay formations
Canada	Temporary underground storage of spent fuel	Geologic disposal in crystalline rock
Denmark	Reprocessing in another country	Geologic disposal in a salt dome
Finland	Reprocessing in another country	Geologic disposal in crystalline rock
France	Reprocessing and vitrification of waste	Additional reprocessing and vitrification facilities
Germany	Reprocessing of waste only; no vitrification	Geologic disposal in salt formations
India	Reprocessing of waste only; no vitrification	Additional reprocessing and vitrification
Italy	Reprocessing of waste only; no vitrification	Vitrification of waste
Japan	Reprocessing of waste only; no vitrification	Vitrification and geologic disposal
Netherlands	Reprocessing in another country	Geologic disposal in salt formations
Sweden	Reprocessing in another country	Geologic disposal in crystalline rock
Switzerland	Reprocessing in another country	Geologic disposal in crystalline rock
United Kingdom (Britain)	Reprocessing of waste only; no vitrification	Vitrification and geologic disposal
USSR	Reprocessing of waste only; no vitrification	Vitrification and geologic disposal
USA	At reactor storage of spent fuel; no reprocessing	Geologic disposal in various media

Volcanic Hazard At Yucca Mountain

Evaluating the potential hazard of future volcanism is an important part of site investigations necessary to determine the suitability of the site for constructing a deep geologic repository at Yucca Mountain for disposal of high-level radioactive waste.

Volcanism represents one of a number of possible tectonic processes that may cause changes in the future environment of Yucca Mountain and thus adversely affect the ability of the site to contain and isolate the waste from man. The perceived hazard of volcanism is based on a geologic record of widespread and voluminous volcanism in the Great Basin during Cenozoic Time (the last 65 million years) and the local presence of Quaternary Age (the last 2 million years) volcanic centers in the southern Nevada region.

The exact nature of the hazard is dependent on the composition of the magma (molten volcanic rock), the geometry of magma/waste intersection, and the timing of the volcanic event with respect to operation and closure of the repository.

If an ascending magma directly intersects a repository, there is the possibility of dispersal of significant quantities of radio-

silic volcanic centers (called calderas) in the Yucca Mountain area and identified a series of volcanic eruptions which ranged in age from as young as 6 million years to as old as 15 million years. Yucca Mountain itself is made of nearly 4,000 feet of silic volcanic ash flow material called "tuff." DOE concludes there is an extremely small likelihood of recurrence of silic volcanism, because:

- 1) There has been no silic volcanism near Yucca Mountain in the last 5 million years;
- 2) There has been a regional decrease in silic volcanism in the Great Basin for the last 10 million years;
- 3) Young silic volcanism (less than 2 million years old), such as the Mono Craters near Mammoth Lakes, is confined to the margins of the Great Basin, and thus would pose little hazard on a post-closure repository.

However, the Nevada Bureau of Mines, in its comments on the draft Environmental

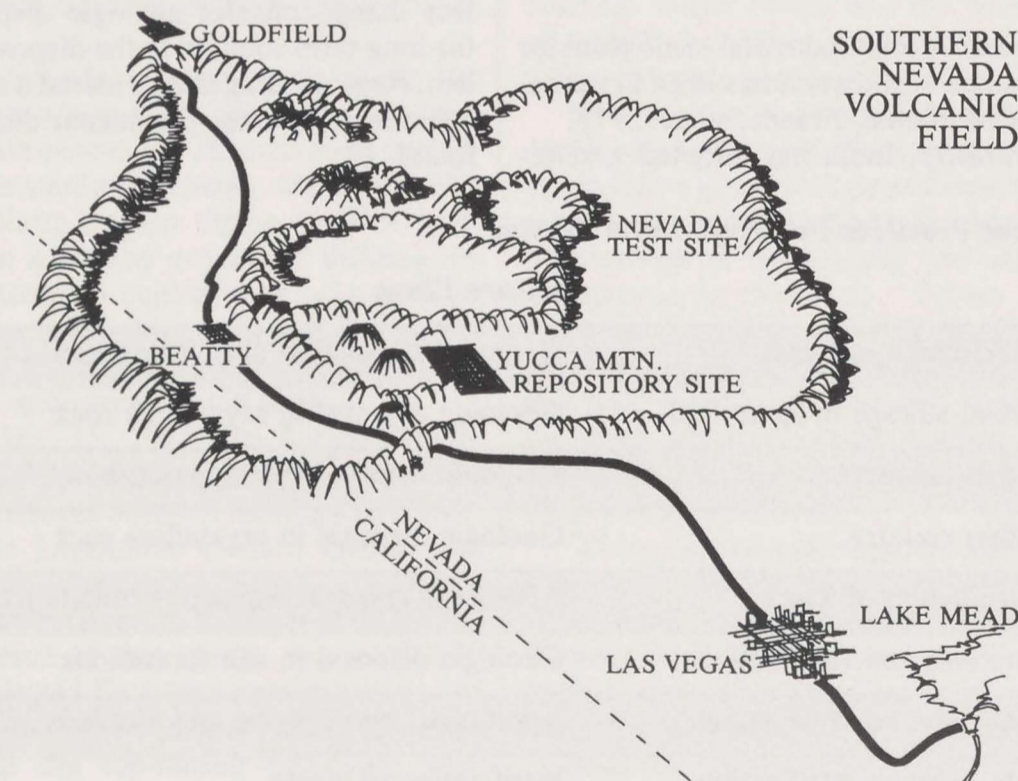
It is more difficult to define and assess the hazards of future basaltic volcanism. There is considerable uncertainty in forecasting future rates of volcanic activity, because of limited knowledge of past activity and the geologic processes which trigger volcanic activity. More importantly, the DOE Siting Guidelines demand that areas under consideration for waste disposal must have low rates of volcanic activity for the last 2 million years.

DOE, in the draft Environmental Assessment for Yucca Mountain, concluded that the probability for basaltic eruption at the site ranged from approximately five chances for eruption in 10,000 years to as small as .03 chances for eruption in 10,000 years. The cutoff of 10,000 years is the point at which the U.S. Environmental Protection Agency considers the radioactive materials to no longer be a threat to public health. From that range of probabilities, DOE selected a middle value, or less than one chance for eruption in 10,000 years, as the most likely possibility. From that, DOE concluded the risk of volcanic eruption during the life of the repository is low.

The state and Bureau of Mines and Geology, in their comments on the draft Environmental Assessment for Yucca Mountain, concluded that the field evidence of past volcanism did not support a finding that future volcanism was not likely. They cited the following lines of evidence:

- 1) The Crater Flat volcanic field lies along the so-called Death Valley-Pancake Range Basalt Belt, a series of young volcanic centers which has shown basaltic eruptions younger than 10,000 years at its northern end. Taking a conservative view of geologic processes, there could be a high likelihood of a greater than one chance of a volcanic event during the 10,000 year life of the repository.
- 2) Geologic evidence in Crater Flat suggests that at least one volcanic event in the past was accompanied by surface faulting. Recent evidence from fault mapping in Crater Flat suggests at least one episode of fault movement occurred in the last 10,000 years. Thus, there is a distinct possibility that within the life of the repository (10,000 years), fault movement could reoccur in Crater Flat and volcanic eruption could accompany the fault activity.

In the state's view, the current level of knowledge of volcanic processes is insufficient to define the potential hazards of future volcanism. The suitability of the Yucca Mountain site cannot be conclusive without a complete and thorough assessment of the risk of volcanism. □



active materials by surface volcanic eruptions. In addition, injection of magma within the vicinity of a repository could alter the geologic and hydrologic conditions of the site and change transport pathways of radionuclides, thus possibly upsetting the isolation capabilities of the site.

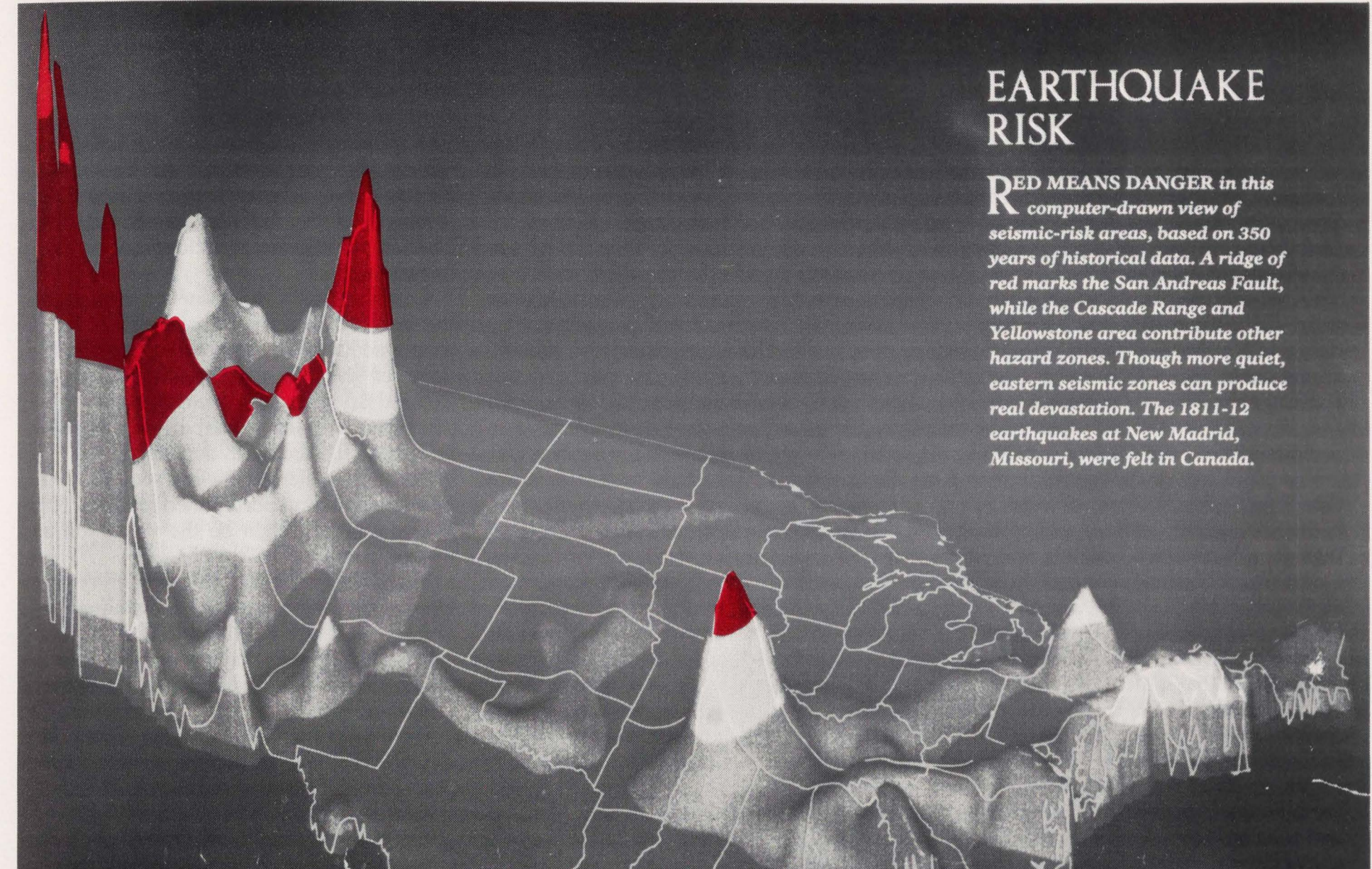
There are two factors in a volcanic hazard assessment for Yucca Mountain: 1) future hazards from silic volcanism and 2) future hazards from basaltic volcanism. The U.S. Department of Energy (DOE) and its contractors have examined

Assessment for Yucca Mountain, noted that the Great Basin is an extremely active area geologically, and as such the hazard from future silic volcanism could not be routinely dismissed.

The potential of basaltic volcanism at Yucca Mountain appears to be more of a risk. Volcanic cones with basaltic cinders and lava flows have been mapped in Crater Flat a few miles west of Yucca Mountain. The youngest of the cones (called Lathrop Wells Cone) is approximately 250,000 years old.

EARTHQUAKE RISK

RED MEANS DANGER in this computer-drawn view of seismic-risk areas, based on 350 years of historical data. A ridge of red marks the San Andreas Fault, while the Cascade Range and Yellowstone area contribute other hazard zones. Though more quiet, eastern seismic zones can produce real devastation. The 1811-12 earthquakes at New Madrid, Missouri, were felt in Canada.



VOLCANIC RISK

EARTH'S HEAT VENTS, volcanoes usually lie near plate perimeters. Part of the Pacific "Ring of Fire," active areas are highlighted in relief, according to frequency and size of eruption and vulnerability to ashfall. White areas indicate zones of risk from lava flows, both recent and prehistoric—the latter as shown from Idaho to New Mexico.



MOST OF THE NATION'S active volcanoes lie in Alaska and Hawaii. Major earthquakes have occurred in both states.

MELVIN PRUETT, LOS ALAMOS NATIONAL LABORATORY, U. S. GEOLOGICAL SURVEY, AND JAMES BELLETT, NEW YORK UNIVERSITY

Questions And Answers

1. What rock types are being considered for nuclear waste repositories?

In the United States, geologic concepts for isolating high-level radioactive wastes have been under study for 20 years. Several different rock types have been shown to have characteristics that make them acceptable for geologic waste isolation where suitable sites can be found.

- Salt—Two different salt formations are considered acceptable for waste isolation: salt domes and bedded salt. A salt dome is a structure resulting from the upward movement of a salt mass. The structure is roughly circular in shape with a relatively small diameter, but often several thousand feet in depth. A few domes of high purity salt are mined. Many domes are associated with oil and gas fields. In the United States, most salt domes are found in the Gulf Coast area.
- Bedded salt is a deposit of salt inter-layered with other sedimentary rock formations (sandstone, claystone, etc.). Bedded salt may contain thin lenses and layers of clay. Many bedded salt deposits have been folded and contorted by geologic forces. Bedded salt deposits occur in most parts of the United States, except the Pacific Northwest and the Southwest.
- Basalt—Basalt is a rock formed from the cooling (solidification) of molten lava which flowed over the land surface from volcanos or fissures in the earth. Basalt is generally hard, fine-grained and dark in color. It forms thick beds; some sequences of basalt flows are thousands of feet in thickness. While small basalt flows are found throughout the United States, the primary location is the Columbia Basalt Plateau in the Pacific Northwest.
- Tuff—Tuff is a rock composed of com-

pacted ash produced by eruptions of volcanos. Tuff varies from very dense (welded) to porous (nonwelded), contains fragments of other rock materials, pockets of mineral crystals, and gas voids, and is light in color. The compacted ash can form thick beds of tuff resulting from repeated eruptions. The thickest beds of tuff are found in the Southwest.

- Granite—Granite is a rock formed by the cooling of molten rock beneath the surface of the earth. Granitic rocks are exposed at the ground surface through the actions of mountain building or erosion. Granite is a light colored crystalline rock. Granite rock bodies vary widely in size and thickness, from whole mountain ranges to small masses measured in acres. Granitic rocks occur widely in the United States, but predominate in the West, Northeast, and East.
- Shale—Shale is a sedimentary rock composed mainly of clay-size particles. The particles may grade up to silt size. The prominent features of shale are its thin laminated bedding and cleavage (breakage) parallel to the bedding. While individual shale beds are thin, shale units many thousands of feet thick are not uncommon. Shales have low permeabilities and high sorptive capabilities. Shale formations occur widely throughout the United States.

Possible sites have been identified in a number of these rock types in various parts of the United States.

- Salt Domes—Louisiana, Mississippi
- Bedded Salt—Texas, Utah
- Basalt—Washington
- Tuff—Nevada
- Crystalline Rocks (granite and other igneous and metamorphic rocks)—Various states in Northeast and Southeast

- Shale—No states identified

2. What is a mined-geologic waste repository?

A geologic repository will resemble a conventional mine. The repository will consist of both surface and underground facilities. A vertical shaft or inclined ramp will provide access from the surface facilities to the underground repository horizon. The surface facilities will be used to receive and handle the waste. Waste will be placed in special canisters and then emplaced in either vertical or horizontal holes underground. The emplacement holes will be excavated along a network of mined tunnels (called waste emplacement rooms) within the repository horizon. When the repository has been filled to capacity, the surface facilities will be decommissioned (dismantled) and all shafts, tunnels, and bore holes will be filled and permanently sealed.

To protect public health and safety and the environment over the long term of geologic disposal, the repository will utilize multiple independent barriers, both natural and engineered, to contain and isolate the waste.

- The *natural system* will consist of (1) a host rock suitable for repository construction and waste emplacement and (2) the surrounding rock formations.
- The *repository system* consists of the underground structures and components, such as shaft seals and the backfill of tunnels and rooms.
- The *waste package* consists of the radioactive waste, and any containers, shielding and backfill packing materials that separate the waste from the host rock. □

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Nevada Files Suits To Block Repository Study

The State of Nevada reacted with a flurry of legal challenges within hours after Energy Secretary John Herrington's announcement that the President had approved Yucca Mountain for characterization. Five petitions for judicial review of the secretary's actions were filed with the Ninth Circuit Court of Appeal in San Francisco May 28, the day of the announcement.

The petitions sought to enjoin and invalidate actions taken by the secretary that the state contends were not authorized by the Nuclear Waste Policy Act.

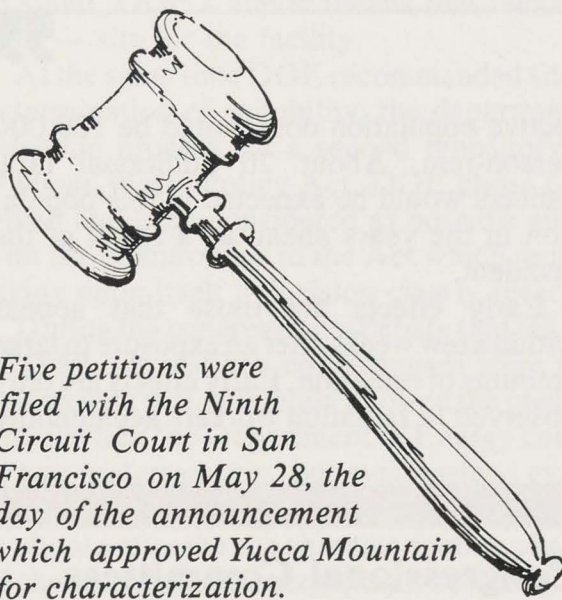
In the first, the state alleged that the process of nominating five candidate sites, recommending three of the five to the president for his approval that they be characterized, receiving the president's approval of the three sites and the issuance of the environmental assessments as one administrative action was arbitrary, capricious and illegal under Section 112 of the NWPA. The state contends that the environmental assessments should have been issued first to permit the state officials to comment and to permit the secretary to take such comments into account before making a recommendation to the president.

The second petition challenges the land status at Yucca Mountain. It alleges that the siting of a repository will require a withdrawal and reservation of land to satisfy Nuclear Regulatory Commission regulations. A reservation must be created by an act of Congress with the consent of the state Legislature. The petition requests the court to enjoin characterization of the site until the Department of Energy has acquired the necessary jurisdiction and control over the site by a suitable reservation of land.

The third petition is a general challenge to the sufficiency of the environmental

assessment for Yucca Mountain and the validity of the DOE Final Siting Guidelines applied by the environmental assessments.

Another challenges the timing of the



Five petitions were filed with the Ninth Circuit Court in San Francisco on May 28, the day of the announcement which approved Yucca Mountain for characterization.

secretary's preliminary determination that the three sites selected for characterization are suitable for development as repositories. The determination was made concurrent with the secretary's recommendation of the sites to the president. The state contends that such a determination should have been made after characterization is completed as required by Section 114(f) of the NWPA.

The first repository will be selected from the sites that are characterized. Only one site will need to be completely characterized under the secretary's interpretation of Section 114(f). If the secretary's determination is made after site characterization, at least three sites will emerge from characterization. The petition seeks the court's order to require the determination of suitability after characterization is completed.

The last petition involves a continuing controversy between the state and the Department of Energy about whether the state may use a portion of its grant from the

Nuclear Waste Fund to seek judicial review of department actions. The state contends that its right to participate in the program and provide the oversight role envisioned by Congress does not require it to use state funds to seek judicial review. The state relies in part upon the Ninth Circuit Court's statement in *Nevada vs. Herrington*, another grant dispute, that "Congress intended all the costs of nuclear waste disposal to be the responsibility of the generators and owners of such waste." It is the generators and owners of the waste that contribute to the Nuclear Waste Fund.

The state was joined on the petition by Gov. Richard Bryan, Sen. Paul Laxalt, Sen. Chic Hecht, Rep. Barbara Vucanovich and Rep. Harry Reid. They said they wanted to convey a clear message to the court, to Congress, and to the Department of Energy that Nevada is united in its opposition to a process they believe is designed to pre-select Yucca Mountain as the nation's first high-level nuclear waste repository. □

Issue Highlights

- 1** Nevada Files Suits to Block Repository Study
- 2** Radiation Damage has Early and Late Effects
- 4** NRC: Safety Is Key To Repository License
- 6** Nuclear Power Plants: Measuring the Pros and Cons
- 9** Rusche: States Play Characterization Role
- 10** Local Government Profiles Clark County: Heavily Involved

NRC: Safety Is Key To Repository License

Members of the state Commission on Nuclear Projects, staff of the state Nuclear Waste Project Office, the ad hoc Local Government Committee, and Department of Energy staffers visited the Yucca Mountain site of the proposed high-level nuclear waste repository May 16. For most, it was their first trip to the mountain.

A Nuclear Regulatory Commission (NRC) official says he wants to see the high-level radioactive waste repository project move on schedule, but not at the expense of public safety.

John G. Davis, director of the NRC Office of Nuclear Material Safety and Safeguards, appeared before the state Commission On Nuclear Projects in Las Vegas May 15. The Department of Energy (DOE) must have NRC authority to construct the repository, and NRC must issue a license before it can be put into operation.

"NRC is an independent federal regulatory agency," he said. "We see ourselves as the public's advocate for safety. That is the reason NRC exists. We have a primary mission of health and safety and protection of the environment. This is our first responsibility."

He added, however, NRC "cannot be indifferent to priorities other than health and safety that are established by law for the national program."



"We are interested in the timeliness of the process. We want to avoid delays that may lead to pressures for a rush at the end of the process."

"The commission's guidance to the staff has long been that in the absence of unresolved safety concerns, the NRC regulatory program will not delay implementation of the executive branch's program. Let me state with certainty, however, that NRC does not intend to sacrifice quality and

technical correctness to meet deadlines," he said.

In addition to having the power to authorize and license construction and operation of a repository, NRC also regulates the storage of spent commercial reactor fuel prior to disposal. Davis said transportation of spent fuel and high-level waste is governed by regulations of the Department of Transportation and NRC, which share federal regulatory responsibility in this matter. □

Nevada Creates National Panel to Advise on Socioeconomic Impacts

Nationally recognized experts from around the country have agreed to serve on a Technical Review Committee to help oversee Nevada's socioeconomic impact assessment study relative to the effects of a high-level nuclear waste repository in the state. The three-year study is being conducted by Mountain West Research-Southwest, Inc. of Phoenix, Ariz. under a contract with the state Nuclear Waste Project Office. The study will establish baseline data relative to social and economic conditions within the state and within local communities likely to be affected by repository-related activities. Economic, demographic, sociocultural, and risk-related impacts will be identified and mitigation and compensation strategies developed.

The Technical Review Committee will assist the NWPO and its local government steering committee to critically evaluate the methodological aspects of the study and providing ongoing guidance relative to study implementation.

The committee is comprised of nine members including: Dr. Gilbert White, member of National Academy of Sciences (NAS) and father of natural hazard assess-

“The study will establish baseline data relative to social and economic conditions within the areas likely to be affected by repository-related activities.”

ment; Dr. Allen Kneese, one of the foremost experts in the field of resource economics, currently affiliated with Resources For The Future, in Washington, D.C.; Dr. Roy Rappaport, nationally recognized anthropologist; Dr. Kai Erikson, professor of

sociology at Yale University and an acknowledged leader in his field; Dr. Bruce Dohrenwend, a professor at Columbia University's Social Psychiatry Research Unit, member of the President's Commission on Three Mile Island, and an expert in the psychological aspects of risks and stress; Dr. E. William Colglazier, University of Tennessee's Energy Environment and Resource Center; Reid Hansen, a planning consultant in the State of Washington with extensive 'hands-on' experience in social impact assessment; Richard Moore, director of the Wyoming Industrial Siting Administration, and Edith Page, U.S. Congress Office of Technology Assessment.

Andrea Dravo, former Chief Aide to Congressman Morris Udall, the acknowledged father of the Nuclear Waste Policy Act, will serve as an advisor to the committee and provide guidance as to congressional and legislative implications of the study. Still to be named to the panel is a national expert in the area of transportation impacts. □

Nevada, Texas and Washington Battle In Court Over Repository Sites

Aside from Nevada, Texas and Washington looked to the courts for help when Energy Secretary John Herrington recommended sites for the first high-level nuclear waste repository.

Texas filed suit challenging DOE on the Environmental Assessments, nominations, and Herrington's recommendation. It also requested reopening an earlier challenge of the overall national site identification process for selecting the first-round sites.

Washington's attempt to block DOE includes the issues in the Nevada and Texas suits. It also challenges selection of the Hanford site as arbitrary and not based on the ranking methodology. Hanford was ranked fifth among the nine nominated sites in both preclosure and postclosure analysis, but wound up among the top three selected by DOE.

First-round states expressed dismay at DOE's decision to halt indefinitely the second-round repository site selection process.

Rep. Sid Morrison, R-Wash., requested hearings before the Science and Technology Committee's energy research subcommittee. He wants to determine whether DOE acted legally in suspending the second-site program. He also wants to learn how DOE justified selecting Hanford. He said suspending the second-round siting was unfair to first-round states that "understood they would not be alone in the burden of solving the country's nuclear waste problems."

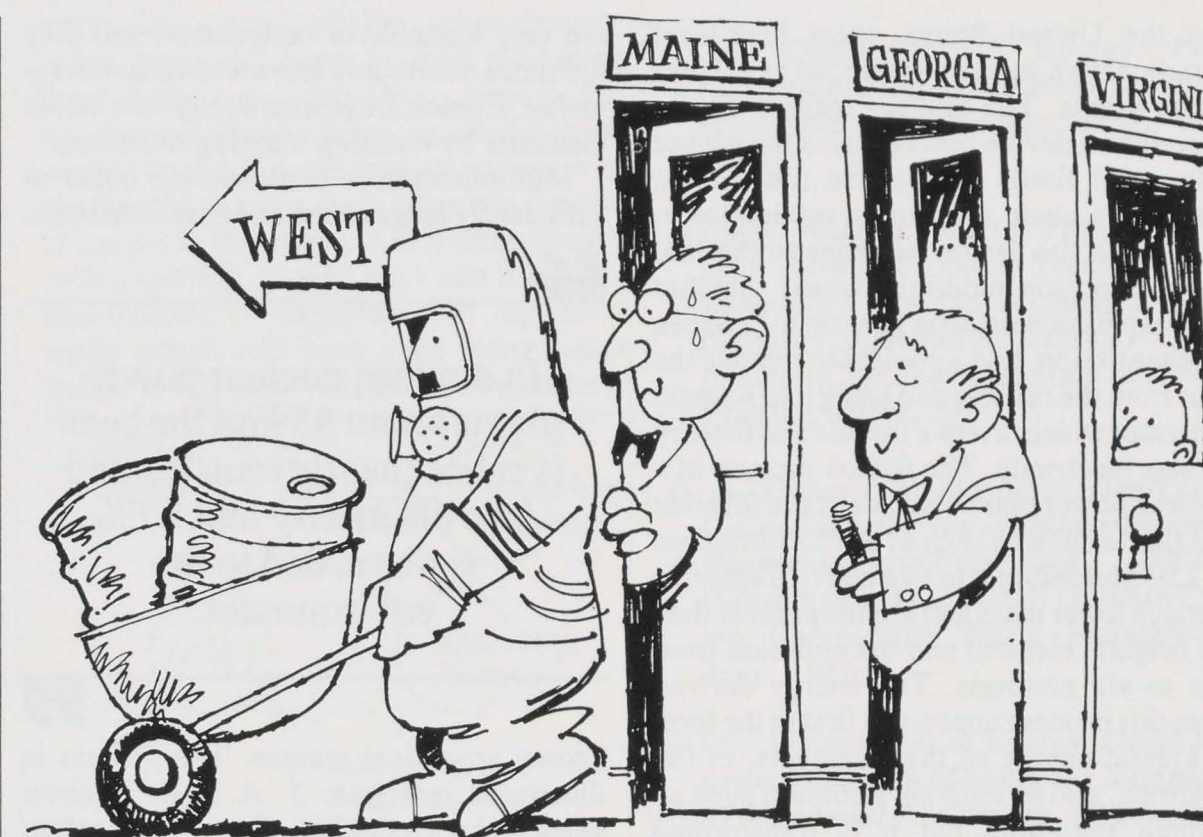
Robert Loux, executive director of the Nevada Nuclear Waste Project Office, said the decision appeared to be politically motivated. He said it removed the repository as an election-year issue in the second-round states, most of which have large congressional delegations.

"We have said all along that the repository search would lead to Yucca Mountain over the path of the least political resistance," he said. "We believed DOE has been using the Nuclear Waste Policy Act as it sees fit to accomplish its predetermined goal of building the repository in Nevada."

Gov. Richard Bryan said DOE's program has been a "charade" aimed at putting a repository in the state.

Steve Frishman, director of the Texas High-Level Waste Program, said the siting process has been politically driven from the start. He said the process could leave open the question of whether the site that is ultimately selected will be the safest.

Herrington told a press conference the siting for the second repository was halted because of declining projections of the amount of spent fuel. Ben Rusche, chairman of the Office of Civilian Radioactive



Waste Management, said earlier estimates were that there would be about 140,000 metric tons of spent fuel produced by 2020. He said current projections are that this might fall below 100,000 tons. DOE is planning for 115,000 to 120,000 tons, not including up to 15,000 tons of defense waste.

The Environmental Assessment released along with the announcements on first-round siting and second-round scrapping assume a repository could handle a maximum of 3,000 tons per year. Nevada NWPO officials said this loading rate applied to a single repository would leave very little capacity for removing the backlog of spent fuel that will be piled up at reactor storage sites by the time a repository actually begins receiving waste.

Schedule of Events

July 11:
Nevada Commission on Nuclear Projects. Reno.
Contact: Sally Cox
(702) 885-3744.

July 28-29:
National Association of Attorneys General High-Level Radioactive Waste Committee. Minneapolis.
Contact: Linda Walker
(202) 628-0435.

Aug. 4-8:
NCSL annual meeting. New Orleans.
Contact: Cheryl Runyon
(303) 623-7800.

Aug. 13-14:
Quarterly meeting of first repository states and tribes. Portland, Ore.
Contact: Russell Jim
(509) 865-5121.

Mid-September:
NCSL High-Level Waste Committee. Amarillo, Texas.
Contact: Cheryl Runyon
(303) 623-7800.

Sept. 24:
Western Legislative Conference High-Level Waste Subcommittee meeting. Colorado Springs, Colo.
Contact: Patty Spangler
(415) 986-3760.

Nuclear Power Plants:

Measuring the Pros and Cons of Nuclear Powered Electricity and Its Waste

In the United States, most high-level radioactive waste is produced in nuclear power plants. The nuclear reactor can be viewed as a device that contains the proper amount of fissile radioactive material to maintain a chain reaction, a moderator to slow down the fission neutrons to thermal energies, poison materials to make sure that only one fission neutron goes on to produce another fission, and a coolant to remove the heat from the reactor and bring it to a steam generator which drives a turbine and thereby creates electricity. The fission process in a nuclear power plant consists of the division of a fissile nucleus such as the 235-uranium or 239-plutonium into two heavy fragments of much lower mass and atomic number than the original element and the emission from one to six neutrons. The energy derived from this process appears at first in the form of kinetic energy of the fragments, of the neutrons, and as ionizing radiation such as gamma radiation, but it is transformed eventually into heat. In modern nuclear power plants about 33 percent of the heat is subsequently transformed into electricity and 67 percent is discarded to the environment. This split in energy follows the laws of thermodynamics and is the same for all types of power plants. The heavy fragments

are very unstable or radioactive, and they are more commonly known as fission fragments. Fission fragments decay into stable elements by emitting ionizing radiation.

Multiplication of neutrons can occur in sufficiently large masses of fissile elements

In modern nuclear power plants about 33% of the heat is subsequently transformed into electricity and 67% is discarded to the environment.

known as critical masses. The process is illustrated in Figure 1. A single neutron causes the fissioning of a 235-uranium nucleus which breaks up with the emission of three neutrons. In the absence of any other non-fissionable nuclei, these three neutrons proceed to split three other uranium nuclei, giving rise to three, two, and three neutrons respectively. Thus after only two steps in the chain, we have eight

neutrons where there was but one originally. Where neutron multiplication occurs in fission weapons, a large number of nuclei are fissioned in a time interval of a millionth of a second or less and a very large amount of energy is simultaneously released.

In a controlled chain reaction, illustrated in Figure 2, only one of the fission neutrons is allowed to go on and cause another fissile nuclei to fission. The excess neutrons are absorbed in neutron absorbing substances such as cadmium or lithium.

The fission process is best triggered by the absorption of a thermal neutron, a slowly moving neutron or one with very little kinetic energy. Fast-moving neutrons are slowed to thermal energies by collision with light nuclei such as hydrogen and carbon, and assemblies of such nuclei are known as moderators. In pressurized water or boiling water reactors, the hydrogen atoms of water molecules constitute coolant and the moderator. However, some reactors such as the reactor at Chernobyl use graphite as the moderator and water as the coolant.

Pellets of uranium oxide are the fuel of commercial nuclear power plants generating electricity. These solid pellets are sealed in metal tubes approximately twice the diameter of a pencil, about 12 to 13 feet long, and also referred to as cladding. The tubes are bundled together into assemblies. Between the tubes is space in which flows coolant that removes the heat generated by the controlled chain reaction. As already mentioned, the coolant is water. The reactor core consists of many fuel assemblies.

When an unspent fuel assembly is placed in a reactor, the uranium is 3.3% enriched in the uranium isotope 235-uranium, i.e., in every 1,000 kilograms of uranium there are 33 kilograms of 235-uranium and 967 kilograms of 238-uranium. The assembly is kept in the reactor for a time span of about 1,100 days, during which, for each 1,000 kilograms of uranium charged to the reactor, 44 kilograms of uranium are converted to 35 kilograms of fission products plus 9 kilograms of transuranics. The fission products and the transuranics in the spent fuel element are the high-level waste. Both the fission product and the transuranic inventories in a nuclear reactor represent very large quantities of radioactivity and if released to the environment they can contaminate large areas and irradiate entire populations as witnessed at Chernobyl. The fission products are contained in the spent fuel pellets by the cladding, and most of the ionizing radiation they emit is absorbed locally in the fuel element and con-

verted into heat which is also known as decay heat. Even when the chain reaction is stopped, the decay heat at first is so intense that the coolant must continue to flow and remove the heat or the fuel will heat up to its melting point, burst the cladding, and release the gaseous and volatile radioactive fission products. Also, the high radiation intensity causes the breakdown of water molecules into hydrogen and oxygen. To overcome this hazard, the reactor is equipped with a device that recombines the oxygen and hydrogen molecules. However, this recombining device is located in the coolant loop

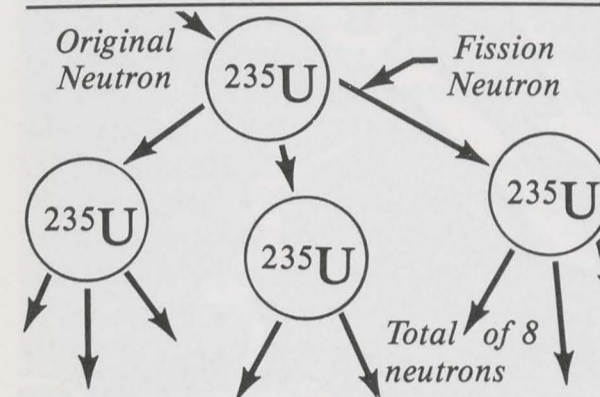


Figure 1. Neutron multiplication without the presence of absorbing nucleus.

and for it to be effective, the coolant must be flowing.

The most serious reactor accident is known as a loss of coolant flow and it can lead to the release of very large quantities of fission products to the environment. The scenario occurred to some extent at the Three Mile Island plant and it probably occurred outright at Chernobyl. A malfunction of a mechanical device causes the coolant to stop flowing through the reactor, or a rupture in the coolant loop causes loss of fluid and loss of coolant flow through the reactor. Large amounts of hydrogen gas are generated by the radiation field in the reactor, and the oxygen and hydrogen are not recombined since there is no coolant flow. Also, the decay heat causes the fuel to melt, the cladding to rupture, and the release of large quantities of fission products to the coolant. An ignition mechanism causes the hydrogen gas to explode and large quantities of coolant with volatile fission products are released into the reactor building. At Three Mile Island, the secondary containment prevented large quantities of fission products from reaching and contaminating the environment, while at the Chernobyl plant there was no containment structure to prevent fission products from reaching the environment. At Chernobyl, the chemical explosion destroyed the reactor building and probably caused the graphite to ignite and burn. The decay heat and the burning graphite caused the fuel pellets to melt and release large quantities of volatile fission products. Since the reactor building had been destroyed, the fission products were

released to the environment.

131-Iodine is a fission product of great concern in reactor accidents. 131-Iodine enters the human food chain when deposited on grass and eaten by milk producing cows. In humans, iodine is accumulated in the thyroid gland. Some epidemiological studies have indicated that an exposure of the thyroid to a few rems increases the risk of cancer in this organ. 131-Iodine decays with a half-life of eight days and it is not a radionuclide of importance in high-level waste which will have aged many years before it will have reached the repository.

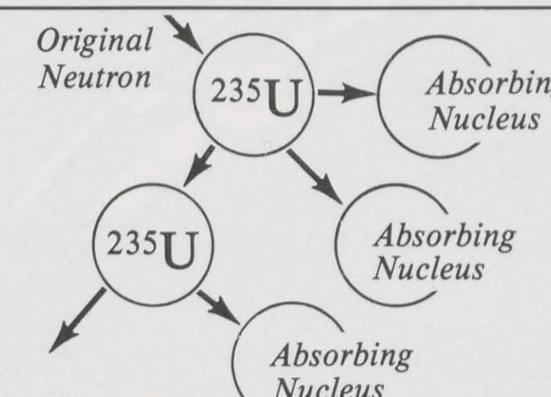


Figure 2. Controlled chain reaction.

The radionuclides of importance in high level waste are 90-strontium, 137-cesium, 14-carbon, and the transuranics, which include all the plutonium isotopes. The half-lives of 90-strontium and 137-cesium are 30 years and it takes about 1,000 years for the large quantities of these radionuclides to decay to insignificant levels. The half-lives of the other radionuclides are in the thousands and ten thousands of years and it takes hundreds of thousands of years for the large quantities to decay to insignificant levels. □

Glossary of Terms

Fissile: Those elements that can be fissioned and in which a chain reaction can occur. 235-Uranium and 239-Plutonium are the best known fissile elements.

Neutron multiplication: the growth in the number of neutrons during a chain reaction.

Thermal Neutron: neutrons that move with a velocity of about 7,000 feet/second. Such velocities are considered slow.

Thermal energies: Energies at which neutrons have speeds comparable to those of gas molecules of air at room temperature.

Transuranics: Elements produced in a nuclear reactor that have atomic numbers greater than uranium. Plutonium, Neptunium, Americium, Curium are all transuranic elements.

Recent Publications

The following is only a partial list of available reference materials.

(U.S.) Department of Energy, *Final Environmental Assessment for Yucca Mountain*, (Washington, D.C., May, 1986).

Nevada Nuclear Waste Project Office, *Map Showing Proposed Yucca Mountain Repository Site and Schematics of Exploratory Shaft and Repository Facilities* (Carson City, Nevada, State of Nevada Printing Office, 1986).

(U.S.) Department of Energy, *Draft DOE Guidelines for the Administration of Payments-Equal-to-Taxes (PETT)*, (Washington, D.C., DOE Office of Civilian Radioactive Waste Management, June, 1986).

(U.S.) Department of Energy, *Draft Program Planning Manual for Recipients of Financial Assistance*, (Washington, D.C. DOE Office of Civilian Radioactive Waste Management, June, 1986).

(U.S.) Department of Energy, *Transporting Spent Nuclear Fuel: An Overview*, (Washington, D.C., DOE Office of Civilian Radioactive Waste Management, March, 1986).

Tennessee Valley Authority, "Forum for Applied Research and Public Policy," Volume One, Spring, 1986. NOTE: A series of articles is devoted to issues surrounding DOE's proposed MRS facility.

(U.S.) Department of Energy, *Annual Report to Congress*, (Washington, D.C., DOE Office of Civilian Radioactive Waste Management, March, 1986).

Donald L. Barlett and James B. Steele, *Forevermore: Nuclear Waste in America*, (New York, N.Y., W.W. Norton & Co., Inc., 1985). NOTE: A very comprehensive look at the nuclear waste problem nationwide.

(U.S.) Government Accounting Office, *Quarterly Report on DOE's Nuclear Waste Program as of March 31, 1986*, (Washington, D.C., GAO/RCED-86-154FS, April 1986).

Argonne National Laboratory, *Draft Annotated Table of Contents Environmental Monitoring and Mitigation Plan*, (Washington, D.C., DOE Office of Civilian Radioactive Waste Management, April 10, 1986).

Types of Radioactive Waste

Waste To Be Deposited In NWA Repositories

Spent Fuel

- Irradiated fuel discharged from a nuclear power reactor
- Highly radioactive and very hot
- Small pellets sealed into metal fuel rods
- Produced by commercial utility power reactors

High-Level Waste

- Residues from reprocessing spent fuel
- Highly radioactive
- Calcined solids and liquid or sludge that would be solidified prior to transportation
- Produced primarily by defense activities

Other Types of Radioactive Waste

Transuranic Wastes

- Materials contaminated with elements heavier than uranium
- Moderately radioactive; slow decay
- Used nuclear equipment, filters, clean-up waste
- Produced primarily by defense activities

Low-Level Wastes

- Radioactive wastes not included in the above categories
- Typically, small amounts of radiation in a large volume of waste
- Includes contaminated rags, laboratory equipment, resins, etc.
- Produced by commercial, industrial and medical uses and by defense activities

Tailings

- By-products of uranium mining and milling
- Low concentrations of natural radioactivity
- Large volumes of rock and soil
- Produced by commercial mining operations

Local Government Profiles Clark County: Heavily Involved

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 second in a series of articles that profile each of these local governments and describe the nature and scope of each jurisdiction's involvement in the state's oversight and planning efforts.

CLARK COUNTY: POTENTIAL SHIPPING CORRIDOR AND 'BEDROOM COMMUNITY' FOR THE REPOSITORY

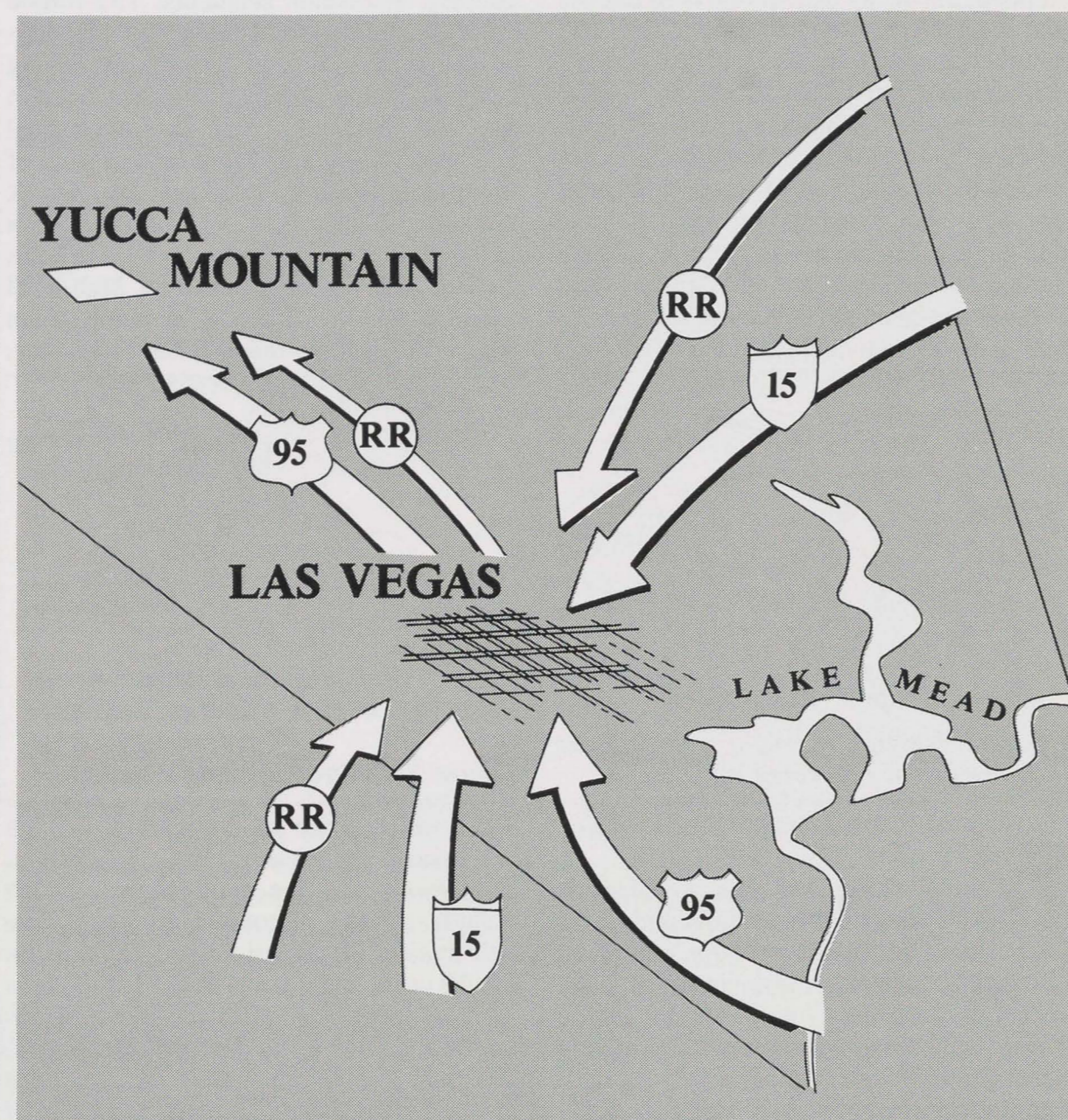
Located at the southernmost tip of the state, Clark County encompasses 7,881 square miles between California and Arizona. Geographically, the county contains almost 550,000 people, most of them in the Las Vegas metropolitan area.

Should a repository be sited and constructed at Yucca Mountain, it is possible that a significant portion of the work force for such a facility could elect to live in Clark County and commute to work at the site, 100 miles to the north-west. At the present time, most workers at the Nevada Test Site do just that.

Because of its large population, it is unlikely that the relatively small repository work force could have a major impact on socioeconomic conditions in the county overall. However, depending on worker settlement patterns, certain areas/jurisdiction within the county could be affected more than others.

Of great concern to Clark County officials and planners is the prospect that highways and rail lines within the county could become major conduits for thousands of shipments of highly radioactive materials destined for the repository. Current DOE planning documents show Interstate 15 and U.S. 95 through Clark County, including the heavily populated Las Vegas area, as being the prime truck route for waste shipments. Likewise, the Union Pacific rail line, which also transits the county, is projected as being the primary rail route for nuclear waste shipments.

DOE estimates that over 6,400 truck or 830 rail shipments of highly radioactive materials could pass through Clark County each year for as many as 30 years should a repository be located at Yucca Mountain. The implications of such massive shipments of radioactive waste through a highly populated, urban area are of considerable con-



cern to elected officials, planners, emergency response personnel and others charged with the protection of the health and safety of the county's citizens. Of concern, too, is the potential impact these shipments could have on the county's tourist and gaming industries and potential implication of even a minor accident involving nuclear materials on the county's economy.

For more than two years the Clark County Department of Comprehensive Planning has been engaged in developing the capabilities needed to adequately evaluate the potential effects a repository would have on the county, its people, its environment and its economy. Using grant funds made available through the state Nuclear Waste Project Office, the county has assigned staff and resources to the task of analyzing DOE plans and activities, determining their implications for the county, and developing strategies for effectively addressing any negative impacts that could occur.

Dennis Bechtel, planning coordinator for the department, has functioned as the county's lead planner and key liaison with the state Nuclear Waste Project Office for

high-level waste issues. Bechtel came to Nevada from Ohio, where he worked for 11 years as an urban planner and four years as an industrial engineer. A veteran of both the public and private sectors, Bechtel has worked for the City of Cleveland, for a regional planning organization in Ohio, and for an international engineering firm based in Cleveland. He holds a Bachelor's Degree in engineering and earned his Master's Degree in Urban Planning from Kent State University in 1973.

Bechtel has been a key member of the ad hoc local government advisory group that has worked closely with the state NWPO for several years. He has assisted in shaping the socioeconomic impact assessment study that is being undertaken by the state, with direct involvement of affected local governments, and has helped design and focus state and local efforts aimed at evaluating transportation-related effects of a repository. Bechtel has been an effective advocate for Clark County's concerns in both state and federal nuclear waste planning and decision-making. □

Rusche: States Play Characterization Role

Ben Rusche, chairman of the Office of Civilian Radioactive Waste Management, says the states will be involved in several ways during site characterization at proposed locations for the country's first high-level radioactive waste repository.

Rusche discussed the repository program at a meeting of the state Commission on Nuclear Projects May 15. When asked if Yucca Mountain, Nevada; Hanford, Washington and Deaf Smith County, Texas, would be chosen for site characterization, Rusche said the decision had not been made. The formal announcement came May 27.

"Formal site characterization plans will be developed with input from the three states containing sites," Rusche said. "In addition, hopefully negotiations for formal consultation and cooperation will proceed parallel."

He said states will be involved in development and review of the site characterization plan "and those reviews are already under way."

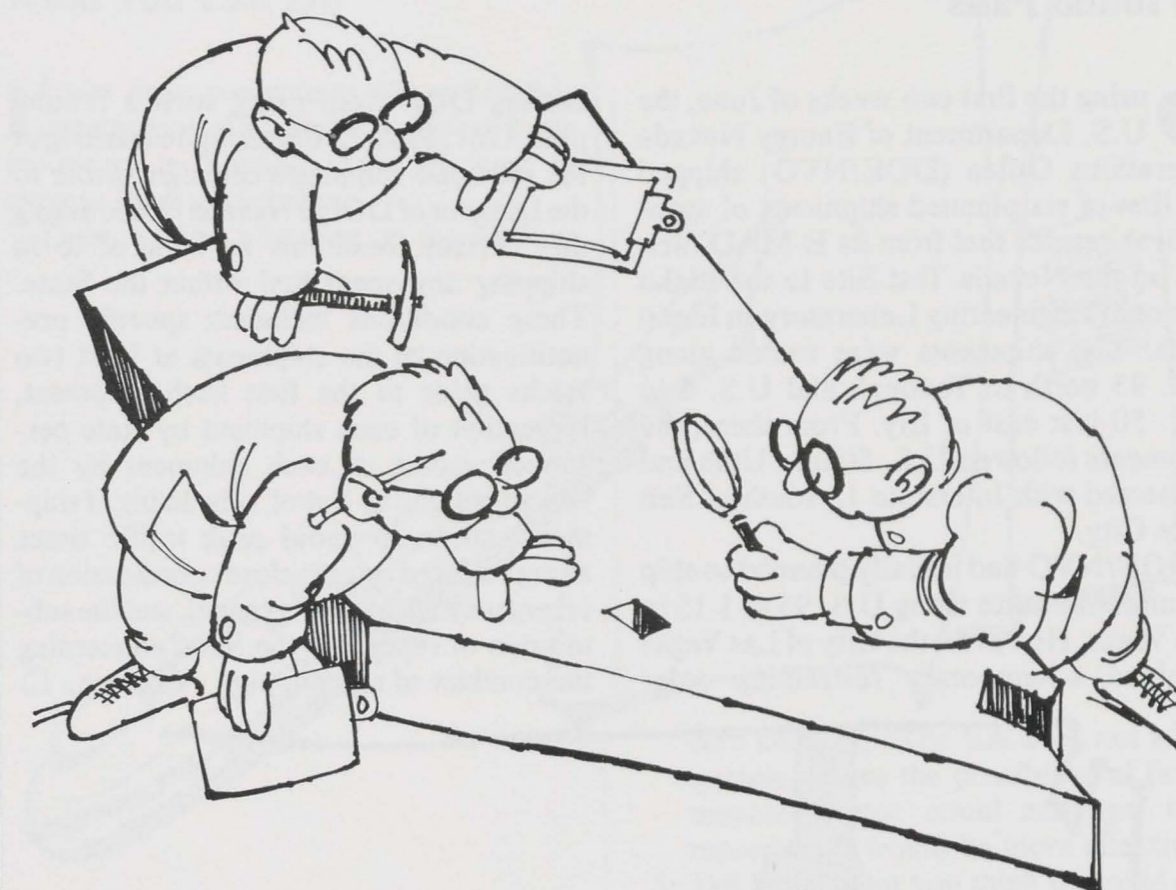
"They will be involved in the monitoring and conduct of activities after characterization begins, if those activities meet certain tests as the 9th Circuit (Nevada vs. Herrington) recently directed.

"In addition, the state through its very presence will have the opportunity to conduct whatever oversight activities it wants to do on its own. It will be the recipient of all of the documents that are prepared by DOE and will have the opportunity and hopefully will be able to participate in an extensive system of documentation and provided with a complete record for the licensing process," he said.

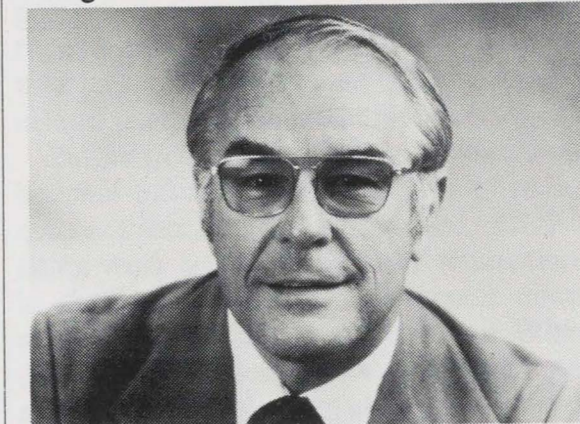
The meeting was punctuated by chants from the opponents of the repository program, and by exchanges between Rusche and commissioners who said the Department of Energy has not been working with the state as required by the Nuclear Waste Policy Act of 1982.

Chairman Grant Sawyer and commissioners Anne Peirce and Michon Mackedon questioned Rusche about DOE's refusal to grant about \$1 million to conduct technical on-site studies at Yucca Mountain. They said the 9th Circuit Court had upheld Nevada and approved funding for the studies. Rusche said the court had set forth tests for funding, and that DOE had complied with them.

He said the question "hinges much less on the content of the work than on the time of the work," and indicated the matter would be resolved later in the day at a meeting between his lawyers and state officials. (It was not).



Rusche was asked about a General Accounting Office report that said DOE sent "conflicting statements" to repository states by granting a Massachusetts request for contractors to perform independent data collection. Rusche said this differed from Nevada's request in that "It's one thing to collect data and it's another thing to create data." He said Massachu-



Ben Rusche — "The states will be involved with radioactive waste repositories."

setts, once considered as a possible second-round state, was not doing any drilling or on-site measurements. The question concerning Nevada, he said, "had to do with the conduct of original exploratory work which would itself produce data which would eventually be collected."

Sawyer questioned Rusche about reports DOE would drop studies involving a possible second repository. (In announcing the three sites to be characterized, DOE said studies toward a second repository had been halted indefinitely). Sawyer said

dropping the second-round states would "leave us out here with the only repository." He asked if it would not be possible to lump the second-round states with the first-round states in the search for the single repository.

"I think that is probably more a function of Congress than it is of our consideration," Rusche said.

When Sawyer asked if he would recommend such an approach to Congress if the second-round states "went out of the picture," Rusche said, "I would have to look at it very carefully. I can't give you an answer on that right now."

As for congressional reevaluation of the second repository, Rusche said that would deal "primarily with the timing." He said he would not want to change the Act concerning the second repository.

Sawyer said it would only be fair if the second-round sites were characterized "for comparison with the three out here that are going to be left." Rusche said Congress had selected the time schedule, and the sites in the West are being considered "on the basis of Congressional judgment that it was important to proceed." Sawyer said the state of Nevada must not be "dumped on" by DOE and will insist on taking a meaningful role in the repository process. He said, "It has been extremely frustrating because this 'trust us' business gets a little bit old."

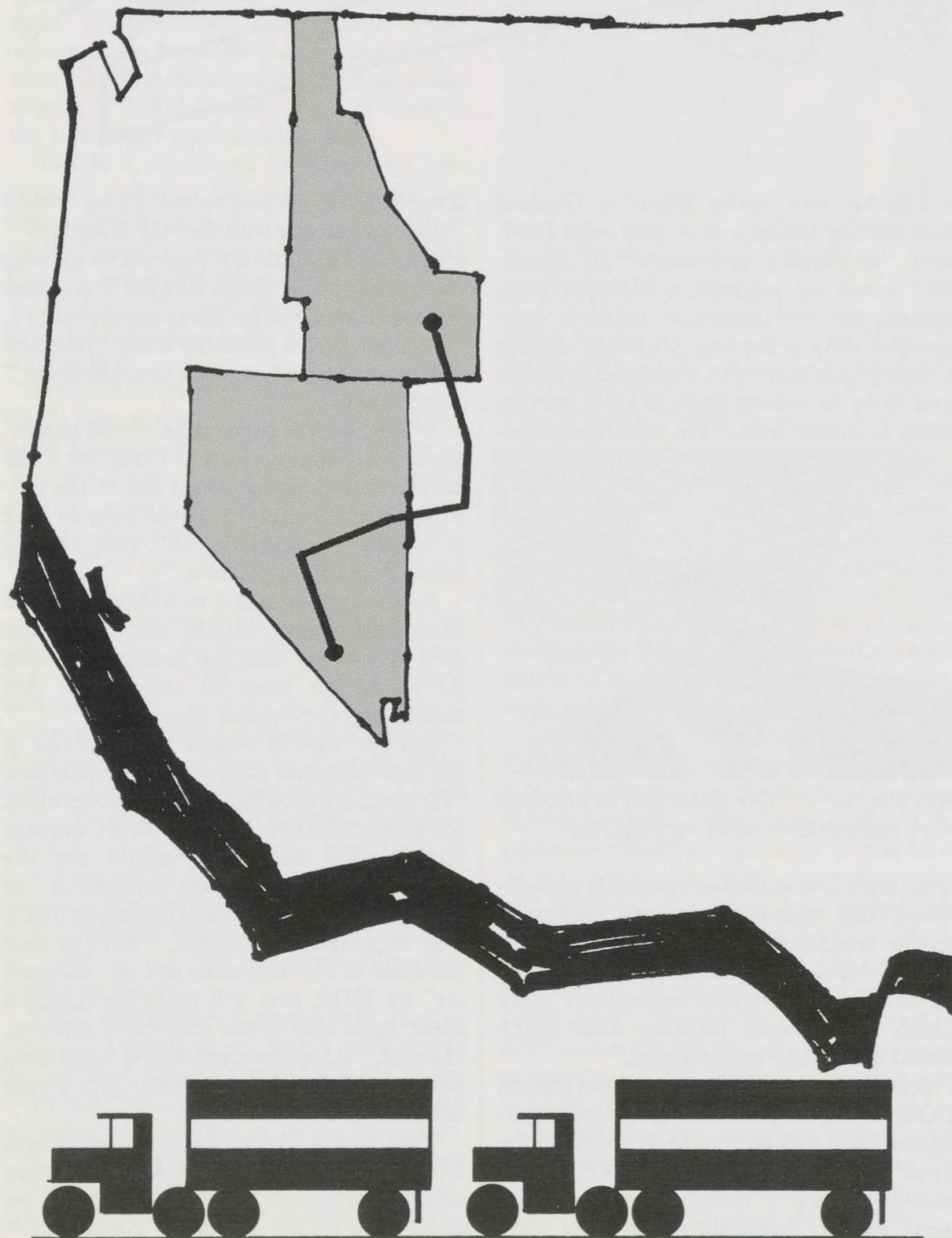
"We would like to have, as the federal Congress has provided, some consultation and cooperation in its true meaning, and we don't think we are getting it," Sawyer said.

Transportation: Spent Fuel Shipped From Nevada Test Site To Idaho Falls

During the first two weeks of June, the U.S. Department of Energy Nevada Operations Office (DOE/NVO) shipped the first of six planned shipments of spent nuclear reactor fuel from its E-MAD facility on the Nevada Test Site to the Idaho National Engineering Laboratory in Idaho Falls. The shipments were routed along U.S. 95 north to Tonopah and U.S. 6 to U.S. 50 just east of Ely. From there, the shipments followed U.S. 50 into Utah and connected with Interstate 15 south of Salt Lake City.

DOE/NVO had initially planned to ship the material south along U.S. 95 to I-15 in Las Vegas. However, the City of Las Vegas obtained a temporary restraining order

barring DOE from using such a routing plan. Gov. Richard Bryan, upon learning of the intended shipping campaign, wrote to the Director of DOE's Nevada Office asking that certain conditions be adhered to in shipping any spent fuel within the State. These conditions included: specific prenotification of the shipments at least two weeks prior to the first such shipment, inspection of each shipment by state personnel, escort of each shipment by the Nevada Highway Patrol, scheduling of shipments so as to avoid peak traffic times along selected routes, close coordination of emergency response personnel, and the submission of reports to the State concerning the conduct of the shipping campaign. □



10

Nevadans: Politics Flaw Repository Selection, DOE Bends Under Pressure

Gov. Richard Bryan told a congressional subcommittee June 16 that politics, rather than technical merit, has become the standard for locating the country's first high-level nuclear waste repository. He asked Congress to overturn the site characterization decision, and to void DOE's decision to halt the search for a second repository. He said Congress should insist that DOE follow the NWPA, which set forth the manner in which the repository program must be conducted.

President Reagan rejected Gov. Richard Bryan's request for a face-to-face meeting to discuss the Department of Energy's program to develop a high-level nuclear waste repository, possibly at Yucca Mountain.

Bryan had asked for a brief conference at the president's visit to Las Vegas June 25. However, Mr. Reagan, in a letter to the governor, suggested Bryan meet instead with Energy Secretary John Herrington.

Bryan told the Senate Energy Research and Development Subcommittee that DOE has used the Act to support a predetermined course that followed the path of least political resistance. He said the department had rebuffed Nevada's efforts to participate in the program, as specified by the Act, and the decision to drop the second repository program was the "final straw." He said DOE bent under pressure from populous eastern states with large congressional delegations, resulting in "ganging up" on the West in general and Nevada in particular.

"Nevada had no opportunity to advise the president on the merits of the May 28 recommendation to begin site characterization at Yucca Mountain," he said. "The process used constitutes the most hollow consultation and is clear evidence the department has dropped even the pretense of fairness in the selection process. The department seeks to use the Act to ratify long-standing site preferences and to

establish a site selection process that is wholly political."

Nevada Sen. Paul Laxalt, general chairman of the Republican Party and a personal friend of President Reagan, said, "It is now politically impossible for nuclear waste ever to be stored in the continental United States." Laxalt said ocean disposal might be a way out of the political charges that have surrounded DOE's storage program. Washington Sen. Slade Gordon agreed there is a need to explore different methods of HLW disposal, possibly in connection with 50-year temporary storage in a monitored retrievable storage facility (MRS) similar to temporary storage facilities in Europe.

Subcommittee Chairman Peter Domenici, R-N.M., said Congress included second repository activities as a line item in DOE's fiscal 1986-1987 budgets, and said this constituted congressional authorization for continued second-round activities.

Washington Gov. Booth Gardner said DOE's actions were inviting court challenges that could "probably prevail" in the site selection process. He said that in 10 or 15 years, the government "will have invested a fortune and will find itself right back at step one." □

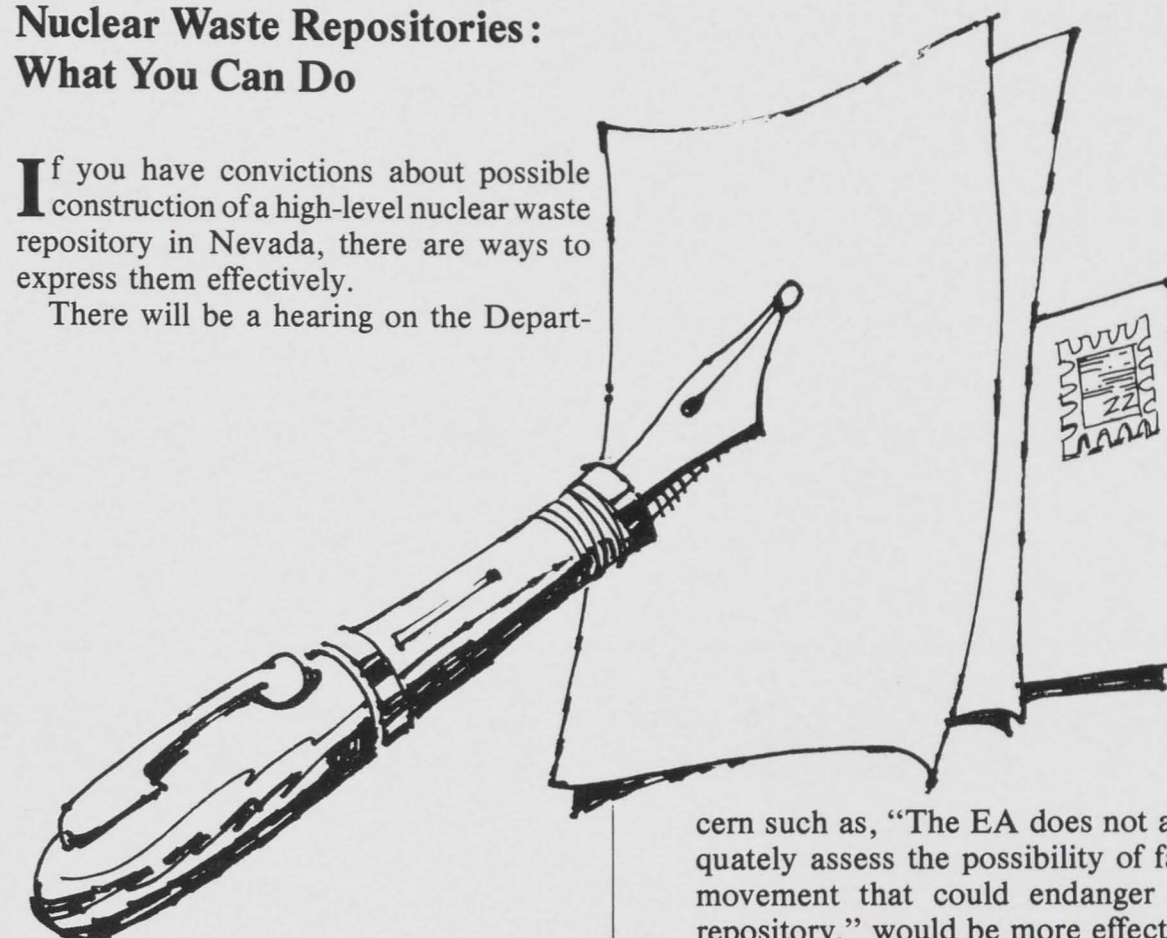
President Reagan says deciding where to build the nation's first high-level nuclear dump will be decided on the basis of safety, not politics.

"It will not be handled in an arbitrary or political fashion," he said at a campaign fund raiser in Las Vegas June 25. "I will never do anything that is not totally safe. And that will be true for any president — republican or democrat — who follows me."

Getting Involved With High-Level Nuclear Waste Repositories: What You Can Do

If you have convictions about possible construction of a high-level nuclear waste repository in Nevada, there are ways to express them effectively.

There will be a hearing on the Depart-



cern such as, "The EA does not adequately assess the possibility of fault movement that could endanger the repository," would be more effective.

3: Tell DOE what you think it should do to improve the process.

Other ways to get involved:

- Read appropriate materials at your library, the state Nuclear Waste Project Office reading rooms, and the DOE reading room in Las Vegas.
- Attend meetings of the state Commission on Nuclear Projects and legislative meetings concerning high-level waste.
- Attend DOE and state Nuclear Waste Project Office information meetings and public hearings. The dates will be publicized when they are set.
- Write letters to the editor of your newspaper expressing your concerns.

For more information:

Nevada Nuclear Waste Project Office
Capitol Complex
Carson City, Nev., 89710
(702) 885-3744

U.S. Department of Energy
Nevada Operations Office
2753 S. Highland
Las Vegas, Nev., 89
(702) 295-3521

U.S. Department of Energy
Office of Civilian Radwaste Mgmt.
Mail Stop RW040
Washington, D.C. 20585
(202) 252-5722

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

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- A Yucca Mountain repository: How would it operate?
- The Nuclear Waste Policy Act of 1982:
What does it do?
- What is spent nuclear fuel and how much waste is
there?
- Why Yucca Mountain?

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Nevada Nuclear Waste Newsletter

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

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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

- 1** DOE Budget Slashed: Drilling Prohibited
- 2** Repository Search: What's Next?
- 4** Hereditary Effects of Radiation
- 5** DOE Loses Bid to Transfer Wave of Repository Lawsuits
- 8** Repository Program in Jeopardy
- 10** Nevadans: DOE Playing Repository Politics
- 11** State Challenges DOE Water Claim for Repository

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.

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

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.

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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

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

is near the Columbia River, which forms the boundary between the two states and is a major economic resource.

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;

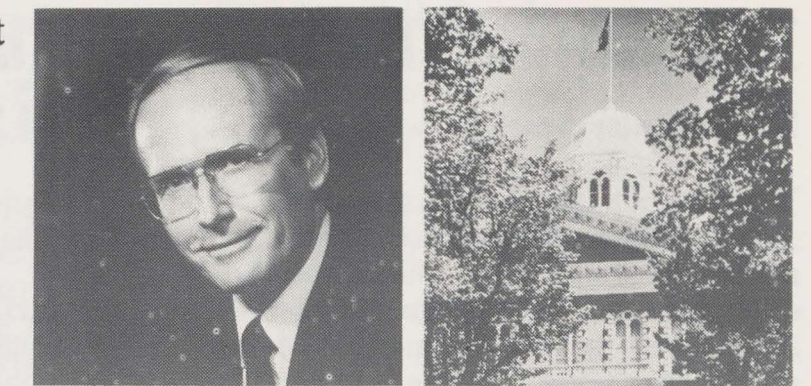
— Congress must provide funds to develop two repositories or suspend all funding of any repository program;

— 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.

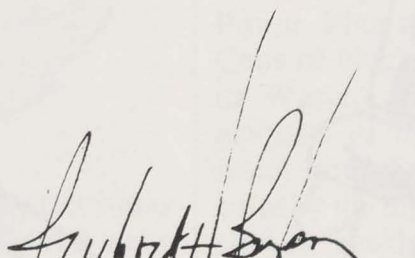
Nevadans are greatly distressed by these revelations, because they show a repository selection process that is far removed from the one Congress envisioned when it enacted the Nuclear Waste Policy Act of 1982.

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 plasma 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 is 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.

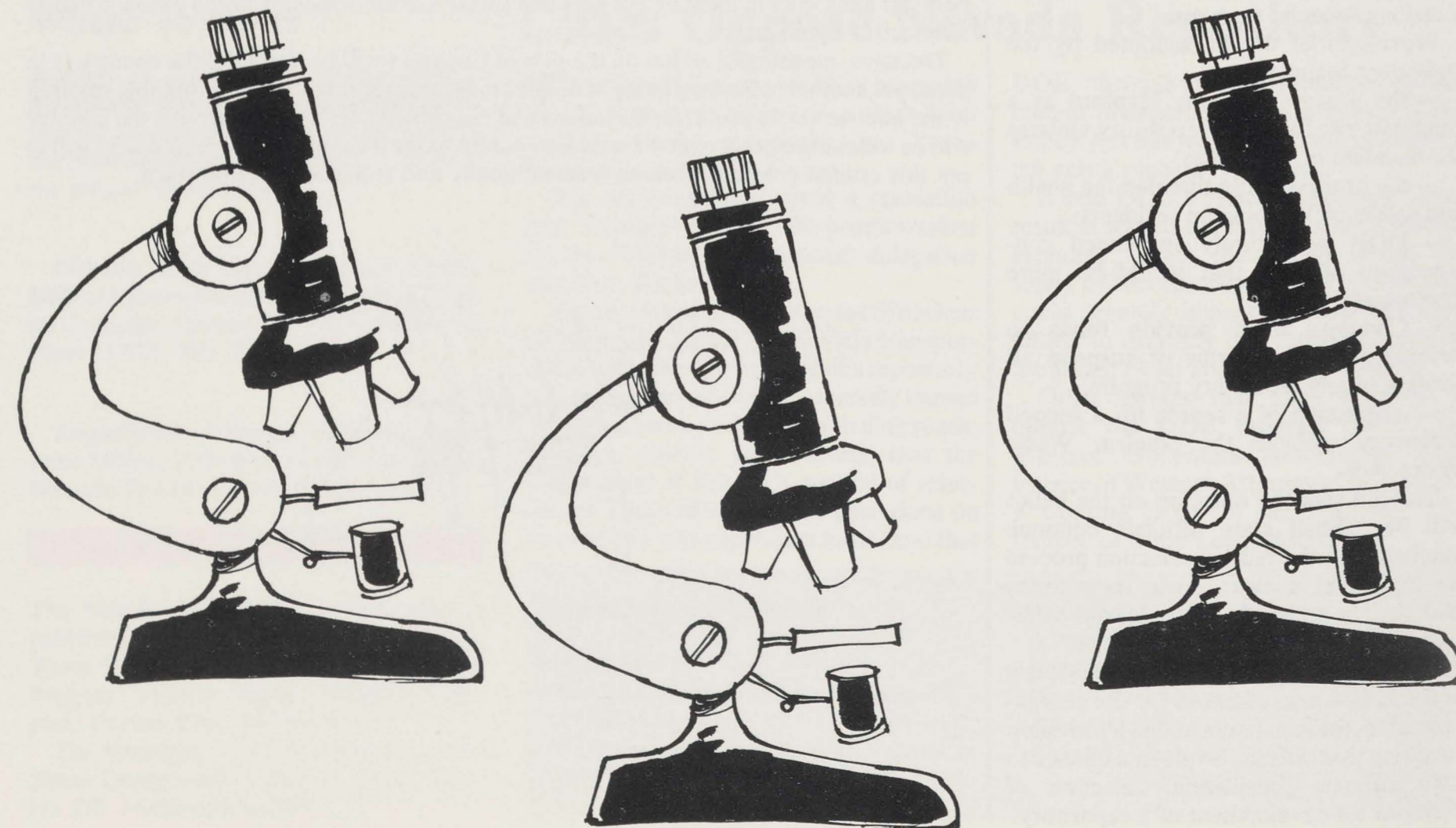
However, such extrapolation can be fraught with errors and radiation scientists usually try to be very guarded and equivocal in their statements.

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.



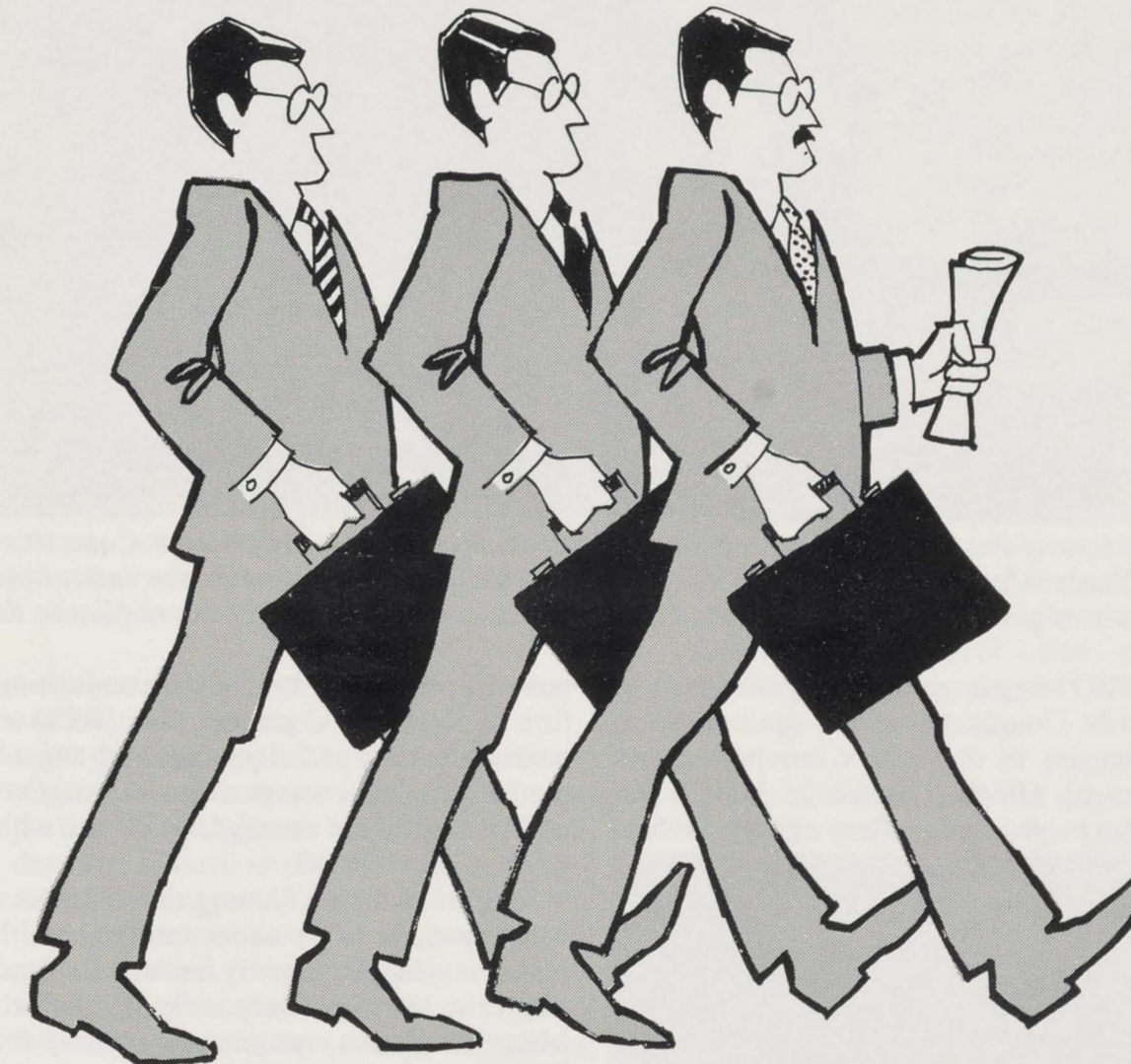
DOE Loses Bid to Transfer Wave of Repository Lawsuits

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.

nuclear waste in a deep geologic repository.

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



Three cases, also in the first wave, are awaiting decision in the First Circuit Court

“ 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. ”

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

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.

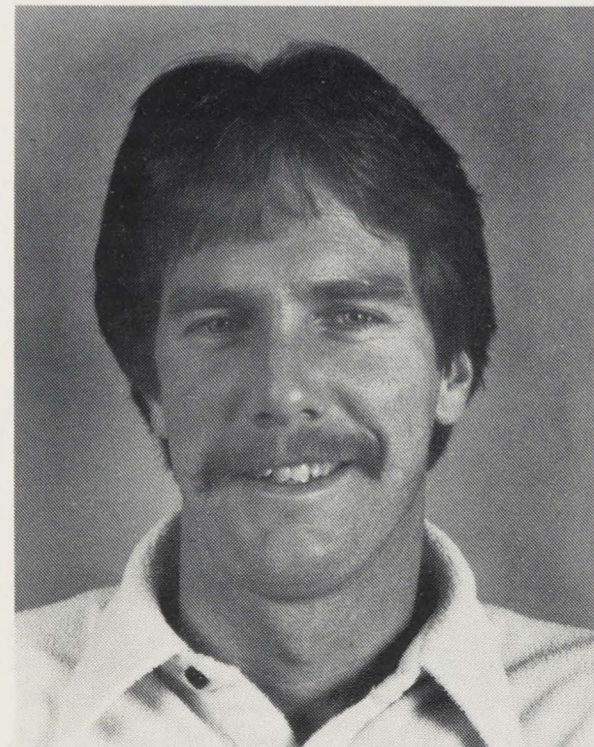
Caliente, because of its unique location with regard to the rail corridor, is likely to be significantly affected by the repository-related nuclear waste shipments. The city is literally astride the Union Pacific rail line. Residences, shops and even the city offices are only feet from the tracks which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



Members of the Lincoln County/City of Caliente Joint Impact Alleviation Committee and interested citizens visited the Nevada Test Site and the Yucca Mountain repository site in July. The tour was arranged by the committee to provide the opportunity to learn more about DOE's repository program, and to address city/county concerns about airborne radiation dangers as a result of weapons testing activities.

(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 subse-



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

quently 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.

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

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.

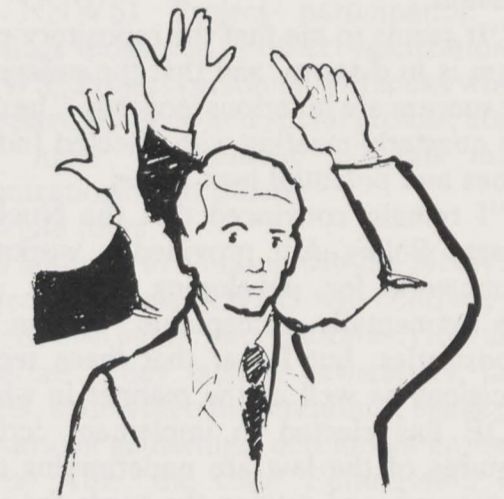
Here's What You Can Do...

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.

For more information:

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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 indefinitely 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.

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 with 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.

For more information:

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(202) 252-5722

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 be-

tween 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

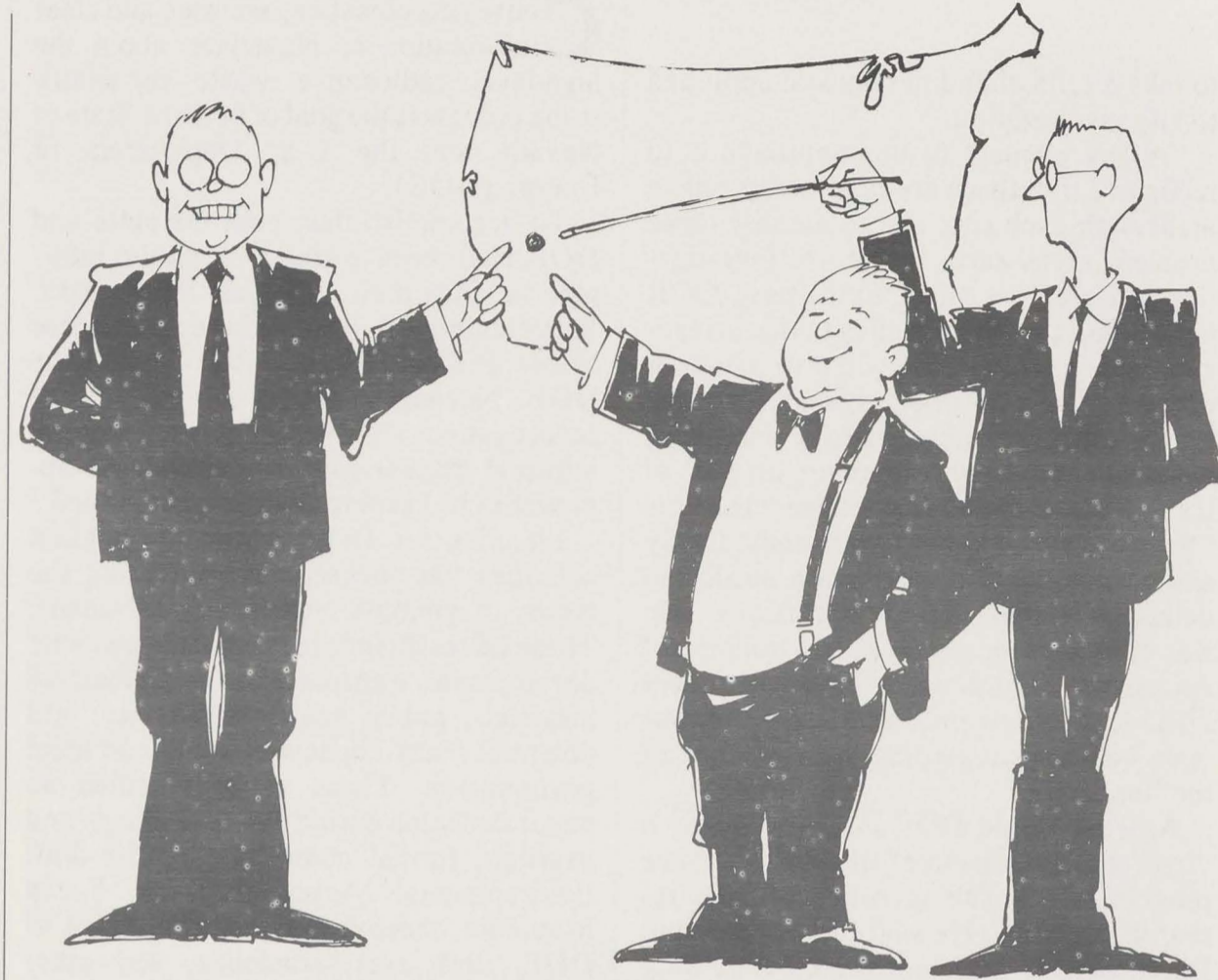
A Nevada official says a congressional charge that the Department of Energy deliberately distorted information for locating nuclear waste sites shows the entire siting program should start anew.

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

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 re-open 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.

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 pre-judged 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.

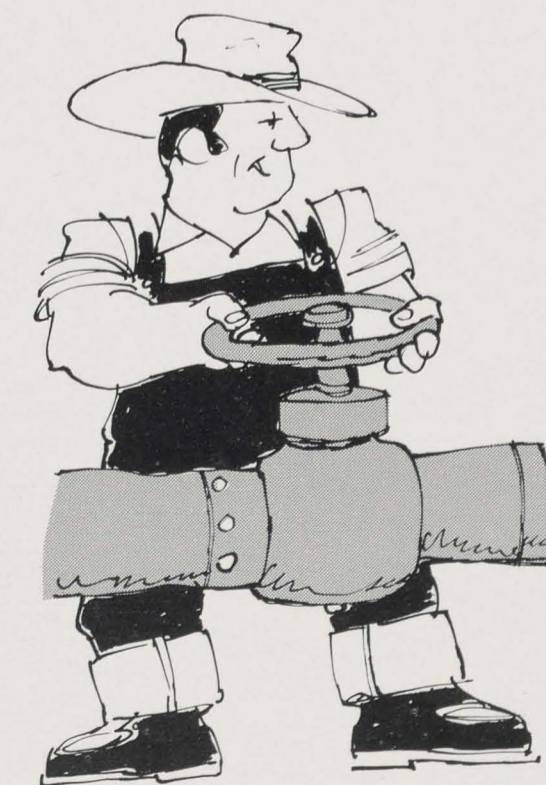
State Challenges DOE Water Claim for Repository

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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What does it do?
- What is spent nuclear fuel and how much waste
is there?
- Why Yucca Mountain?
- A Yucca Mountain Repository: What are
Nevada's Concerns?

*Clip this page and fold it in thirds for mailing.
Thank you for sending your views.*

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Nevada Nuclear Waste Newsletter

Repository Program Delayed Five Years... 'til 2003

The Department of Energy has put its nuclear waste repository program on hold to provide more time to study proposed sites in Nevada, Washington and Texas.

Energy Secretary John Herrington told Congress in January there will be a five-year delay, from 1998 to 2003, in the opening of the country's first high-level waste repository. He said the new deadline is needed to fully investigate the three proposed sites, to prepare licensing documents as required by the Nuclear Regulatory Commission, and to better cooperate with affected states and Indian tribes.

New plans call for sending a recommendation of the best site to the president in 1994, with construction to begin in 1998. By 2003, the repository would begin accepting spent fuel from nuclear

power plants. In 2008, the site also would begin accepting high-level waste from the defense program. DOE has signed contracts to take spent fuel from the utilities by 1998, despite lack of a completed repository. The department says it could handle the waste if a Monitored Retrievable Storage (MRS) facility were built. A proposed MRS in Tennessee has been blocked by court action.

Some congressmen said the delay, along with the May 1986 decision to halt the siting for a second repository in the East, violated the Nuclear Waste Policy Act of 1982 which required that the dumps open on schedule. Western congressmen claimed the decision to drop the second repository was an election-year move intended to get candidates off the hook in eastern states with large con-

gressional delegations. Herrington said the second repository will not be needed until well into the next century.

When members of the Senate Energy Commission asked Herrington what legal authority he had to make such changes in the siting process, he said "It's a legal question, and there are no answers to legal questions."

Bob Loux, executive director of the Nevada Nuclear Waste Project Office, said Herrington's announcement showed the repository program is in jeopardy.

"It signals that DOE realizes the program is in big trouble and is teetering on the verge of collapse," he said. "The problem is that DOE is evaluating sites that are not good ones, and you can't throw money or time at these three sites and make them better."



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Challenge: Prove "Beyond Shadow of a Doubt" Repository Would Not Harm Nevada

Governor's Statement

In the Spring of 1985, the Nevada Legislature created a Commission on Nuclear Projects to provide policy guidance to the governor and legislation on matters concerning nuclear waste disposal in our state. The first report of that Commission released last December contains 15 recommendations suggesting ways in which our state's interests can best be protected in relation to the federal government's proposal to site a high-level nuclear waste repository in southern Nevada. These recommendations and documentation which support them represent a year of study on the part of the Commission. Chairman Grant Sawyer, Vice Chairman Michon Mackedon, and members Thalia Dondero, Ron Lurie, Anne Peirce, James Cashman III, and Frank Caine have done an exceptional job in providing me and the Legislature with sound policy advice and guidance.

I believe the Commission's report sends a very clear message that the nuclear waste repository program as it is being implemented by the U.S. Department of Energy (DOE) is in serious jeopardy. Interference with what was intended by Congress to be a technically driven and scientifically objective site selection process has reached the point where it is extremely doubtful that DOE is even capable of identifying technically suitable sites.

Recent events in Washington, DC seem to indicate that Congress is becoming increasingly frustrated with the Department of Energy's implementation of the Nuclear Waste Policy Act. Senate Energy Committee Chairman, Bennett Johnston (D-LA), suggested at a hearing on the repository program in early February that, rather than require that DOE conduct a scientifically sound, objective screening process to select a repository location, the state of Nevada may be induced to consider a "grand compromise" and accept the site in return for certain federal "payments."

The suggestion that the Department of Energy can (or should) buy its way out of having to comply with the carefully crafted provisions of the Nuclear Waste Policy Act of 1982 is not only damaging to the integrity of the Act, which took years of effort and compromise to pass into law, but it is also frighteningly irresponsible. To suggest that a state (any state) would trade the health and safety of its citizens and the well-being of its economy and environment for generations to come for a short-term economic windfall is demeaning and dangerous.

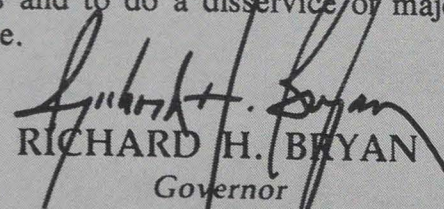
Additionally, this suggestion clearly indicates that Congress is on a fishing expedition to attempt to find a quick fix to the repository program, rather than examining DOE's faulty effort and forcing it to comply with the specific requirements of federal law.

Senator Johnston's further inference that Nevada is already so contaminated that it would be a likely place for a repository is indicative not only of a disturbing lack of knowledge about our state, but also a lack of understanding about the many technical problems and potential defects inherent with the proposed site at Yucca Mountain. Experts employed by the state of Nevada as well as staff of the U.S. Nuclear Regulatory Commission have voiced serious concern about the ability of the Nevada site to safely isolate the highly radioactive waste that must be stored there for the amount of time required. Until a site (any site) can be shown conclusively to be technically suitable and absolutely safe, any talk of compensation, payoffs, or grand compromises is not only premature, but also dangerously misleading. Such talk implies that almost any site will do for a repository and that all that is needed is a quick political fix to get things moving.

There is real danger for Nevada in the current state of affairs surrounding the federal high-level waste program. Unless Congress acts to put a halt to DOE's mismanaged and out-of-control project, Nevadans could very well find themselves looking down the barrel of DOE's repository project as federal efforts intensify to find a vulnerable location for the repository — regardless of the technical suitability of the targeted site.

The report of the Commission on Nuclear Projects addresses this very real concern by urging that Nevadans speak with one voice on the nuclear waste issue. Nevada is simply too small a state in the political sense to be able to afford to appear divided — therefore vulnerable — in the face of a potentially disastrous federal undertaking. The state's congressional delegation has joined me in calling for a halt to DOE's mishandled site selection program. We in Nevada, together with our sister states of Texas and Washington, find ourselves as perhaps the last line of defense against a federal program that is out of control and headed for a potentially catastrophic outcome.

It is time, I believe, for the Nevada Legislature to join me and our congressional delegation in sending the strongest possible message to the Department of Energy and to Congress that Nevada is united in its opposition to the politically contaminated and technically unsound manner in which the Nuclear Waste Policy Act is being implemented. To do anything less at this point would be to condone a flawed and illegal repository siting process and to do a disservice of major proportions to the citizens of our state — and to the nation as a whole.


RICHARD H. BRYAN
Governor

Is There Oil or Gas Beneath Yucca Mountain?

Some petroleum geologists in Nevada believe the potential is present for petroleum beneath the Nevada Test Site and Yucca Mountain based upon presence of hydrocarbon source rocks, reservoir rocks, and favorable geology. Few drill-holes penetrate the ancient Paleozoic formations which lie buried beneath the volcanic tuffs of Yucca Mountain, but the presence of these ancient rocks kindles the hope that future oil fields similar to recent finds elsewhere in the state can be found in southern Nevada.

Recent discovery of two new oil fields in Nevada have made the eastern Great Basin one of the most attractive exploration areas in North America. The Grant Canyon Field in east central Nevada is producing oil from Devonian-age (325 million years ago) carbonate rocks. Its three wells already have flowed more than five million barrels of oil since its discovery in 1983. One well, 3 Grant Canyon, has been flowing an average of 3,333 barrels per day and is one of the most prolific wells in the United States.

The other recent discovery is the Blackburn Field in north central Nevada, also producing oil from Devonian carbonates. Located just west of the Bruffy oil seep, its four wells have produced nearly one million barrels of oil since its discovery in 1982.

The oil in these two new "Paleozoic" fields is believed to have been generated from Mississippian-age (285 million years ago) shallow marine to nonmarine environments rich in organic material. Previous models by petroleum geologists concluded that the Mississippian sediments were interlayered with limestone and dolomite carbonate formations derived from an ancient highlands area in Utah and Colorado. New models suggest instead that the Mississippian sediments were derived from the Antler Mountains, a prominent highland area in central Nevada in Mississippian time. The new model based on recently acquired field data suggest the Mississippian sediments are actually delta deposits laid down by ancient rivers and streams which flowed from the Antler Mountains.

These Mississippian sedimentary source rocks were subsequently exposed to several tectonic events that may have been responsible for several periods of hydrocarbon generation and migration. Many hydrocarbons were probably generated before and during a late Mesozoic-age thrust faulting event (approximately 150 million years ago), and were consequently trapped beneath large thrust plates and folds in

eastern Nevada. The Sevier-Laramide thrust belt is a remnant of those Mesozoic thrusting events. Evidence for the thrust belt can be seen in a broad band of thrust faulting extending from the Las Vegas shear zone (in Clark County) on the south to above Elko, Nev. on the north. Typically, Devonian carbonate rocks are thrust up and over the Mississippian sediments with displacements on the order of tens of miles. This thrust event had been previously obscured from the explorationist by Basin and

The recent Devonian oil discoveries have stimulated a new effort that is underway to evaluate the potential of Paleozoic marine sediments in contact with large fault-related structures. Success of this new effort demands that basic questions of source, reservoir, and stratigraphy be answered before attacking the complex tectonic history, structure, and traps of the Great Basin. One conclusion is clear — all of the oil produced in Nevada is found along the Sevier-Laramide thrust belt. Ex-



Range block faulting which forms the present landscape in the Great Basin.

Small fault traps formed in the block faults have been the main exploration target for the last 30 years while the large thrust-related structures have been ignored. The first oil field in Nevada, the Eagle Springs Field, produced from a small fault trap in Railroad Valley. Subsequent application of the fault trap model resulted in the discovery of the Trap Spring field in 1986. The Trap Spring field has produced over six million barrels of oil since its discovery. It is now believed that these oil concentrations in small fault traps are most likely formed as a result of leakage of hydrocarbons from deeper, larger pools.

ploration is currently concentrating along this belt with detailed mapping and drilling underway. Cedar Strat, a prominent petroleum exploration firm in Nevada, is leading the way in the mapping and stratigraphic analysis of this thrust belt. Continuation of detailed study southward onto the Nevada Test Site and Yucca Mountain may confirm the presence of the thrust belt and the potential for future major oil discoveries in southern Nevada.

Alan Chamberlain, president of Cedar Strat, submitted the basic information for this article.

Poll Results:

No Nuclear Waste Repository For Nevada

Nevada should do everything in its power to prevent siting of a high-level nuclear waste repository in the state, according to a poll conducted by the University of Nevada, Las Vegas and the University of Nevada, Reno.

It showed that nearly 80 percent of those surveyed believed there should be no repository in the state. Most also believed transporting nuclear waste into the state would probably lead to serious accidents, and that tourism almost cer-

tainly would suffer if there were a repository in Nevada.

The poll, conducted in September 1986, surveyed 400 people in the Reno-Carson City area and 402 in metropolitan Las Vegas. University officials said the results had an error factor of plus-minus 5 percent at the 95 percent confidence level.

The survey, which dealt with eight topics of major concern to Nevadans, showed most Nevadans believed transporting nuclear waste into the state probably would

lead to serious accidents, scientific know-how does not exist to make a repository safe from contamination, and Nevada tourism would suffer if a repository were located in the state.

The survey report said, "One observation seems apparent when reviewing the findings: There is considerable agreement between populations in the northern and southern parts of our state. This study supports the notion that Nevadans see issues nearer agreement than disparity."

Issue: Nevada should do everything in its power to prevent the locating of a high level nuclear waste site in the state.

Responses:

Northern		Southern
56.5%	Strongly agree	51%
22%	Agree	25%
13%	Disagree	18%
6.5%	Strongly disagree	6%
2%	Don't know	0%

Issue: Transporting nuclear waste into Nevada will probably lead to serious accidents.

Responses:

Northern		Southern
29%	Strongly agree	23%
46%	Agree	51%
15%	Disagree	20%
3%	Strongly disagree	4%
8%	Don't know	2%



Reagan Budget: \$525 Million For Western Repository Work

The Reagan administration wants Congress to approve a FY 1988 budget that would provide \$525 million for the Department of Energy (DOE) to develop a high-level nuclear waste repository in the West.

The request amounts to an increase of \$144 million over the current fiscal year's budget. Last year, congressmen who were angry over a decision to halt studies for a second repository in the East slashed DOE's FY '87 budget to \$380 million. Congress said DOE could get another

\$79 million if it could show it was working in good faith to carry out the repository program. Congress ordered there be no test drilling in 1987 at the Nevada, Texas and Washington sites that were selected for characterization.

The new budget request also calls for \$58 million to establish a Monitored Retrievable Storage (MRS) facility in Tennessee. Federal Court action has blocked DOE from seeking funds for the facility that would be an interim stop for spent fuel destined for the repository.

Washington... Hanford is Top News Story of 1986

The U.S. Energy Department's selection of the Hanford Reservation as a possible nuclear waste repository was the "runaway No. 1 story" in Washington last year, according to a survey of United Press International subscribers and reporters.

UPI said: "To the surprise of almost no one, the DOE last May named the Hanford Nuclear Reservation as one of three possible sites for the nation's first high-level nuclear waste repository. While Gov. Gardner and others cautioned against knee-jerk opposition, the discovery that Hanford initially came in fifth using a list of criteria developed by the Energy Department...prompted government leaders to take an active stance against the DOE. The state of Washington, supported by Oregon and Idaho, filed lawsuits in federal court to stop the Energy Department from further studying Hanford. The issue became the key one in the Senate race. Democrat Brock Adams successfully used the Hanford issue against Sen. Slade Gorton, R-Wash., in the November election, and voters overwhelmingly approved Referendum 40 calling on state officials to continue the battle against the DOE's plan."

The year's No. 3 story concerned the release of 40 years of documents about research and experiments that took place at Hanford. Among the more controversial discoveries in the 16,000 pages were that 530,000 curies of Iodine 131 — a cancer-causing agent — had been conducted on prison inmates in the 1950s. Local, state and federal health panels agreed that follow-up studies of people who lived and worked at Hanford during the early atomic age must now be conducted.

Texas... DOE Buys Land for Repository Study

The purchase of 60 acres is part of the Energy Department's study to determine whether a high-level nuclear waste repository will be constructed in the Texas Panhandle.

In a letter to Sen. Lloyd Bentsen, D-Texas, Energy Secretary John Herrington said Congress prohibited the drilling of exploratory shafts this year, but did not ban the purchase of land. Therefore, Herrington said, DOE would go ahead with plans for obtaining access to land at the potential repository site in Deaf Smith County.

"Very little disruption of current agricultural activities is expected and no disruption of current homesteads is planned," Herrington wrote in a letter to Bentsen.

The Texas site is one of three in the country being considered as the nation's first high-level nuclear waste repository. The others are in Nevada and Washington.

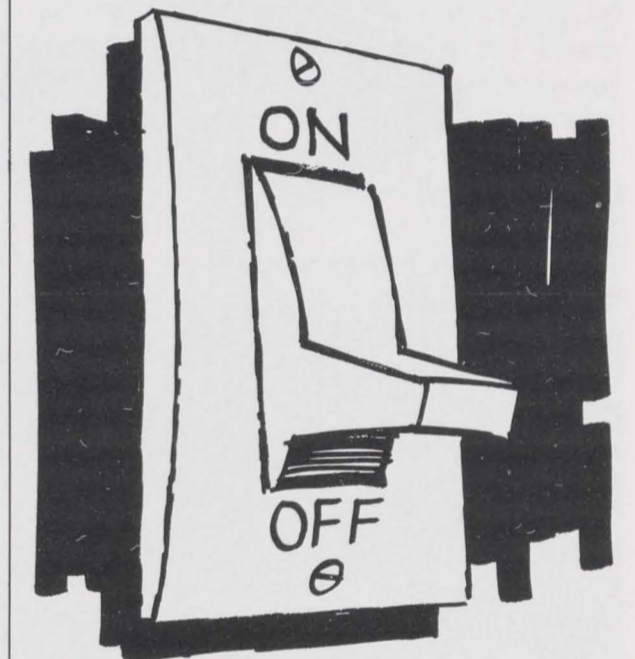
The Deaf Smith site is a salt deposit several thousand feet beneath the surface. The Ogallala aquifer, which provides water to much of west Texas, lies between the site and the surface.

"The Department is well aware of, and concerned about, the unresolved questions about the Deaf Smith County site, including the potential impacts on agricultural activities and the potable aquifers," Herrington wrote. "Our planned studies and field activities during the next five or more years of site characterization are intended to resolve those issues and determine site suitability for all three sites under investigation."

Oregonians Reject Nuke Plant Shutdown

A new proposal to shut down Oregon's only nuclear power plant may go to the ballot. In November, voters defeated 2-1 an initiative to close the Trojan generating plant until the federal government licenses a repository for high-level radioactive waste. Sponsors asserted that no commercial nuclear plant is safe enough to risk operating. Sponsors said they would work on a similar initiative for the next election.

The nuclear waste issue is of interest in Oregon because the Columbia River, which forms the common boundary with Washington, flows past the Hanford Nuclear Reservation which is one of three potential repository sites.



Where To Write

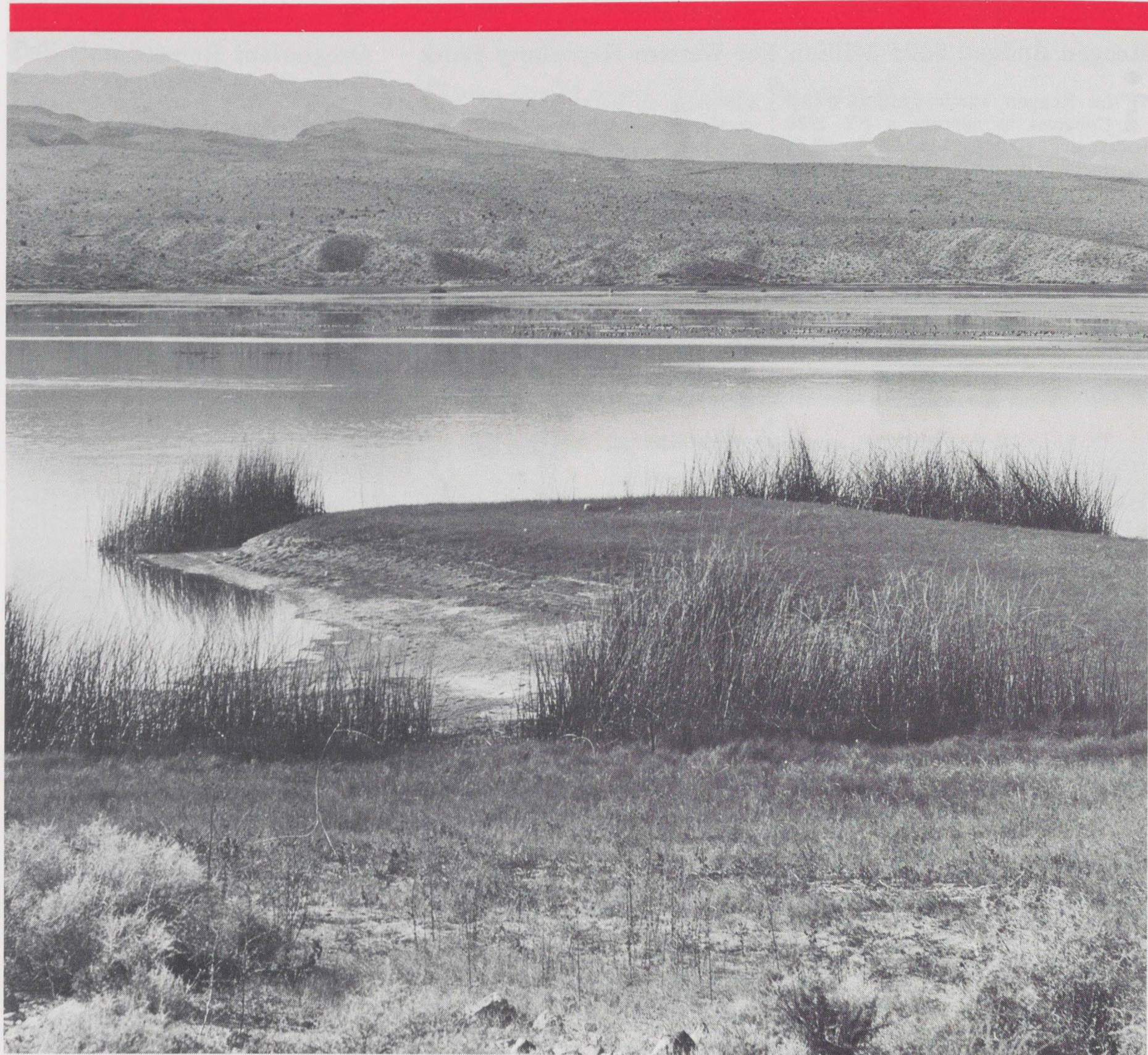
Readers of the *Nevada Nuclear Waste Newsletter* who desire additional information about issues or documents discussed in the *Newsletter* are encouraged to write to the offices listed below.

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

Department of Energy, Nevada Operations Office, P.O. Box 14100, Las Vegas, NV 89114. Phone 295-3521. □

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NEVADA MAGAZINE/DEPARTMENT OF TRANSPORTATION

Pahrnagat Lakes, 80 miles north of Las Vegas, are said to be fed by the carbonate rock aquifer that has scientists and officials so intrigued. If so, fact is much like the legend, which holds that the two lakes receive their water from an underground remnant of the ancient White River.

Nevada's Mysterious Subterranean Sea

Scientists say a massive underground reservoir sits under about half the Silver State. If so, tapping it could turn the desert into a garden. But dare we rock the boat?
By Rose Anne DeCristoforo

In the desert valleys of southern and eastern Nevada, where less than 10 inches of rain falls each year, there are green places where trees, grass, flowers,

and crops thrive on water that comes from huge springs. The mystery of these springs is that they flow even when there has been no rain for many months. Folk legend says the springs occur where underground rivers come close to the surface of the earth.

But Mother Nature has outdone the legend this time. Instead of rivers, a virtual ocean of water may lie under this most arid of deserts, a vast, almost unimaginable

source of new water that could forever change the shape of Nevada's political, social, and economic landscape. This is water that, because of what is called "the artesian effect," may rise naturally to the surface, even from great depths. And because the water is very old, it may also be very pure.

No one is sure what this water will mean to Nevada. Some people envision Las

Vegas doubling in size and Ely growing into a major city. Will it mean that Caliente can open a Wet 'n Wild water park for the benefit of its tourists? Should we look for water-dependant industries to migrate to Eureka and Pioche?

There are no answers yet. And the irony is that, even if the water is there, we may not be able to tap it at all.

Although the geologic formation that is said to hold the water is not fully understood, some experts describe it as "a giant bathtub full of crushed rock." The rock layer may be as much as five miles thick. In some places it is close to the earth's surface. In others it is so deeply buried that no wells have reached its bottom.

The Ruby Marshes are fed by springs originating in this formation, as is the Muddy river, which provides water for Glendale, Logandale, and Overton. Ely gets municipal water from one of these perennial springs, and the entire 30-mile length of the lush Pahrnagat Valley is made green by ancient spring water.

One of the first people to realize there was something curious about Nevada's bottomless springs was a young hydrogeologist named George Maxey. Maxey came to Nevada in the 1940s to map sections of the eastern Great Basin for the U.S. Geological Survey. He later founded the Desert Research Institute's Center for Water Resources. Maxey was in international figure in water planning. He served as president of the International Geophysical Union and received major national and international awards in his field.

In the early 1970s Maxey and a former student, Martin Mifflin, worked on a project in Mexico that led to the discovery of water in a carbonate aquifer. When the two men found themselves back in Nevada, they applied the lessons of Mexico to the Great Basin. They had noticed that the water "budgets" for many of the valleys in eastern Nevada didn't balance out. Some water basins contained more or less water than they should have had, based on annual rainfall. Water had to be traveling from one basin to another in the carbonate rock system. But how much water was there, and where was it going?

The springs, Maxey and Mifflin realized, were flowing from a thick layer of water-bearing limestone and dolomite that was laid down in eastern Nevada and western Utah 200 million to 500 million years ago. At the time a warm, shallow sea covered the area, which was at the western edge of the North American continent.

The rock beds were built up by marine life in the way coral reefs are created. Minerals precipitated out of the water in a Paleozoic Bahamas environment, and slowly built a 100,000-square-mile band of

rocks — half of it under present-day Nevada — that geologists call the Great Basin Carbonate Rock Province. The water was stored during the Pleistocene Epoch 10,000 to 25,000 years ago, when a wet climate left a third of the state covered with lakes.

In 1985, Maxey and Mifflin published a scientific paper describing the enormous potential of what has come to be known as Nevada's deep carbonate aquifer. In early 1977, Maxey died. Mifflin became a professor at the Desert Research Institute and now operates a private business in Las Vegas.

“

It is a major system that could provide hundreds of thousands of acre feet of water for hundreds of years.

”

Today, a decade later, there are many voices of caution, but excitement is growing about the aquifer's potential. It is "a major system" that "could provide hundreds of thousands of acre feet of water for hundreds of years," Robert Broadbent, then assistant secretary of the interior, told state legislators in 1985. Through the efforts of Broadbent, an Ely native who is now director of McCarran International Airport in Las Vegas, \$17 million in federal, state, and local money has been committed to probe the so-called "relic ocean" and determine its potential uses.

The existing data is impressive. Wells drilled into carbonate rock formations on the Nevada Test Site in the early 1960s revealed enough water under its desolate wastes to provide for the state's needs, at the present rate of consumption, for about 40 years. "However," a state report cautions dryly, "because this water is on a federal reservation and because this area is and has been involved in underground nuclear testing, this potential water supply might not be available."

And in 1979 Air Force researchers for the proposed MX missile system drilled into carbonate rock formations near Coyote Springs, 45 miles north of Las Vegas. One of their wells produced 3,400 gallons per minute for 30 days before it was capped.

Scientists believe the formation in Nevada tilts from the northeast to the south and

southwest, so that the water moves toward Southern California. It is generally agreed that the carbonates drain a significant amount of water into the Colorado River system near Las Vegas. Water also may seep into Death Valley from the area near the Test Site and adjacent Yucca Mountain. The possible impact of nuclear waste storage on the aquifer is one of the state of Nevada's key concerns in the selection of Yucca Mountain as a potential site for a high-level radioactive waste repository.

The U.S. Department of Energy says the overall effect of the proposed repository on the geohydrologic system will be evaluated as part of the Site Characterization Plan (SCP) currently being developed by its Nevada Nuclear Waste Storage Investigation Office. Specifically, it is tentatively proposing plans to assess the value of groundwater as a resource at Yucca Mountain, and to investigate the projected trends in local and regional groundwater development in that area.

The aquifer's storage capacity is unknown. USGS geologist Jim Harrill, project manager for the current government study, says there are other carbonate rock aquifers in the world, but that Nevada's is unique. For example, Florida's is 1,000 feet thick, while experts believe Nevada's may be up to 30,000 feet in depth.

"A lot of our investigation probably will be in shallow parts of the aquifer, in the upper several thousand feet and where carbonate areas are exposed at land surface," Harrill said. "We want to find areas where we can get access readily."

As part of the joint federal-state research program, another well will be drilled in the Black Hills-Corn Creek area near Indian Springs between Las Vegas and Yucca Mountain. Harrill and Mifflin agree the research is costly and must be conducted over a period of years before the volume and flow of the deep water can be charted completely.

"It is a complex problem," says Mifflin. "We know the flow systems are there. They are related to the carbonate rocks, but what we know is in broad generalizations. To go from that level of knowledge to finding the water is very difficult." Mifflin says reservoirs may be hidden in huge caverns that resemble Lehman Caves in eastern Nevada, but it is difficult now to predict where those may be.

Although flow patterns also are something of a mystery, scientists speculate that water coming out near Las Vegas may have entered the aquifer 25,000 years ago in the Elko area, 400 miles to the north. New water from more recent rain and snowfall may be behind it.

The question is, how far behind is the

Continued next page

DOE Balks at Nevada's Additional Budget Request

The Department of Energy refused to fund a portion of Nevada's grant request that was submitted after Yucca Mountain was selected for characterization as a potential high-level nuclear waste repository site.

Robert Loux, executive director of the Nevada Nuclear Waste Project Office, submitted a FY 1987 request for \$5.6 million in February 1986. After May 28, when Energy Secretary Donald Herrington named Yucca Mountain as a finalist candidate for the repository, Loux requested another \$4.6 million, largely to fund state technical and socioeconomic

studies deemed necessary during site characterization.

Donald Vieth, DOE's Nevada nuclear waste project manager, said the additional money was not available because of the budget cuts. He said he would not take the money out of his \$117.2 million budget for Yucca Mountain because he would have to lay off workers in Las Vegas and at national defense laboratories such as Los Alamos and Sandia.

Until Congress cut the DOE budget late in December, Vieth had expected to get \$176.5 million for the Nevada program, with \$5.6 million reserved for the

state. He said he did not reduce Loux's original request, but the additional request came too late.

Loux believes the additional money is available and he hopes to get it without going to court. Last year, a federal court upheld Nevada's claim that it should receive funds to do independent technical studies at Yucca Mountain to confirm the research being conducted by DOE. On May 28, the state filed a series of additional lawsuits challenging DOE's site selection program. The suits are pending in the 9th Circuit Court of Appeals.

Nevada's Mysterious Subterranean Sea

(Continued from previous page)

new water? Would it take 30, 50, 100, or maybe 1,000 years to deplete the aquifer? Nevada's low annual rainfall obviously would not replenish the supply if serious pumping begins. If new cities the size of Las Vegas spring up in eastern Nevada, their wells might run dry in a few hundred years. Such questions are being addressed by the joint USGS, DRI, and the Bureau of Reclamation team now studying the aquifer.

To further complicate matters, Nevada's water laws simply don't provide for the possibility of an underground sea. They assume that the only water up for grabs is what little falls out of the sky and lands in lakes, streams, and basins. The state's water laws also are designed to prohibit anyone from drilling a well to "mine" water that cannot be replaced by normal rainfall.

If water does run from one basin to another, as Mifflin and Maxey concluded, there is cause for concern among those whose job it is to keep it all straight.

State Water Engineer Pete Morros, whose delicate charge is the allocation of water in this dry state, suspects that the eastern basins' water budgets don't add up because ground-water supplies and the carbonate aquifer are connected. Morros is worried that a push to mine water from carbonate rocks could endanger the flow from traditional sources, including the springs upon which communities like Ely depend. He says that before he allows anyone the right to use water from the carbonate aquifer he must have "a clear understanding of the effect on existing rights."

From the perspective of central Nevada, Nye County Planner Steve Bradhurst also has expressed concern. He worries that drawing water out of the carbonates to quench a thirsty Las Vegas might result in

what he calls "another Owens Valley situation," referring to the California valley whose water goes south to Los Angeles.

Metropolitan Las Vegas and the Reno-Carson City areas are among the fastest-growing in the country. Both face the pro-

“ Nevada's water laws simply don't provide for the possibility of an underground sea. The only water up for grabs is what little falls from the sky. ”

blem of finding water to supply the new residents. Is it possible that sometime in the future these cities, following the Los Angeles tack, could build an aqueduct system that would bring precious water from an eastern Nevada source?

Other states do allow the mining of water. In Florida and Texas deep aquifers have been tapped. Mifflin has studied the Florida carbonates, which supply water for Miami and other areas. Some of the problems he observed there include declining water quality, sinkholes, and lower water tables.

Mifflin says decisions about whether to mine the water under Nevada cannot be made until the extent and character of the aquifer is better understood. "Our proposal was to develop this information before the crunch hits," he explains.

If the state's leaders can predict how long

the water will last and what will happen if it is taken out, they may decide to tap the aquifer, Mifflin predicts. "Using the water would be just like using oil, coal, and minerals," he says. "We don't stop mining those just because we have a limited supply."

Mifflin says he doubts that the carbonate rock aquifers will really be understood until they are developed experimentally. Such a program should, among other things, pump a well field for 10 to 20 years, he says.

"This is not a simple scientific challenge. It has to be blended in with actual water demand. You can't just let the water run on the ground. We have to truly marshal the resources in a wise manner," Mifflin says.

In the meantime, Pat Pine, who manages the Las Vegas Valley Water District, says, "I am preparing my people for possible disappointment." Pine says Elko and Ely could turn out to be the only places in the aquifer that can be tapped without upsetting existing rights. Las Vegas need to know if this is the case soon, Pine says, "because until they are told the water isn't there, they won't look for other solutions to the problem." problem."

"It's our children's future. We have an obligation to them to think about these issues, even though it is the human thing to wait until there is a crisis," he says. "In the water business you have to look 40 years down the road, but right now people are saying, 'Don't worry, there's this vast underground sea.'" □

Rose Anne DeCristoforo is founder and former editor-publisher of the Nevada State Recorder. She currently is a freelance journalist and consultant. The above article, with minor additions and deletions, was published in the October 1986 edition of Nevada Magazine.

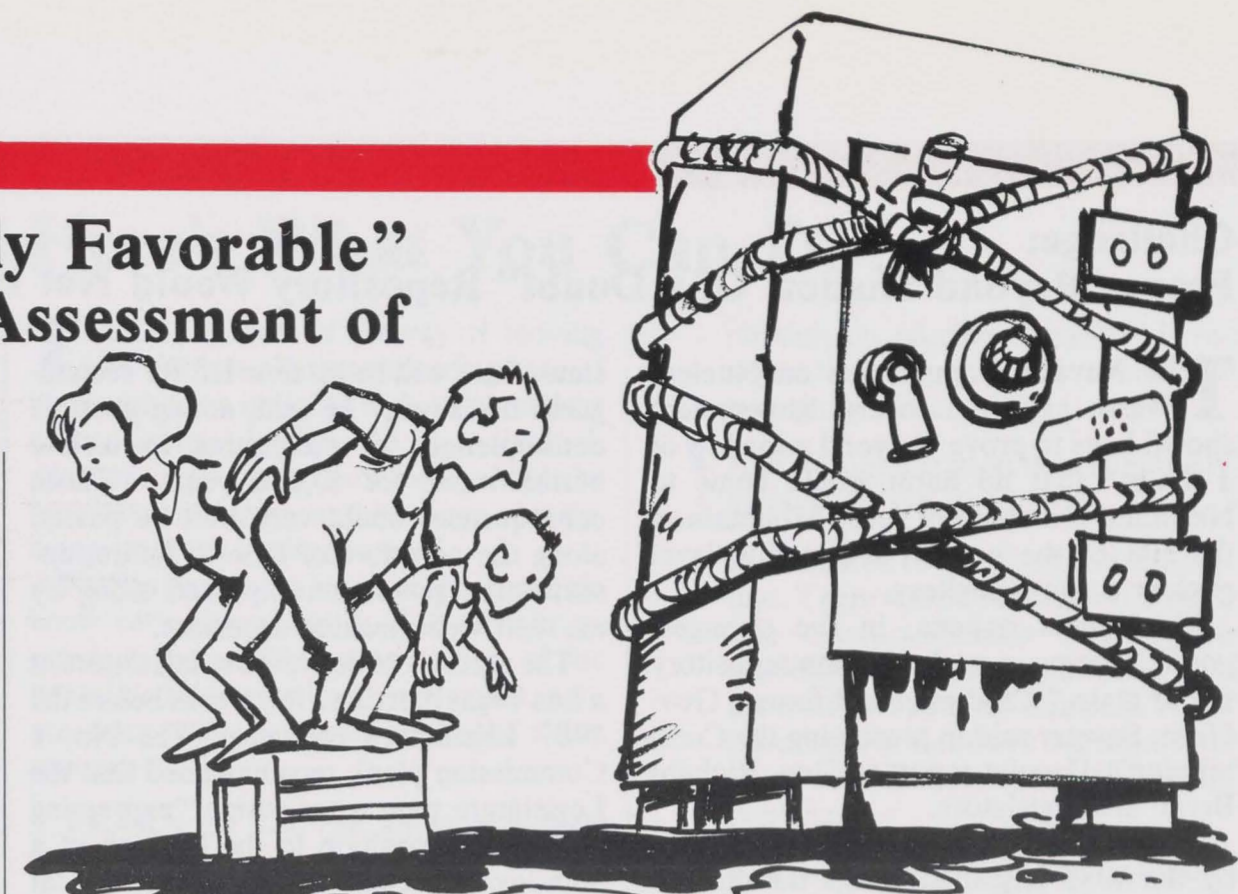
NRC: DOE "Overly Favorable" In Environmental Assessment of Yucca Mountain

In mid December the U.S. Nuclear Regulatory Commission (NRC) completed its review of the Environmental Assessment of Yucca Mountain. On May 28, 1986, Department of Energy (DOE) issued the final Environmental Assessment to support its selection of three sites (Yucca Mountain, Deaf Smith and Hanford) for site characterization. The NRC has ultimate responsibility for the licensing of the nation's first repository to accept nuclear spent fuel and high-level radioactive waste. These comments are part of NRC's continuing effort to identify and resolve potential licensing issues early.

In NRC's view, the final EA is "still overly favorable or optimistic" for the areas of technical concern. They conclude that concerns still remain that focus on "1) not identifying the range of uncertainties associated with the existing limited data base, 2) not identifying the range of alternative interpretations and assumptions that can be reasonably supported by existing data, and 3) not incorporating a reasonable range of uncertainties and alternative interpretations into evaluation and conclusions."

The NRC acknowledges that "at this stage of the site investigation and screening process there is inherent uncertainty in site information that can lead to alternative interpretations of data. Furthermore, resolution of uncertainties — such as those identified in our comments — must await detailed site characterization. However, recognition of these uncertainties and alternative interpretations is critical to the development of test plans that will lead to adequate characterization of sites and result in the information needed for licensing."

The review document contains nine major comments authored by NRC staff. Three of the comments address faulting at or near Yucca Mountain. Staff contends that literature evidence suggests that faults in the vicinity of Yucca Mountain should be considered to be potentially active. The high state of stress measured on Yucca Mountain suggests that north-south trending faults could be reactivated by nuclear weapons tests. Further, the omission of a comprehensive discussion of northeast-trending strike-slip faults reflects an inadequate recognition of the current uncertainties regarding the nature and rates of fault movement. Also the final EA fails to acknowledge U.S.



Yucca Mountain: "Safe" for NRC License?

Geological Survey literature which suggests that detachment faulting may be a much more important element in the tectonic setting of Yucca Mountain than previously believed.

Another NRC comment raised concern that the potential for hydrothermal activity, which is often associated with volcanic activity, was not addressed in the final EA. Staff contends there may be potential for hydrothermal activity and hence the potential for such activity to create new flow paths and adversely affect the waste package.

Staff also raised concern that an analysis of historical mining and prospecting in the area of Yucca Mountain was not sufficient to assess economic potential inasmuch as natural resource exploration has been banned within the Nevada Test Site for over 30 years. The EA did not recognize the direct knowledge currently available about natural resources at Yucca Mountain and overlooks various indirect lines of evidence which suggests the presence of significant economic natural resource potential.

Concern was expressed that because the ability of the geochemical system to effectively retard radionuclide migration was highly speculative, it is not unreasonable to assume significant increases in radionuclide transport to the accessible environment due to changes in climate or geohydrologic conditions.

Staff also questioned DOE's confidence in the calculation of groundwater travel time. They stated that the "many assumptions, hypotheses, and approaches used in the analysis did not incorporate uncertainties associated with available data." The specific problems relative to the calculation of groundwater travel time are 1) uncertainties affecting the groundwater travel time calculations; 2)

uncertainties connected with parameters input to models as random variables, and 3) uncertainty with regard to vertical movement of groundwater. Staff cautioned that the use of 0.5 mm/yr for an upper bound for flux for groundwater travel time is not substantiated and that higher values should be considered. Their review further suggests that under certain conditions fractures flow could occur at flux values less than 0.5 mm/yr, thereby producing groundwater travel times of substantially less than the 1,000-year travel time required by EPA.

The staff questioned the two mechanisms — matrix diffusion and sorption — which would diminish radionuclide releases to the accessible environment. NRC suggests that colloids present in the groundwater may lessen the effectiveness of matrix diffusion for retarding radionuclide transport and may in fact enhance migration. Research described in scientific literature suggests that zeolites and clays are not effective sorbers of plutonium or americium, major elements in radioactive waste.

The NRC's final major concern is that the 3,000-year waste package container life proposed in the final EA is neither realistic nor conservative. Research conducted by NRC contractors for a range of simulated Yucca Mountain environments confirms the overestimation of the waste package lifetime. In their view, the EA should fully acknowledge the uncertainties in current waste package analyses and the limited data base available.

The Nevada Agency for Nuclear Projects is in total agreement with these comments and concerns. The state's comments on the final EA for Yucca Mountain are being assembled and will be issued in a matter of months.

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Nevada Nuclear Waste Newsletter

Vol. 3 No. 2

July 1987

Bills Propose Moratorium And Review of DOE Repository Program

Two bills introduced in Congress July 1 call for a moratorium during which a special commission would review the Department of Energy's (DOE) efforts to construct the country's first high-level nuclear waste repository.

Similar House and Senate measures would create a commission with subpoena power to investigate cooperation and conflicts between the federal government and affected states and Indian tribes. The commission would make recommendations to Congress concerning DOE's existing program.

The moratorium would halt all site-specific work on potential sites for a repository or a monitored retrievable storage (MRS) facility. As proposed by DOE, the MRS would serve as a handling facility for waste bound from commercial nuclear power plants to a permanent repository.

The House bill's chief sponsor was Rep. Morris Udall, D-AZ, often called the father of the Nuclear Waste Policy Act of 1982. Chief sponsors of the Senate version were Sens. James Sasser, D-TN; Harry Reid, D-NV; Brock Adams, D-WA, and George Mitchell, D-ME.

Udall drafted his legislation after the House voted to continue the ban on DOE drilling of exploratory shafts at potential repository sites at Yucca Mountain, NV; Hanford, WA, and Deaf Smith County, TX. At the time, he said he had "about given up" on the Department's ability to provide a repository for the nation's high-level radioactive waste.

"There is no hope of making it (the Act) work. I'm ready to go back to Square 1."



The House-approved spending bill contained \$500 million for the nuclear waste program, but added that "no funds are provided for drilling of any exploratory shaft at any site." That would continue for next fiscal year the restriction already in effect for the current year. The House also earmarked \$24 million for work on a second repository that would be located in the eastern half of the country. In May 1986, Energy Secretary Herrington named the final candidate sites that will be characterized as possible first repository locations, and announced the program to find a second repository site was halted indefinitely. Western states immediately claimed the halt was politically designed to take the heat off candidates in populous eastern states.

Many members of Congress, as well as officials of affected states, have looked to Udall for direction on how to handle the controversy over DOE's siting program. Nevada Gov. Richard Bryan said Udall reiterated what DOE critics have been saying all along—that the siting program is fatally flawed. In May, Bryan testified before

the Senate Energy Committee, headed by Sen. Bennett Johnston, D-LA, who also is a member of the Appropriations Committee that must review the House spending recommendations. Bryan recommended a moratorium and the creation of an independent repository investigation commission.

Bryan submitted a lengthy report detailing Nevada's objections to DOE's siting guidelines, concerns over hydrologic and geologic conditions at Yucca Mountain, and claims that DOE frequently had failed to comply with the Act.

Bryan, along with representatives of Texas and Washington, told Johnston they did not approve of his bill that would offer an inducement of \$100 million a year to a state or Indian tribe willing to accept a high-level radioactive waste dump. It also would offer \$50 million to the host of the proposed MRS. Bryan termed it "nuclear blackmail" and said, "You can't just buy public trust and confidence."

Issue Highlights

- 2** Bullfrog County created to get Yucca Mountain funds
- 4** Nevada criticizes DOE, plans own study.
- 6** Nuclear fuel reprocessing — Alternative to repository?
- 10** Contamination from bomb test or repository — What's the difference?

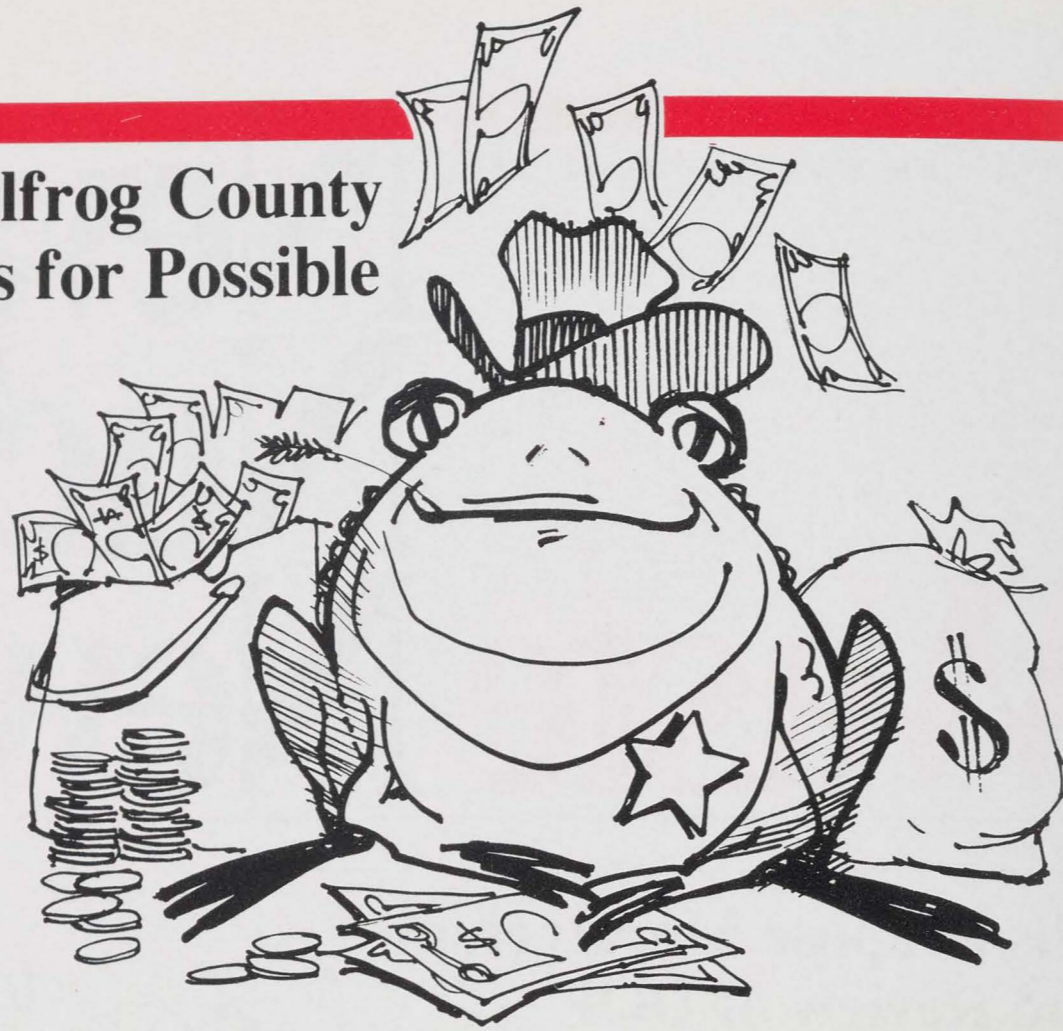
Legislature Creates Bullfrog County to Receive GETT Funds for Possible Yucca Mountain Dump

The 1987 Nevada Legislature processed numerous bills concerning transportation and handling of hazardous waste, and created a new county to receive grants equal to taxes on a potential repository at Yucca Mountain.

Several measures resulted from interim studies by a legislative committee on radioactive waste. A key bill authorizes the Highway Patrol to regulate vehicles transporting waste, establishes a repository for information concerning hazardous materials, requires notification be given before hazardous materials are transported into the state, creates a contingency fund, provides for training and equipping state and local personnel to respond to accidents, and establishes liability for spills or accidents involving hazardous waste.

One bill requires the state Transportation Department to develop plans for routing shipments of hazardous waste within the state. Another directs the Nuclear Waste Project Office to study the regulation of transportation of high-level waste and develop a plan for the 1989 Legislature.

The Legislature considered various proposals to get the most revenue from Yucca Mountain, should it become a repository. Nye County advocated a constitutional



amendment that would raise the tax rate to the constitutional maximum of \$5 per each \$100 of assessed valuation. This would be the basis for submitting a request for funds under the Grants Equal To Taxes (GETT) provision of the Nuclear Waste Policy Act, which says the Department of Energy may approve such grants retroactive to May 1986 when site characterization began. The grants would be based on the amount that could be raised from taxation if the repository were a private operation.

Ultimately, the Legislature approved the

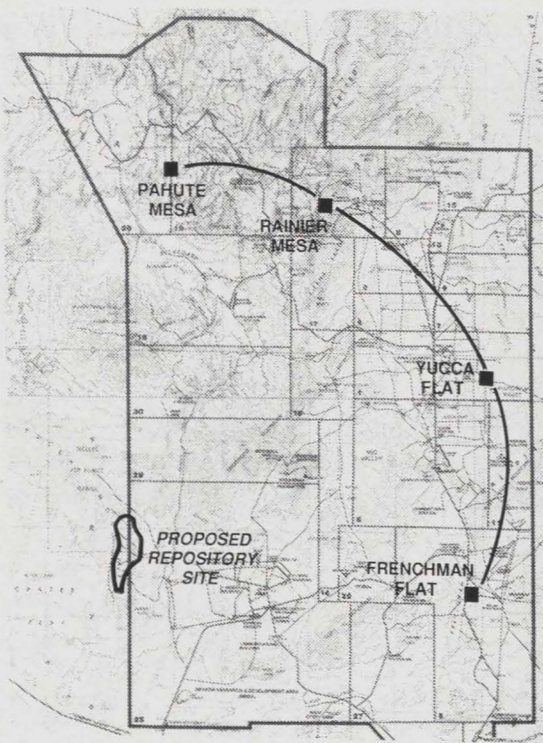
"Bullfrog County" bill. It immediately raises the tax rate to \$5 in a new county carved from Nye County and embracing the Yucca Mountain repository area. GETT funds would go to the Bullfrog County Commission. Since there are no residents of the new county, the commissioners and other county officials would be appointed by the governor. The commission could turn over the grant funds to the state or to "any private, non-profit agency." Proponents of the Bullfrog plan say this plan would raise more money for the state than would any other.

Yucca Mountain: Better for Nuclear Testing than for Nuclear Waste?

Should Yucca Mountain be disqualified as a potential site for a high-level radioactive waste repository because of nuclear weapons testing at the adjacent Nevada Test Site?

The Nuclear Waste Policy Act of 1982 required the Department of Energy (DOE) to draw up guidelines for the nomination and recommendation of potential repository sites for site characterization. The Act says the guidelines must specify factors that qualify or disqualify any site from development as a repository, "including factors pertaining to the location of valuable natural resources, hydrology, geophysics, seismic activity, and atomic energy defense activities."

Under these guidelines, "a site shall be disqualified if atomic energy defense activities in proximity to the site are expected to conflict irreconcilably with repository siting, construction, operation, closure or decommissioning."



Since 1951, nuclear testing has ranged along an arc from Frenchman's Flat on the southeast to Pahute Mesa on the northwest. The map shows the relationship of proposed Yucca Mountain repository to nuclear testing, including current weapons-effect tests inside Rainier Mesa.

Since the Nevada Test Site was commissioned in 1950, tests have been conducted along a southeast-northwest arc about 25-30 miles from Yucca Mountain. The first tests were on the eastern end of the arc. As the program used up more and more land, testing moved northwest as far as Pahute Mesa. Weapons-effect tests currently are conducted in tunnels at Rainier Mesa on the northern end of the arc.

Rainier Mesa is volcanic tuff, as is Yucca Mountain. Recent accidents at Rainier Mesa have caused concern that future testing may not be safe because repeated underground tests have fractured the upper layers of the tuff. In 1984, the ground above the "Midas Myth" test site caved in, killing one person and injuring 13. The DOE said a possible cause was the "compromise of the welded tuff caprock integrity. . . from repeated nuclear detonations." In 1986, partial failure of an integral shield system during the "Mighty Oak" test resulted in radiation and heat damage totaling \$32 million to experimental and diagnostic equipment.

Rep. Mike Lowry, D-Wash., said he has asked DOE for an explanation of past and

potential problems at the mesa. He questioned department assurances it is safe for future testing. He said there is a "high probability" of an accident due to problems with the structural integrity of the rock. He said workers at the test site and the population over a large area could be exposed to radiation in the event of such an accident.

Jack Evernden, a government geophysicist and seismologist who is a leading authority on detection and identification of underground nuclear blasts, said in a newspaper dispatch the tests should either be conducted deeper in the ground or moved to another location, but that digging deeper costs more "and even nuclear tests don't have unlimited budgets."

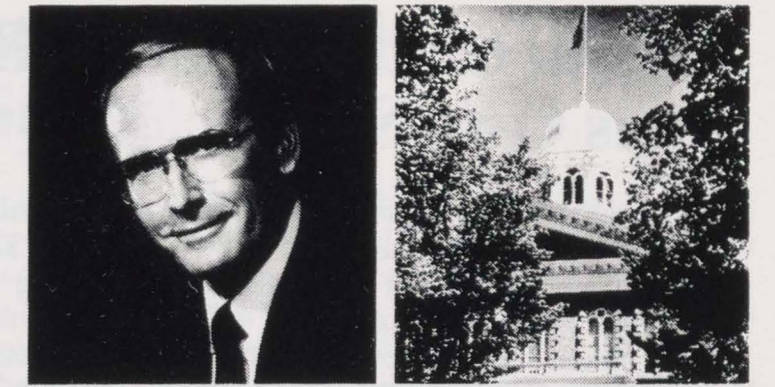
The Nevada Test Site is the only location in the country used to test effects of nuclear blasts on complex military-related equipment, including "Star Wars" systems. More than 50 such tests have occurred in a tunnel complex at Rainier Mesa since 1957. Other blasts, such as those to test stockpile weapons, are conducted in vertical shafts drilled elsewhere on the reservation. Both DOE and the Defense Department contend there is no safety problem at the mesa. But if one should develop, how would it affect a repository at Yucca Mountain? And if DOE eventually must abandon Rainier Mesa, where would it look for new testing space? When the search for the country's first nuclear waste repository began, DOE officials scoured the test site for suitable locations. In fact, they say their experiment in a mine on the site proved that spent fuel could be stored safely in granite. (Nevertheless, DOE halted the siting program for a second repository in crystalline formations in the East and recommended characterization of three western sites in unproven tuff, salt and basalt).

Robert Loux, executive director of the Nevada Nuclear Waste Project Office, says the state believes that under DOE's own siting guidelines Yucca Mountain meets the disqualifying condition concerning the effect of nuclear testing upon a nuclear repository.

"Despite DOE and Defense Department assurances to the contrary, there appears to be evidence that Rainier Mesa is crumbling under the bombardment of repeated nuclear tests," he said. "The testing program is vital to the nation's defense and, during the lifetime of a repository, it may become necessary to move the testing from the mesa."

"It has been mentioned that Yucca Mountain may offer the best rock for a new site. There are many areas in the country where a repository could be constructed, but there are no areas where another nuclear test site could be developed. Looking to the future, the priority for Yucca Mountain might well be nuclear testing, not nuclear waste. These two activities simply are not compatible."

Governor's Statement



The mass of legislation before the Congress reflects growing concerns that the high-level nuclear waste repository program has failed and something must be done to get it back on track.

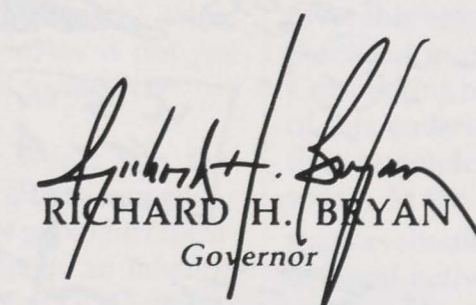
There now appears to be widespread recognition that the Department of Energy's siting guidelines are flawed, that political expediency has been the driving force in choosing the three candidate repository sites that include Yucca Mountain, and that DOE has violated the Nuclear Waste Policy Act in a predetermined program to select those sites. DOE's failed stewardship has left the repository effort in shambles.

I commend the Congress for the introduction of legislation calling for a moratorium and independent review of the DOE program, as I requested in testimony before congressional committees. During the moratorium on site-specific activity, a commission would review the existing program and make recommendations to Congress. The commission would have subpoena power to "investigate cooperation and conflicts" between the federal government and the affected states and Indian tribes.

There are numerous other bills pending that deal with the pressing problem of how to dispose of the nation's nuclear waste. Some of this legislation is an honest effort to solve the problem fairly within the framework of the Act. Some bills, however, are merely the "not in my backyard" variety and should be dismissed accordingly. Measures that would provide financial incentives for a state to volunteer to accept a repository also are deficient, since they overlook the need for scientific judgment in determining site suitability.

A congressional decision to go back to the beginning to review the repository effort to date is necessary to regain the confidence of the public in the government's ability to carry out this difficult task. Public confidence is essential. It cannot be bought with legislation that would pay a state to accept a repository that may not be able to isolate the waste for the required 10,000 years.

The proposed moratorium would provide additional time to allow our best people to review the program, see what went wrong, and determine how to fix it — with safeguards against the same administrative actions that have caused the present debacle. This should provide a fair, scientific and equitable solution to a problem that has plagued the country since the dawn of the Atomic Age. Isn't that what we all want?


RICHARD H. BRYAN
Governor

Nevada Criticizes DOE Environmental Activities, Plans Own Study

The state Nuclear Waste Project Office (NWPO) will undertake its own environmental program at Yucca Mountain because the Department of Energy (DOE) has not conducted a comprehensive environmental survey and has not always complied with state and federal environmental requirements.

"We are continuing efforts to document past DOE geologic and hydrologic activities at Yucca Mountain but we are receiving increasingly less cooperation from DOE as more is learned of past oversights," said Charles Malone, chief of NWPO environmental studies.

"Under pressure, DOE has said it will apply for water rights at the proposed repository site, but when asked repeatedly about compliance with other state environmental regulations, DOE refused to comment other than to say 'DOE will, in accordance with standard procedure, take whatever steps are necessary to protect the environment.'"

Nevada submitted a grant request for about \$2 million to fund the study which, among other things, would provide an environmental baseline for evaluating impacts of site characterization activities at the site.

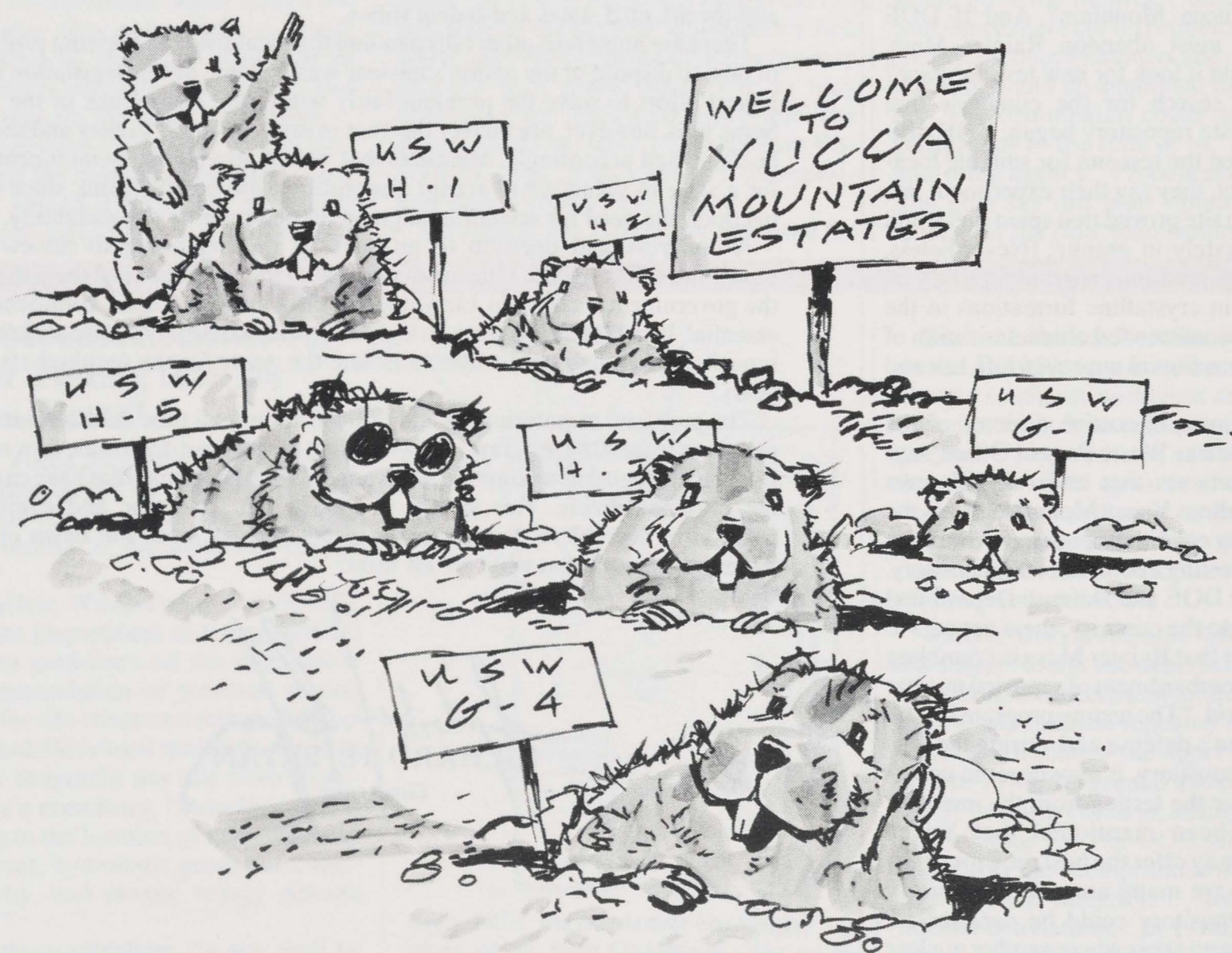
Efforts to document environmental protection and compliance measures associated with DOE activities disclosed:

- Approximately 180 holes have been drilled.
- Perhaps as many as 15 geologic trenches have been excavated.
- Several hundred miles of seismic lines have been surveyed.
- These activities and associated access to them may have resulted in as much as 300 to 400 acres of surface disturbance over the affected area. Over 10 percent of the activities were outside the 27.5 square mile environmental study area.
- Archeological surveys and studies in

compliance with regulations were conducted prior to site disturbance and a state permit was obtained for the studies.

- Biological surveys and studies in compliance with regulations were performed prior to sites being disturbed in 1982 and 1984. The number of locations and extent of area involved are not known. The environmental contractor obtained the necessary state approvals for the biological investigations.
- Sites of drilling and other activities conducted during 1983 were not surveyed by the environmental contractor in accordance with regulatory requirements prior to disturbance and resources at the sites were destroyed.
- The environmental contractor reported these violations and numerous impacts at Yucca Mountain including destruction of species protected by Nevada law,

4



"WE COULD NEVER DIG HOLES AS GOOD AS THESE. AND DOE DID ALL THE WORK."

Nevada Nuclear Waste Newsletter

loss of catchment basins used as water sources by wildlife, failure of construction contractors to reclaim large numbers of abandoned sites, and breaching of waste disposal ponds containing spent drilling fluids and related hazardous materials that contaminated natural drainages and destroyed biota in the path of the waste flows.

- Water rights, drilling permits, and other regulatory authorizations required by the state were not obtained for constructing wells.
- Appropriate regulatory approvals were not obtained where well logging with radioactive sources was conducted and radioactive materials may have been lost in some wells.
- Iodine-131 was injected into some wells, a procedure which may violate provisions in NWPA requiring that any radioactive material used at a site be fully retrievable and removed when siting research is completed.
- As much as 60,000 barrels of drilling fluids were lost belowground during drilling operations.
- DOE apparently did not follow or comply with its Environmental Checklist and other internal procedures and orders established to document NEPA compliance.
- In violation of NWPA, study plans for site characterization activities conducted since January 1983 were not issued by DOE for review by the NRC and the State.

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

Department of Energy, Nevada Operations
Office, P.O. Box 98518, Las Vegas, NV
89193-8518. Phone (702) 295-3521. □

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The Condemnation Principle In Repository Siting

The Nuclear Waste Policy Act of 1982 sets forth a process to site two high-level radioactive waste repositories. The siting is based on systematic and sequential screening of sites in various geologic media to identify the most suitable—the "most suitable" meaning the site that will do the best job of protecting the public health and safety and the environment. Since 1983, the State of Nevada has questioned the approach taken by the U.S. Department of Energy (DOE) to determine sites suitable for geologic repositories. Siting studies at Yucca Mountain since 1976 have consumed large amounts of money and scientific manpower. The "exploration budget" for past and projected work exceeds the expenditure of all but the largest mining and petroleum companies, yet much of the work is identical. This article compares the DOE approach to siting with that of industry.

Industry Approach

To succeed and survive, mining and petroleum companies are constantly searching for new reserves. While there are still a few lucky finds in remote areas, most of the economic discoveries result from systematic application of geologic, geophysical and geochemical techniques in an orderly process. The exploration manager in charge of the process has a budget and must maximize returns within its constraint. He knows that a "dry hole" costs about as much as a discovery, so he becomes tight-fisted and wary about spending money on anything but a sure winner. No winners mean no job and eventually no company. While scientists in the field and laboratories can—and should—be optimistic about a prospect, the project manager practices "condemnation." That is, he constantly searches for the fatal flaw to the point of spending money to prove that a location cannot be developed at a profit. This allows him to abandon the prospect and use his money and talent someplace else. Cutting losses is not just good business; it is critical to survival.

DOE Approach

Congress, in so many words, has told DOE there will be as much money as needed to prove up sites for geologic repositories. This generosity carries an inherent risk in that the rewards for DOE and its contractors compete not from discovery but from lack of discovery of disqualifying evidence. Without a funding constraint, at least at the level of industry's constraint, there is less incentive to practice the condemnation principle, and more to expand and prolong the study. DOE takes great pains to work objectively and credibly, and to document

its geotechnical findings, but the site studies move slowly and expensively by comparison to industry practice.

An Industry Approach to "Repository Exploration"

An exploration manager would look at the current evidence for a site and propose of condemnation. One logical target would be faulting and fractures at, above, and below the repository horizon. With the goal of saving something like \$1 billion and five years time, an expenditure in the tens of millions of dollars would be justified. While faults are not necessarily groundwater pathways, they may be, and only a scientifically based, well-focused exploration program can provide solid answers.

The Nevada Agency for Nuclear Projects has identified a number of concerns with the Yucca Mountain site. Active faulting, natural resource potential, risk from volcanic eruption, conflict with nuclear weapons testing and groundwater movement through the unsaturated zone are a sampling of these concerns, some of which are potential fatal flaws. While the evaluation of these concerns is neither cheap nor easy, it is the prudent course of action to identify any fatal flaws. If flaws are so identified, then the site should be abandoned with haste.

Conclusion

The DOE Yucca Mountain geotechnical approach is patterned not on industry, but on academia. Everything is studied in parallel. The results are descriptive reports of which there are hundreds already. This approach creates a large body of employment and increases knowledge, but only toward the end of the site characterization process in the mid-1990s is there likely to be a definitive answer on the capability of the geologic repository to safely isolate the waste from the public and the environment. At that time, the findings, if considered favorable by DOE, would have to be defended in protracted licensing hearings. Considering both cost, time and importance of this undertaking, use of the condemnation principle is responsible and justified today. At the very least, DOE and its contractors should be in a different reward system and actively looking for disqualifying conditions.

This article by Carl Johnson, NWPO Technical Studies Division director, was modified from a report by Dr. Bill Brewer of the State of Washington High-Level Waste Management Office.

Nevada Nuclear Waste Newsletter

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Nuclear Fuel Reprocessing — An Alternative to the Disposal of Spent Fuel Elements in Geological Repositories

Comments received by the Nuclear Waste Project Office indicate that many people believe that nuclear fuel reprocessing—the recycling of spent fuel for valuable elements — would be a viable alternative to disposing of spent fuel in underground repositories. After all, they reason, it would conserve the supply of valuable uranium and plutonium, rather than burying large amounts of these valuable elements that are not fully “burned” in commercial reactors. Some believe that removal of long-lived plutonium from spent fuel would eliminate a major biological hazard contained in the geologic repository. Removal of uranium and plutonium from spent fuel would sharply reduce repository

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Reprocessing is more than a technical and economic issue. Because of nuclear weapons, it is also a political issue.
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cost since it would not require emplacement of waste canisters in a manner suitable for possible future retrieval for reprocessing.

Indeed, total reprocessing of spent fuel would be an alternative to the disposal of spent fuel or of high level waste in a deep geologic repository such as is considered for Yucca Mountain. However, reprocessing in the U.S. is currently done only for the defense program to recover weapon grade plutonium or highly enriched uranium. Reprocessing for commercial purposes is not considered economical and neither the nuclear power industry nor the Department of Energy (DOE) is interested in pursuing the option. Commercial fuel reprocessing is performed in other countries such as France,

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Great Britain, and the Soviet Union. Japan and West Germany are developing their capabilities.

Nuclear fuel reprocessing is not just a technical and economical issue. Most important, because of the awesome power of nuclear weapons, it is a political issue. Therefore, it is important to keep in mind some historical developments. It was recognized early in the days of the Manhattan Project that the man-made element plutonium could undergo fission more readily than the naturally occurring isotope 235-uranium. Plutonium could be separated chemically from 238-uranium, the element from which it was made by neutron bombardment, whereas 235-uranium could only be isolated from 238-uranium by isotope separation techniques which were energy consuming and inefficient. Because plutonium is more readily fissionable than 235-uranium, the critical mass of a plutonium nuclear weapon is also significantly smaller. This discovery led to the construction in 1944 of the Hanford facility which consisted of nuclear reactors and the first fuel reprocessing facility. The Trinity weapon, the first nuclear weapon detonated in New Mexico in July 1945, was a plutonium bomb. Nuclear power scored great successes in naval submarine propulsion during the 1950s which gave impetus to the development of commercial nuclear power for electricity in the early 1960s. The electric utilities began ordering significant numbers of large nuclear power plants by the end of that decade. The projections called for the construction of over 200 large nuclear power plants that would generate close to 50 percent of the electrical needs of the country. A vision for the breeder reactor

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Congress cancelled the breeder reactor, and attention shifted toward disposal instead of reusage.
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and for commercial fuel reprocessing for plutonium and unspent uranium arose at the same time because the reserves and supplies of uranium were considered inadequate to support such a large nuclear electrical industry. A small reprocessing plant had been built and operated prior to the surge in reactor orders at West Valley, NY. Construction on a much larger reprocessing plant was started at Barnwell, SC, in the early 1970s. By the mid-1970s, an awareness that a large nuclear power industry

with a breeder reactor and with fuel reprocessing for plutonium could lead to the proliferation of nuclear weapons became a dominant issue, and shortly after his inauguration, President Carter adopted a national policy of no commercial spent fuel reprocessing. The facility at West Valley was shut down and construction of the Barnwell plant, which was in an advanced stage of completion, was halted. In 1981, shortly after his inauguration, President Reagan lifted the policy of no commercial spent fuel reprocessing. However, by that time the cost of nuclear power as well as the cost of commercial fuel reprocessing had become prohibitive, and with the cancellation of about 100 large nuclear power projects and the discovery of large uranium reserves producible at low cost in Canada and Australia, the shortages of uranium fuel had

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The U.S. could become a 100% importer of uranium before the first repository is full.
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disappeared. Congress cancelled the breeder reactor since it no longer made sense. There was no desire left to complete the Barnwell plant and to apply for an operating license. Reopening and relicensing of the West Valley Plant had also become uneconomical. The issues and the attention had shifted toward disposal of commercial spent fuel elements in a geological repository. The Nuclear Waste Policy Act of 1982 (often referred to as the Act) provided siting and scheduling guidelines for the first two geological repositories for commercial spent fuel and high-level waste. The Act stipulated that the cost of constructing the first repository be born by the nuclear utilities and the generator of high-level waste, and that the DOE, which was designated to search and build the first repository, start taking ownership of the commercial spent fuel by 1998 from those utilities that accepted the fee clause.

With regard to uranium reserves, it must be pointed out that domestic supplies can only meet the nation's need for the No New Order scenario (i.e. no more orders of new nuclear power plants). For the Upper Reference scenario, which is the basis for the spent fuel projections in the amendment to the Mission Plan and which assumes a substantial order of new nuclear power plants beginning in the late 1990s (close to 100

modern plants), the known domestic reserves will be exhausted by the year 2015. The United States will have to become a 100 percent importer of uranium before the first repository is full or it must adopt fuel reprocessing.

At present, all the nuclear utilities have accepted the fee clause stipulated in the Act and have thus indicated a desire of transferring ownership of the commercial spent fuel to the DOE as soon as possible. This desire can also be interpreted as a reaffirmation that the nuclear industry does not want to try again commercial spent fuel reprocessing. The DOE, by zealously carrying out its mission outlined in the Act, has also indicated that it does not want commercial fuel reprocessing. In fact, by 1998 the DOE will start being the owner of all commercial spent fuels in the United States and the decision of advocating or opposing commercial spent fuel reprocessing will be DOE's issue only.

It must also be emphasized that commercial fuel reprocessing is currently uneconomical. There are adequate supplies and reserves of uranium to support all the nuclear power plants, existing and under construction, through their operating lifetimes. Thus, even if commercial fuel reprocessing were going on, there would probably be no demand for using the plutonium in nuclear reactor fuel. Plutonium from commercial spent fuel is not suitable for nuclear weapons. However, new isotope separation techniques that make use of laser light have been tested in the laboratory. The techniques are only experimental at present, but, when further developed, they will make it possible to separate the various isotopes of plutonium and thus transform plutonium from commercial fuel into weapon grade

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The plutonium obtained would have to be stored in a very safe place to prevent theft.
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plutonium. The DOE abandoned one or two years ago the further construction of a multi-billion dollar centrifuge plant for the separation of isotopes of uranium at Portsmouth, OH, in part because of rapid developments in laser separation techniques. In fact, the DOE has been entertaining the notion of going before Congress and request \$6 billion for a new reactor that would replace the N-reactor at Hanford and the aging reactors at Savannah River. Some

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critics have argued that this is a waste of money and that the DOE should develop the laser separation technique and use it to transform the recycled plutonium from commercial spent fuel into weapon grade plutonium. The plutonium obtained from the reprocessing of commercial spent fuel would have to be stored in a very safe place to prevent its theft. The argument can be advanced that unused plutonium is safer in the spent fuel elements which cannot be stolen because of the high radiation field that they produce.

The NRC's regulations on the disposal of high-level radioactive wastes in geologic repositories have a clause which, if technically feasible, would allow the DOE to

change its position on commercial fuel reprocessing several decades from now. The clause has been written ostensibly to protect public health and safety considerations should there arise doubt about the performance of the repository, not to make reprocessing feasible in the future. Regulation 10 CFR 60.111(b), retrievability of waste, requires that "the geologic repository operations area shall be designed so that any or all of the emplaced waste could be retrieved on a reasonable schedule starting at any time up to 50 years after waste emplacement operations are initiated, unless a different time period is approved or specified by the Commission." However, it is not at all clear that the retrievability clause will

be technically feasible or that the DOE is giving it the proper attention. Experiments with electrically heated canisters at the Waste Isolation Pilot Plant (WIPP) in New Mexico can be interpreted as indicating that retrievability in salt, if at all possible, is only feasible for at most a few years following emplacement of the canister. For the Yucca Mountain site, the site characterization period is too short to perform meaningful experiments. Furthermore, the analysis used to justify the selection of the three sites of Yucca Mountain, Hanford, and Deaf Smith County (report DOE/RW-0074, *A Multiattribute Utility Analysis of Sites Nominated For Characterization For The First Radioactive-Waste Repository* — A

Above Ground Storage of Spent Fuel in Dry Cask

With the issuance of the draft first amendment to the Mission Plan, the start of operation of the first repository for high-level waste by the Department of Energy (DOE) is proposed to be delayed by five years from 1998 to 2003. However, the DOE insists that it will fulfill its pledge of accepting spent fuel elements from the nuclear utilities by 1998 provided that the Congress authorizes funds for the construction and operation of a Monitored Retrievable Storage (MRS) facility. The MRS issue has been on hold because of litigation between the state of Tennessee and the DOE. Projected cumulative spent fuel in storage for 1998 is under 40,000 metric tons of heavy metals (MTHM) and is over 50,000 for 2003 (a large modern nuclear power plant has a core of about 100 MTHM). The waste figures amount to about 400 and 500 spent fuel cores.

Spent fuel storage capabilities at many commercial nuclear power plants are inadequate to handle the projected amounts of cumulative spent fuel wastes for 1998 and 2003. In fact, some of the older nuclear power plants are already hurting for storage space and have been forced to take remedial action. The utilities are turning to two new storage concepts known as dry storage and rod consolidation to face the difficult storage problems ahead.

Rod consolidation is a volume reduction process in which the metal spacers, that provide space for coolant to flow through the fuel element, are removed. The fuel rods are then brought in close contact. Rod consolidation is possible with 5-year-old or older spent fuel elements which no longer produce

very large amounts of decay heat. The fuel rods are still kept in a water pool following consolidation. A factor of two in volume reduction is achieved with rod consolidation.

In dry storage, the spent fuel elements are stored in massive metal casks which act as heat sinks and provide the necessary radiation shielding. The casks are neatly stored above ground on concrete storage pads at an Independent Spent Fuel Storage Installation (ISFSI) which also includes a secure and lighted fenced enclosure. The NRC regulation governing a storage cask ISFSI are contained in 10 CFR part 72. The Virginia Power Company -Surry ISFSI, which uses the CASTOR V cask, is the first facility licensed by the NRC for dry storage of spent fuel elements. The facility has three concrete pads that can accept a total of about 90 casks. The license allows Virginia Power to keep the spent fuel elements in the casks for 20 years until 2006. Three or four casks are expected to be added per year of ISFSI operation.

The CASTOR V cask is made of ductile nodular cast iron. It is a cylinder 16 feet high and 8 feet in diameter. The walls are 15 inches thick. In the walls of the cask are polyethylene rods which attenuate neutrons that result from spontaneous fissions in the spent fuel. The thick walls of iron attenuate the gamma radiation. The cask weighs 102 metric tons empty. It is licensed to contain 21 pressurized water reactor fuel elements producing 21 KW of heat. A critical design feature is to limit peak fuel rod temperature to below 380°C. The 21 spent fuel elements represent about 10 MTHM. The cask

has a double lid closure system. When loaded, the cavity between the two closure lids is pressurized with helium which makes it possible to continuously monitor the cask for leakage. The casks are made in Germany where the nodular cast iron technology has been developed. The cost of an installed cask is close to \$1 million. There is no similar nodular cast iron technology in the United States for the production of dry storage casks. However, licensing experiments are under way at the Idaho National Laboratory for two U.S.-made forged steel casks that are similar in size and weight to the CASTOR V.

Licensing papers on several storage casks have also been submitted to the NRC for transportation consideration. In Europe, the CASTOR casks are licensed to transport spent fuel elements. Studies in the U.S. are also underway to combine dry storage and rod consolidation technologies. Studies indicate this might be possible with 10-year-old spent fuel elements. Estimates are that the capacity of a dry storage cask could be nearly doubled with this technology.

The first casks are licensed to store spent fuel elements for 20 years. However, it is possible that the casks will maintain their structural and functional integrity for much longer periods of time. The dry storage cask is viewed as a temporary solution to the disposal of spent fuel elements. This temporary storage may provide the time necessary to resolve the geological repository issue in a more rational and scientific manner than has been done so far.

Decision-Aiding Methodology, May 1986), is based on the scenario of shipping the spent fuel elements from the commercial nuclear power plants of the East and the Midwest to a geological repository in the West. It is not based on the scenario of shipping the spent fuel elements from the commercial nuclear power plants to the geological repository in the West, retrieving the spent fuel element a given time period following emplacement, shipping the spent fuel element to a reprocessing plant on the East Coast (the completed Barnwell plant as an example), reprocessing the spent fuel element, and shipping the resulting high-level waste back to the repository in the West.

Solvent extraction is the chemical procedure currently used in all spent fuel reprocessing plants for the extraction of plutonium. The first step consists of dissolving the spent fuel pellets in hot nitric acid. Next, the acid solution is brought into contact with an immiscible organic liquid and shaken into an emulsion. The uranium, plutonium, and other transuranics attach to the organic droplets while the highly radioactive fission products remain in the aqueous solution. The organic and aqueous liquid are then allowed to separate. The organic solution

The waste still contains large quantities of long-lived radioactive nuclides.

containing the uranium and transuranics is then subjected to several purification steps for small amounts of fission products that were trapped in the organic. More than 95 percent of the plutonium and uranium can be extracted in this manner. The aqueous solution that contains the bulk of the fission products is known as the high-level waste and is usually transferred to storage tanks before further processing.

The high-level waste, which can be considered less hazardous than spent fuel elements since most of the plutonium and transuranics have been removed, still contains large quantities of long-lived radioactive nuclides and requires further processing for disposal in a safe place such as a geological repository. Vitrification is the most commonly advocated method for the solidification of the high-level waste. The sludges at the bottom of the high-level waste storage tanks are removed and dehydrated and the radioactive elements in solution are precipitated. The sludge and precipitate are then

mixed with molten glass which is poured into a canister and allowed to solidify. The vitrified high-level waste packaged in the canister is now ready for disposal in a geological repository. In the United States, a large vitrification plant is under construction that will allow processing of all the liquid waste, stored and future production, at the Savannah River plant. It will start operating in 1990 and will produce about 500 canisters per year. A vitrification plant may also be built at the Hanford facility after the Savannah River plant becomes operational. The DOE also operates a fuel reprocessing for spent naval fuel elements at the Idaho National Laboratory. At that facility, the high-level waste is transformed into ceramic pellets (the process is referred to as calcination) which are stored in underground bins. The DOE has not reached a decision with regard to the final disposition of this high-level waste. The waste contains a large proportion of inert chemicals and current packaging technology would produce about 22,000 canisters. The waste may eventually be reprocessed for volume reduction and then vitrified before shipping to a geological repository.

Late in the 1960s, it became apparent that storage tanks at the Hanford facility were leaking. The decision was made to convert one of the reprocessing plants of the days of the Manhattan project into a chemical plant for the removal of the two most hazardous radionuclides from the high-level waste, 90-strontium and 137-cesium. Most of the high-level waste was pumped from the storage tanks through an existing pipeline network to B-Plant where about 95 percent of the two radionuclides was removed from the high-level waste which was then pumped back to the storage tanks and immobilized. The waste that remains following extraction of 90-strontium and 137-cesium from high-level waste is referred to in many countries as medium or intermediate level waste, but the term is not used in the United States (At the writing of this article, the NRC has issued for public comment a new definition of the phrase "High-Level Radioactive Waste," which would make it possible to reclassify high-level wastes presently stored in waste tanks at Hanford as "above Class C Low Level Waste.") Intermediate level waste may not be required to be disposed off in a geological repository. Its hazard could be dealt with by grouting it or solidifying it in the storage tanks. Such an option is being considered for some of the waste at Hanford. At Hanford, the 90-strontium and 137-cesium that has been removed from the high-level waste has been placed in double-walled capsules which are stored in water pools. Attempts have been made to find commercial application for these capsules. The 90-strontium

Reprocessing will need public approval and must be economically worthwhile.

capsules, which have a thermal power of about 1 kilowatt, could be used to drive thermoelectric devices. The devices must be packaged in shielded containers. The 137-cesium capsules have been considered for use in the sterilization of sewage sludge, which can then be sold as fertilizer, and more recently for pasteurization of food by radiation. Here again the capsules are kept in shielded rooms. The removal of cesium and strontium from the Hanford high-level waste was a remedial action. Furthermore, the DOE and the nuclear industry have never been able to convince the public of the benefit of pasteurizing food by irradiation with gamma rays emitted from 137-cesium. Reprocessing of 90-strontium and 137-cesium from spent fuel elements should not be viewed favorably unless there are applications that have public approval and unless the reprocessing of these radionuclides is economically worthwhile.

The high-level wastes from commercial spent fuel elements also contain significant amounts of the precious metals of palladium, rhodium, and ruthenium. Since some of these elements contain long-lived low-energy beta emitters, they could be used only in industrial applications, not in jewelry. The DOE has funded research for many years to develop chemical streams that could be incorporated in commercial fuel reprocessing plants for the recycling of these elements. Technetium is an element that does not occur in nature. The long-lived isotope 99-technetium, which is a low-energy beta emitter, occurs in significant amounts in fission products. It has been shown in the laboratory that technetium could have industrial applications in metallurgy. Two other elements of economical values that should be mentioned are argon and the isotope 85-krypton. These two inert gases would have to be captured during dissolving of the spent fuel pellets. Argon is very expensive and is used in night light signs as well as in lasers. The U.S. government is selling 85-krypton through the Oak Ridge National Laboratory to the electronic industry which uses it in electronic quality control procedures. Presumably, the 85-krypton is obtained as a side product from ongoing nuclear fuel reprocessing.

It is not possible to analyze the economi-

cal impact of commercial spent fuel reprocessing because there is no experimental data available and because there is no interest in performing detailed studies. Empirical data on the cost-effectiveness of reprocessing plutonium and uranium will be generated by the French nuclear power program, which has decided to recycle these fissionable elements into fresh fuel elements for light-water reactors. The first reload of mixed-oxide (i.e. uranium and plutonium oxide) fuel into a French pressurized-water reactor was scheduled for the end of 1986. The total cost of individual site characterization, engineering and construction, operation, and decommissioning for the three potential geological repositories—Yucca Mountain, Deaf Smith, and Hanford—has been estimated by the DOE to be \$7.5 billion, \$9.5 billion and \$12.9 billion (1985 dollars), respectively. Based on data presented in the DOE Mission Plan (report DOE/RW-0005, *MISSION PLAN for the Civilian Radioactive Waste Management Program*, June 1985), the cost of the first repository will be between \$14 billion and \$15 billion, assuming that Yucca Mountain is selected. This number includes total development and evaluation, transportation, socioeconomic impact mitigation, government administration, engineering and construction, operation, and decommissioning. The construction of the first repository officially slipped by five years with the issuance in January 1987 of the first amendment to the Mission Plan. The document does not contain a revised cost analysis. Also, the DOE will need a Monitored Retrievable Storage (MRS) facility to keep its pledge of accepting spent fuel from commercial utilities by 1998. In the original Mission Plan the cost of a two repository system with a delay of five years in the two rock types of basalt and tuff is estimated at \$33.2 billion. The cost of an MRS facility is estimated at \$2 billion. With further delays, the total cost of the DOE's program for the disposal of spent fuel and high-level waste can be expected to be well in excess of \$35 billion.

In summary, it is possible to construct a commercial spent fuel reprocessing plant that would recycle all the long-lived radionuclides which necessitate the safe disposal of spent nuclear fuel. The facility would include processing streams for elements that have commercial value. The facility would not produce high-level waste and a deep geological repository such as Yucca Mountain would not be necessary (at worst the facility would produce above class C low-level waste). The economical and political advantages of such a facility would have to be evaluated thoroughly. The going ahead of such a facility would have to be subjected to public acceptance.

Contamination From Weapon Testing or Spent Fuel Repository. What is the Difference?

A frequent question to the newsletter asks why a nuclear waste repository should not be located at Yucca Mountain, since the Nevada Test Site already is contaminated.

There are two reasons why this suggestion is inappropriate: (1) the amount of contamination that has resulted from weapons testing is minute compared to the amount of potential contamination associated with a spent fuel repository. Calculations using the Trinity Test, the first nuclear weapon exploded in New Mexico in July 1945, as a comparison unit show that it would take about 2.3 million Trinity blasts to produce the same fission product inventory that would be in a spent fuel repository. It would take thousands of years of weapon testing at the current rate to approach the amount of contamination associated with a repository; (2) Certain areas of the Nevada Test Site are contaminated; Yucca Mountain is mostly outside of the Nevada Test Site and is not contaminated.

In arriving at conclusion (1) there are two important assumptions:

1. The repository contains 70,000 metric tons of heavy metals (MTHM) of spent fuel, the current limit for the first repository stipulated in the Nuclear Policy Act of 1982, with an average burnup of 33,000 megawatt-days (MW-d).

For fuel with a burnup of 33,000 MW-d, for each MTHM charged to the reactor, 44 kilograms (kg) (97 pounds) of uranium are converted to 35 kg (77 pounds) of fission product plus 9 kg of transuranics, i.e. 35 kg of material are fissioned. About 65 percent of the transuranics is plutonium-239.

2. Complete fissioning of 56 kg (123 pounds) of material will produce an explosive yield of 1 megaton (MT) of TNT (mega is a prefix denoting 1 million).

The Trinity weapon had an explosive yield of 18.6 kiloton (kt) of TNT (kilo is a prefix denoting 1 thousand). The critical mass for plutonium-239 is about 15 kg (33 pounds).

The following calculations result from these two assumptions:

1. Total amount of uranium that is fissioned in the production of 70,000 MTHM of spent fuel:
 $70,000 \times 35 = 2,450,000 \text{ kg (5,400,000 pounds)}$

Amount of fissioned uranium expressed in units of weapon yield:
 $2,450,000 \div 56 = 43,750 \text{ MT} = 43,750,000 \text{ kt}$

Amount of fissioned uranium expressed in units of Trinity weapon:
 $43,759,000 \div 18.6 = 2,350,000 \text{ Trinity weapons}$

2. The 70,000 MTHM of spent fuel will contain the following quantity of transuranics:
 $70,000 \times 9 = 630,000 \text{ kg (1,400,000 pounds)}$
 Approximately 65% of this is plutonium-239.
 $630,000 \times .65 = 409,500 \text{ kg of Pu-239}$

Amount of plutonium-239 expressed in number of critical masses:
 $409,500 \div 15 = 27,300 \text{ critical masses of plutonium-239}$

The numbers clearly show that it would take the detonation of over 2 million Trinity weapons for weapon testing to produce the same fission product inventory as that of the spent fuel repository. It would take over 27,000 undetonated Trinity weapons to match the plutonium-239 inventory of the spent fuel repository. So far, the DOE has detonated a total of about 700 nuclear weapons since the start of testing in the 1950s and the current testing rate is about 20 weapon tests per year. Therefore it would take weapon testing at least 10,000 to 100,000 years to produce the fission product inventory of the spent fuel repository. It would take over 1,000 years of undetonated testing to put in the soil the plutonium-239 inventory of the spent fuel repository.

It must be pointed out that in a nuclear reactor the fissions are caused by thermal neutrons while in a weapon explosion the fissions are caused by fast neutrons. Because of the difference in the fissioning mechanism, the yields of fission products are somewhat different. However, as a first approximation, the difference is not that significant and it can be assumed that a thermal fission produces the same amount and yields as a fast fission.

All the numbers used in the assumptions can be found in the open literature.

Conclusion (2) requires a reemphasis of the Nevada Test Site-Yucca Mountain relationship. Weapons testing has, indeed, contaminated a portion of the Nevada Test Site. However, Yucca Mountain is miles away from the testing areas and is not contaminated. Yucca Mountain is adjacent to—not on—the Nevada Test Site. The surface facilities of the proposed repository would be located on the Nevada Test Site, but the underground or waste emplacement area would be located outside the Nevada Test Site. While the Nevada Test Site is under Department of Energy jurisdiction, Yucca Mountain is divided under three different jurisdictions—DOE, Nellis Air Force Base Gunnery Range, and the Bureau of Land Management.

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 news-magazine 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. You might even organize one in your community.
- 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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What are Nevada's Concerns?
 - Yucca Mountain: Transportation to a
Repository.

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Nevada Nuclear Waste Newsletter
Nuclear Waste Project Office
Agency for Nuclear Projects
Capitol Complex
Carson City, NV 89710

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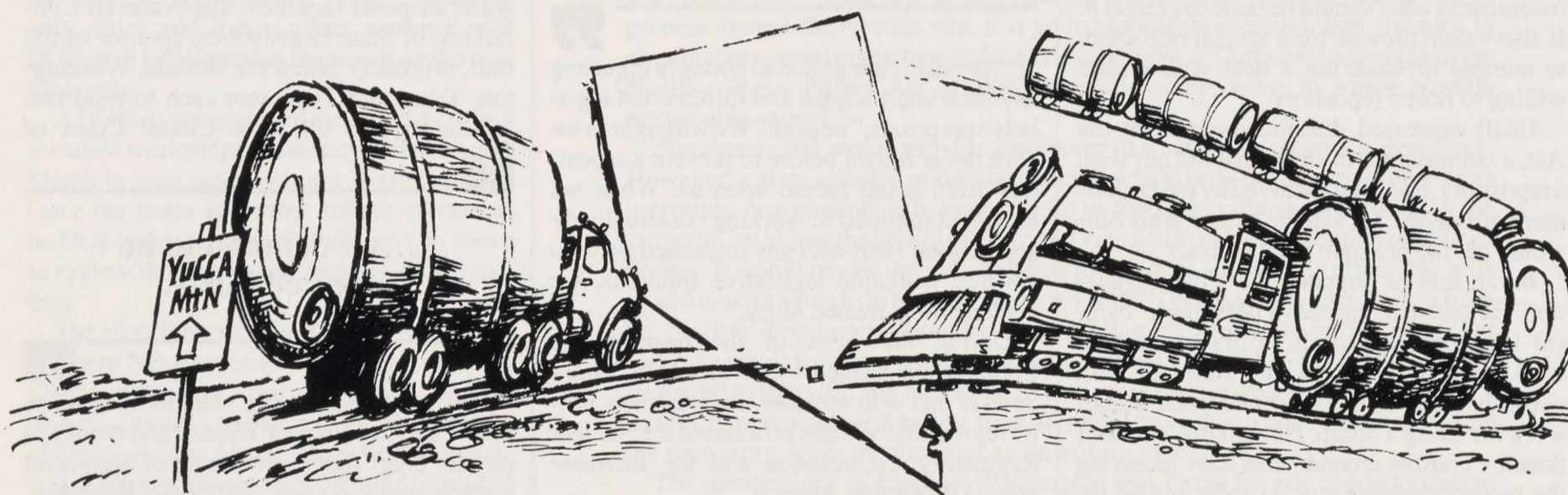
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Nevada Nuclear Waste Newsletter



High-Level Nuclear Waste Transportation: Who and What's Involved?

Although shipments to a high-level radioactive repository are at least 16 to 20 years off, a number of federal, state, local, tribal and other entities are already involved in policy-making, planning and study for such an eventuality. In addition, many of these same groups are now involved in the regulation, supervision and operational aspects of shipments of other nuclear material, including spent nuclear fuel, radioactive material and equipment, low-level radioactive waste (LLW) and transuranic waste (TRU) which traverse the State of Nevada.

How Many Shipments?

Should the repository be built at Yucca Mountain, it is estimated by the U.S. Department of Energy that over 28,000 truck shipments and over 10,000 rail shipments of spent nuclear fuel and high-level radioactive waste would be made during the 28-year operational period of the repository. This means that about

three trucks and two trains laden with high-level nuclear waste would enter Nevada daily as the repository is being loaded. Should a decision be made to retrieve the spent fuel or waste in the ensuing 50 years for reprocessing or other purposes, the number of shipments would vastly increase.

To put the proposed transportation effort into perspective, it should be compared to the fact that only 42 truck shipments of spent fuel (33), low-level nuclear waste (1) or TRU waste (8) have come to or traversed Nevada since 1982. This is an average of one shipment every 44 days. If the projections for repository shipments are accurate, Nevada would experience an increase 220 times over the present level of nuclear waste and fuel shipments. This increase could jump to 400 times if the retrievability option were used. And, for five years, starting in 1990, shipments of TRU waste from the Nevada Test Site to the

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- 8** Report describes Nevada Environmental Plan
- 9** DOE names new Nevada boss

Nevadans Meet With Nuke Waste Decision-makers Lobby for Udall Bills to Correct Repository Siting Program

Gov. Richard Bryan and the state Commission for Nuclear Projects went to Washington, DC in September to tell key decision-makers Nevada will "fight as we have never fought before" to prevent a high-level nuclear waste dump from being forced upon the state.

Bryan testified before a subcommittee of Rep. Morris Udall's Interior and Insular Affairs Committee Sept. 18. Udall, often referred to as the father of the Nuclear Waste Policy Act of 1982, has sponsored legislation that would suspend site-specific activities at candidate repository sites in Nevada, Washington and Texas. It would set up a special commission to determine what went wrong with the repository siting program, and would recommend what should be done to correct it. It also would provide for a special negotiator to attempt to work out a deal with a state willing to host a repository.

Udall expressed disappointment that the Act, a compromise of states that did not want a repository, had been shattered by the Department of Energy. He said he believed his bills would get the program back on track.

Bryan said he supports the Udall legislation. He said that, instead of pursuing a "cynical legislative approach," Congress should work constructively to fine-tune the Act which he said contains a sound basic framework for siting a dump. He said this could be done by crafting amendments after receiving the recommendations of an independent review commission as proposed by Udall and others in both houses.

Bryan said Nevada opposed a bill that cleared the Senate Energy Committee,

chaired by J. Bennett Johnson, D-LA. It called for sequential characterization of the three final repository candidates, a move that Bryan said would target Nevada as the eventual host and virtually scrap the 1982 Act.

“**Udall...has sponsored legislation that would suspend site-specific activities at candidate repository sites**”

“Nevadans are united in strongly opposing any such unprincipled and misdirected legislative proposals,” he said. “We will fight as we have never fought before to prevent a repository from being forced upon us. While we remain committed to working constructively and in good faith with any interested party to develop workable legislative solutions, we demand to be treated fairly.”

During the week of the hearing, the Commission headed by former Gov. Grant Sawyer met with senators, congressmen, utility representatives and officials of the Nuclear Regulatory Commission and the Environmental Protection Agency.

After meetings with Nevada's congressional delegation, Sawyer said the four members were united in opposition to the Senate bill. Sen. Harry Reid and Reps. Barbara

Vucanovich and Jim Bilbray testified before the Udall committee. Sen. Chic Hecht, a member of the Senate Energy Committee, did not but said he would oppose the Senate bill on the floor.

While the Nevadans were in town, the Johnston bill cleared the committee and moved to the floor as a rider to an appropriations bill; Benard Rusche resigned as director of the Office of Civilian Radioactive Waste Management but said he would work in support of the Johnston measure; a report that New Mexico volunteered to host a high-level waste repository was being evaluated; DOE provided funds to allow five more Nevada legislators to attend a tour of European nuclear waste disposal facilities. The National Conference of State Legislatures, sponsor of the tour, originally called for Nevada, Washington, Texas and Tennessee each to send two legislators; the 9th U.S. Circuit Court of

“**...we demand to be treated fairly.**”

Appeals rejected Nevada's claims it should be allowed to use Nuclear Waste Fund money to pay for court fights over siting of high-level nuclear waste dumps; and Steve Frishman, who resigned as director of the Texas Nuclear Waste Programs Office, joined the Nevada Agency for Nuclear Projects/Nuclear Waste Projects Office.

internally inconsistent, and that releases from the canisters of nuclear waste were in the nature of an underground injection requiring compliance with the federal Safe Drinking Water Act. The court remanded the standards to the EPA for corrective action.

The EPA standards will serve as the measuring yardstick for site characterization and eventual NRC licensing of a potential repository at Yucca Mountain, Deaf Smith County in Texas or the Hanford reservation in Washington.

The Nevada motion seeks to halt site activity associated with site characterization until EPA standards are revised and made acceptable to the court. The state now has six legal actions pending that challenge the DOE's handling of the siting program.



DOE Delays SCP for Three Final Dumpsite Candidates

The Department of Energy (DOE) announced in August it will delay the release of site characterization plans (SCP) for three potential nuclear dumpsites until January 8, 1988.

The plans for the sites in Nevada, Texas and Washington will be released at the same time instead of individually in October, December and January as had been anticipated. The change will push public hearings on the plans into 1989.

Under the original plan, once a state or Indian tribe received the detailed study plan from DOE, there would be a 90-day comment period for both local governments and the public. The new schedule allows DOE to issue the plan as "consultative drafts," meaning only states and tribes, while working with DOE, will be allowed to comment on the plan for a year.

A DOE spokesman said the department will schedule workshops in January, February and March in each state to review the documents. Once the states and tribes submit comments on DOE's work, the public will have a chance to review the documents and testify at hearings.

The plan for studying Yucca Mountain in southern Nevada consists of several volumes and 60,000 pages. The spokesman said the revised schedule would give the states plenty of time to review. He said the schedule change was in response to requests for more time from the states and tribes.

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.

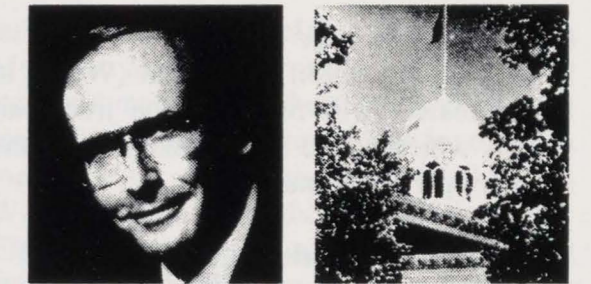
Nevada Agency for Nuclear Projects/Nuclear Waste Project Office, Capitol Complex, Carson City, NV 89710. Phone (702) 885-3744.

Department of Energy, Nevada Operations Office, P.O. Box 98518, Las Vegas, NV 89193-8518. Phone (702) 295-3521.

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Governor's Statement



I recently testified before a House subcommittee in favor of Representative Morris Udall's legislation that would impose a temporary suspension on the Department of Energy's (DOE) high-level nuclear waste repository siting program. The suspension would provide time for a special commission to review the DOE's program and how it could be placed back on track. The legislation also would provide for a special negotiator to attempt to negotiate with a state willing to host a repository. I commend Representative Udall for his statesmanly approach to the waste problem.

In contrast, the Senate Energy Committee has pushed to the floor a bill that calls for sequential characterization of the three final candidate sites in Nevada, Texas and Washington. This bill is intentionally designed to bias the site-selection process toward the Nevada site. It is an irresponsible approach that attempts to circumvent normal procedure and the original intent of Congress in passage of the Nuclear Waste Policy Act of 1982, a fragile compromise in which Nevada responsibly joined.

The Senate bill would provide incentives to a state that accepts a repository. However, a state selected under this process would only be able to receive these incentives or payments if it were willing to forego any future objections to the program, including the ability to exercise a veto and to bring legal action or judicial review. It would render the state helpless to object in any way. In effect, the state would have to agree to being a co-applicant with DOE for a repository license from the Nuclear Regulatory Commission. The bill even appears to nullify any relief that may result from our pending litigation under the 1982 Act. The state would be forced to live with any and all DOE decisions and activities. When stripped of its transparent window dressing, the bill is little more than a blatant attempt to ram the repository down the throat of an unwilling state.

The nominations of Nevada, Washington and Texas for site characterization were improper and unjustified because they were based on an illegal and unfair siting process that violated the 1982 Act's requirements. Congressional committees dealing with the waste issue have chastised the Department of Energy for its politically expedient, illegal actions. Nevertheless, the Senate legislation would ratify these invalid selections as though they were legitimate and justified. It then proceeds to focus the future siting efforts on one site.

Let no one misread the signals coming from Nevada or misunderstand our position. Nevadans are united in strongly opposing any such unprincipled and misdirected legislative proposals. We will fight as we have never fought before to prevent a repository from being forced upon us. While we remain committed to working constructively and in good faith with any interested party to develop workable legislative solutions, we demand to be treated fairly.

I will assure those who are supporting the Senate Energy Committee approach that it ultimately can not work. Moreover, it will prove to be far more costly than the Congress ever intended for the ratepayers and taxpayers to finance. The 1982 Act and the siting process can be repaired, but this will require a fresh start because the current program is so totally lacking in public credibility and acceptability. There is still ample time to restore public confidence that a site selection process will produce a safe repository by developing the necessary midcourse corrections required to place the program firmly back on its intended track.

RICHARD H. BRYAN
Governor

(continued from page 1)

to the Waste Isolation Pilot Plant (WIPP) in New Mexico, will result in one truckload weekly which would be shipped through the southern part of Nevada.

Which Routes Would Be Used?

While it is not clear yet which highways or rail lines would be used for the repository-related shipments within Nevada, it is known that six possible highway routes within Nevada have been identified by the U.S. Department of Energy. (See map, below.) Two of these routes (4, 5) would enter Nevada from Oregon and northern California and proceed generally southbound on interstate and U.S. highways to the repository. Another route (6) would enter Nevada from the Death Valley area of California and proceed northeast. Interstate 15 in southern Nevada may be used, entering Nevada from either Utah (1) or California (2) and then proceeding north to the repository. The sixth possible route (3), which would direct shipments over Hoover Dam, is not likely to be given serious consideration.

Only the Union Pacific is postulated as the main line railroad which would carry repository-bound shipments into and within the State. Trains would enter Nevada either from southern Utah or from southern California.

In looking at the map, it is obvious that a large number of communities within the State and a number of adjoining states (also called "corridor" states) stand to be affected by the

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...about three trucks and two trains laden with high-level nuclear waste would enter Nevada daily...
”

transportation of high-level waste to the repository. Each of these routes has potential problems which must be addressed with regard to impacts on the communities through which it passes.

Who's Involved?

Under the Nuclear Waste Policy Act of 1982, the United States Department of Energy (DOE) is responsible for the selection, construction and operation of the proposed high-level nuclear waste repository. Primary responsibility for all aspects of the project lies within DOE's Office of Civilian Radioactive Waste Management (OCRWM), which coordinates the technical and institutional work of its associated offices and contractors. Such work includes establishing policy and plans for the project as a whole, and overseeing work in all technical aspects such as geological, hydrological and seismic studies, studies of potential environmental, social and transportation impacts, development of storage and transportation casks, routing, costs, and so on. The DOE is bound by federal law and rules established by the Nuclear Regulatory Commission (NRC), the Environmental Protection Agency (EPA) and the U.S. Department of Transportation (DOT). The DOE had entered into agreements with these other federal agencies in developing policy and work

programs in the various areas of the project.

At the state level the Nevada Agency for Nuclear Projects, Nuclear Waste Project Office (NWPO) monitors the work of OCRWM and, in turn, is the state agency which coordinates all planning and activity regarding the repository. The NWPO provides advisement and staff support to the Nevada Commission on Nuclear Projects on all aspects of the repository program. Further, the Commission provides administrative policy guidance to the NWPO and works with the governor and the state Legislature in advising on state policy. The NWPO works closely with the state Legislature by providing information to and interacting with the Legislative Committee on High-Level Radioactive Waste and other legislative committees.

In all of its work regarding off-site impacts relating to socioeconomics, the environment and transportation, the NWPO has fully involved other state agencies which have jurisdiction in certain areas. For example, in the area of transportation, State of Nevada agencies such as Emergency Management, the departments of Health, Transportation, Commerce, Conservation and Natural Resources, the Nevada Highway Patrol and the Public Service Commission all have significant input in the policy-making and planning of the NWPO. Each of these state agencies has either regulatory or functional roles relating to transportation of nuclear waste.

made a strong commitment to include local governments which would be most affected by potential social, demographic, cultural and environmental changes due to the repository. A state/local government planning group meets regularly to discuss, act upon and provide advisement to NWPO staff in the complex task of determining potential impacts on local communities which may arise from repository operations and transportation of high-level waste to the repository. Membership on the state/local government planning group includes representatives from Clark, Lincoln and Nye counties, the cities of Caliente, Henderson, Las Vegas and North Las Vegas and the Legislative Council Bureau. Other local representation on transportation focus teams of the planning group is provided by the regional transportation commissions of Clark and Washoe counties, Indian tribes and local officials such as fire, police, sheriff or emergency management personnel. (To provide an integrated approach, the state agencies mentioned above are also included on the focus teams.)

Through this state/local government planning group and its focus teams in socioeconomic, environmental and transportation studies, the NWPO has assured that the interests and input of all potentially affected communities and groups are meaningfully considered in policy-making, planning and research.

Neighbor States Affected, Too

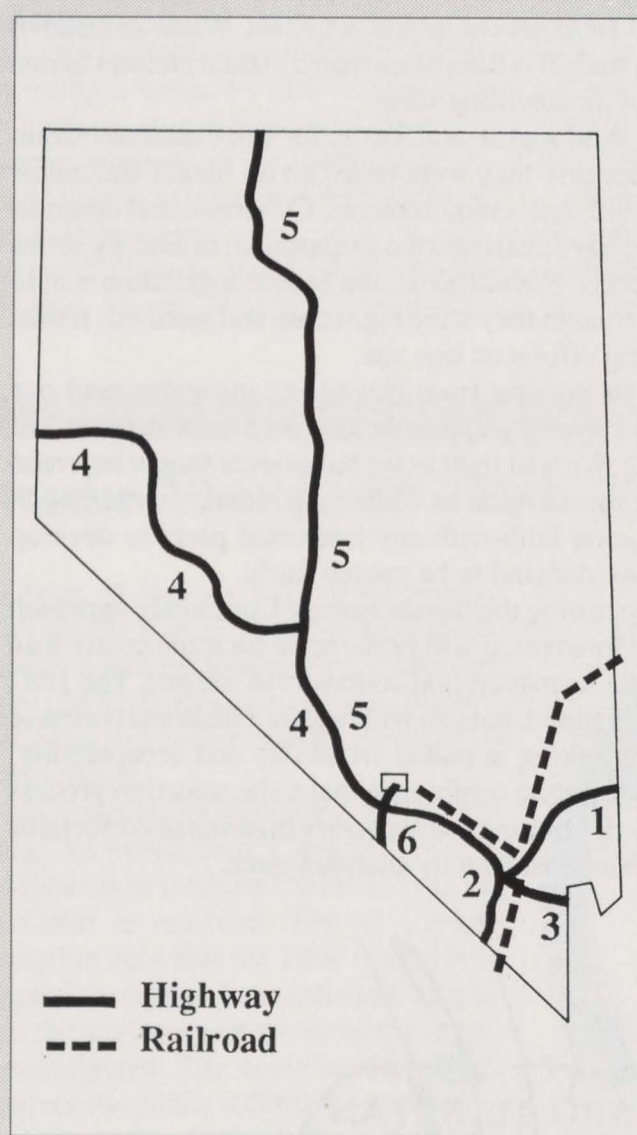
The NWPO is aware that many neighboring states would also be affected by the transpor-

tation of high-level nuclear waste to a Yucca Mountain repository. For this reason, NWPO staff and members of the state/local government planning group are actively involved in meetings of the High-Level Radioactive Waste Committee of the Western Interstate Energy Board (WIEB), a group of 17 western states. WIEB has been most active in studying transportation issues related to the proposed repository. Its committee provides a forum for policy-makers from member states to discuss certain interstate concerns such as routing, costs to states for emergency preparedness and other potential impacts.

The potential transportation corridor states of Colorado, Nebraska, New Mexico and Wyoming are also working closely with Nevada in cooperative studies of highway and rail routing, emergency preparedness and cost to states.

Although shipments of spent fuel and defense high-level waste are a number of years off, federal, state, local and tribal agencies are actively working to clarify transportation issues, isolate potential problems at the national, state and local levels, and plan for study of the broad array of questions which have arisen. In all of this, it is vital that the citizens of each potentially affected city, town or rural area in Nevada be assured that all precautions are being taken to minimize the potential adverse consequences of repository-related transportation, and that all steps are being taken to maintain or enhance their quality of life despite the intrusion of nuclear waste-laden trucks and trains into their communities.

Routes under Consideration by DOE for Shipments within Nevada to a Proposed Repository at Yucca Mountain



Truck Route	Highways Used	Affected Localities/Areas
1	I 15	Mesquite, Moapa Indian Reservation, Las Vegas, North Las Vegas, Indian Springs, Amargosa Valley
2	I 15 U.S.95	Jean, Las Vegas North Las Vegas, Indian Springs, Amargosa Valley
3	U.S.93 U.S.95	Hoover Dam, Boulder City, Henderson, Las Vegas North Las Vegas, Indian Springs, Amargosa Valley
4	I 80 U.S.50 (alt) U.S.95	Verdi, Reno, Fernley Fallon Walker River Indian Reservation, Hawthorne, Coaldale
5	U.S.6 U.S.95	Tonopah Goldfield, Beatty, Amargosa Valley
5	U.S.95 I 80 NV 305 NV 376 U.S.6 U.S.95	McDermitt, Winnemucca Battle Mountain Austin Round Mountain Tonopah Goldfield, Beatty, Amargosa Valley
6	NV 373 U.S.95	Amargosa Valley Amargosa Valley
Rail Route		
Union Pacific (westbound) and proposed DOE spur		Caliente, Moapa Indian Reservation, Las Vegas, North Las Vegas, Las Vegas Paiute Colony
Union Pacific (eastbound) and proposed DOE spur		Jean, Arden, Las Vegas, North Las Vegas, Las Vegas Paiute Colony

State Works With Local Governments

In its off-site impact studies, the NWPO has

Dismantling Aging Nuke Energy Plants A New Challenge

Shippingport, PA-

They now arrive regularly here on the banks of the Ohio River, eager to see a dinosaur of the late 20th century.

Church groups, Eagle Scouts, high school science classes and news media teams carefully pin radiation sensor badges on their collars, pull hard hats over their heads and step gingerly through a low-slung, rust-colored structure half-gutted and full of exposed piping.

When first turned on in 1957 and dedicated by President Dwight D. Eisenhower, the Shippingport Atomic Power Station was the nation's first commercial nuclear power plant. Now, a victim of old age, it is in the process of becoming the first of its kind to be dismantled.

The events unfolding here, however, point as much to the future as the past, for another sort of visitor also frequents this site.

Government officials and utility company executives come regularly to see how the job is going. The attraction for them is not curiosity. They seek clues on how best to dismantle other nuclear reactors.

This is a matter that drew little thought in past years. When the first nuclear power plants were being built, hardly anyone asked what might happen when the structures wore out. Now they must. About 15 other reactors

“
Taking apart Shippingport will cost an estimated \$98.3 million and require five full years - twice as long as it took to build the plant.
”

are due to reach the end of their lives by the year 2000, 53 by 2005, 70 by the year 2010.

The decommissioning of the Shippingport reactor has come to be regarded, by the Department of Energy and some in Congress, as

a model for how a dismantling can be done. Two House subcommittees held a special hearing in July 1986 on the "lessons to be learned" at Shippingport. The DOE and the nuclear power industry expect to find answers to questions of cost, safety, demolition methods and waste disposal.

The lessons learned here, however, may not apply elsewhere - at least not for many years to come.

Shippingport is a relatively small plant, owned and operated not by a private utility, but by the federal Department of Energy. The conditions at Shippingport differ in critical ways from those at the large commercial plants due to go off-line in coming years.

Because of these differences, it is not likely that any nuclear plant but Shippingport will be dismantled in this century. Instead, a dozen or more retired, shut-down reactors probably will decorate the countryside in the early 21st century, surrounded by fences and manned by guards, costing utility companies an estimated

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Nevada Editorial Writers Have Fun With 'No Dump' Suggestion

Nuclear Repository Is Not A Dump?

Every once in a while, we get one of those letters - some harping, some cute, some indignant - contending that the newspaper has misused some word or phrase.

Probably every editor remembers the time his newspaper carried a photo caption about kids "playing frisbee in the park." And every editor probably remembers the inevitable letter from the company that makes Frisbees informing him, in no uncertain terms, that Frisbee (upper case "F") is a registered trademark, not to be confused with other plastic disk toys. Fair enough.

Caesars Palace used to have a cute little rhyming letter it would send out to publications that inadvertently put an apostrophe in the name: "We send 'dis message without no malice. Der ain't no apostrophe in Caesars Palace."

The list goes on and on. Usually, these "get it right" letters have to do with mis-used brand names. But on occasion, you get letters from people who dislike other terms - those who say the term "illegal aliens" is pejorative, casting these immigrants as beings from outer space (use "undocumented workers," they say); those who say the Contras should be labeled "freedom fighters;" those who object to the term "mentally retarded," which they see as pejorative, insisting that the phrase "developmentally disabled" be used instead.

At any rate, it was probably only a matter of time before someone came forward to challenge our use of the term "dump" to characterize that high-level underground nuclear waste site the federal government wants to build at Yucca Mountain.

Sure enough, a group called the Atomic Industrial Forum, has come forth to register a complaint. The Atomic Industrial Forum is a pro-nuclear advocacy organization based in Bethesda, Maryland.

In a missive to news organizations this week, the Atomic Industrial Forum lodged the following complaints and offered these suggestions.

"Dump is a four-letter word that fits neatly into headlines. But it is not an accurate word when you are writing about high level nuclear waste. Please use the correct term: repository."

"After all, what is a dump? A dump is commonly thought of as a place where trash or garbage or drums of toxic waste are dropped in a disorderly manner... A nuclear waste repository is planned to be something entirely different: a carefully engineered facility within a carefully selected site..."

"Those who oppose the peaceful applications of nuclear energy love to use the pejorative word 'dump'. Please don't join their camp..."

We think the Atomic Industrial Forum do not count ourselves among those who folks are a little oversensitive. We do not suggest that an underground, um, oppose nuclear power in general. Nor do we suggest that a politicized siting repository would be inherently unsafe.

What we have objected to in terms of the waste site is the politicized siting repository on politically feeble Nevada. We also object to the unfairness of a deal which gives Nevada not only the nation's atomic weapons testing program but also its high-level atomic waste, all of it generated elsewhere.

Besides that, the term "dump" also carries these definitions: "An accumulation of refuse or other discarded materials; a place where such materials are dumped; a quantity of reserve materials accumulated at one place."

So, the term "dump" in news stories or in headlines is accurate. We plan to continue using it. In editorials, where "pejorative" is not a no-no, we'll call it a dump or tomb or a shaft full of gunk or anything else that comes to mind.

But, tell you what. If you folks in Bethesda manage to convince the feds to put the dump in your backyard instead of ours, we'll call it anything you want.

- Las Vegas Review-Journal



"Hey, this ain't no DUMP."

It Matters Not What Repository Is Called

And what's in a name? A dump by any other name would still be a dump. Except, that is, to the good people at the Atomic Industrial Forum, the association of the nuclear industry.

Those people would like newspapers not to use the word "dump" in connection with a place to put nuclear waste. Sounds a little too trashy to them, they say. They would prefer that newspapers use the word "repository", which they think has a less odious ring to it. Or if repository is too long, then "site", another four-letter word for dump, will do, they say.

But it matters not what a dumpsite is called: A dump is a dump. Unless it is a "suppository," as Nevada Sen. Chic Hecht is said to have called a nuclear repository.

If the Atomic Industrial Forum finds "dump" offensive, then perhaps the press should take the cue from the erudite senator, who recently returned from France, where he was studying nuclear repositories.

Malapropisms aside, the senator may have a point.

-Reno Gazette-Journal

Where I Stand

By Mike O'Callaghan

Eleven Nevada news directors and editors received a red-hot tip from the Nevada Nuclear Waste Study Committee this month. The NNWSC is made up of a group of people wanting Nevada to become the nation's nuke garbage dump. Oops, there I did it again! Shame on me for calling it a dump. That's exactly what the NNWSC doesn't want me to do.

The NNWSC wants Nevada editors and news directors to call the nuke garbage dump a nuke garbage repository. Now doesn't that sound better? Not really. Then how about nuke garbage dump repository? Not any better? Nope.

Well, I guess it just all boils down to the fact that a dump is a dump. Even if you want to call it a rose garden, it's still a dump.

So if the Nevada Nuclear Waste Study Committee wants the Silver State to live with the name, then let them call them the Nevada Nuclear Waste Dump Study Committee.

Now that's what is known as calling a dump a dump. Sure sounds more accurate than repository. Doesn't it? Yep!

-Las Vegas Sun

Report Describes Nevada Environmental Program Plan for Yucca Mountain

A technical report titled Environmental Program Planning for the Proposed High-Level Nuclear Waste Repository at Yucca Mountain, Nevada, (NWPO-TR001-87) describes the program proposed by Nevada for protecting the environment at the Department of Energy (DOE) site.

Prepared by the state Nuclear Waste Project Office (NWPO), the report also reviews the DOE environmental program plan and concludes that it lacks integration and coordination.

Because DOE has issued no comprehensive plan for environmental protection, it is unclear how the department will accomplish environmental monitoring, impact assessment, impact mitigation and site reclamation. The NWPO recommended in its report that DOE should defer further implementation of the site characterization program until a comprehensive environmental protection plan is available. As a corollary, the state has proposed an independent environmental program for the Yucca Mountain site that includes the following elements:

1. undertaking studies immediately to establish a 12-month baseline of environmental information at the site;
2. adopting the Site Characterization Plan (SCP) and the engineering design plans it will contain as the basis for defining the impact potential of site characterization activities;
3. using the environmental baseline and the SCP to evaluate the efficacy of the preliminary impact analysis reported in the Environmental Assessment;
4. using the SCP as the basis for discussions with federal, state and local regulatory authorities to decide which environmental requirements apply and how they can be complied with;
5. using the SCP, the EA impact review and the compliance requirements to determine the scope of reclamation measures needed;
6. developing environmental monitoring and impact mitigation plans based on the EA impact review, compliance requirements and anticipated reclamation needs; and
7. incorporating environmental studies during site characterization or adjusting the monitoring program to accommodate information needs for the EIS and the siting guidelines once more is known about the repository design.

The approach being taken by DOE, as described in the NWPO report, constitutes piecemeal planning in response to individual environmental requirements specified by the Nuclear Waste Policy Act of 1982 (NWPA). Indicative of this are the following steps taken or planned by DOE thus far:

1. issuing an environmental assessment (EA)

- for site characterization and repository development based largely upon historical, non-site specific information and preliminary, incomplete engineering design plans;
2. drafting an environmental monitoring and mitigation plan (EMMP) based upon the limited aspects of the environment at Yucca Mountain where the EA predicted significant adverse impacts might occur;
3. planning for an environmental regulatory compliance program that would identify which environmental statutes and regulations DOE believes apply to the project and that would discuss measures believed adequate for compliance;
4. preparing an SCP that includes descriptions of the geologic and hydrologic activities and testing to be performed to determine site suitability; and
5. planning for the environmental studies needed to evaluate site suitability in accordance

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Because DOE has issued no comprehensive plan for environmental protection, it is unclear how the department will accomplish environmental monitoring, impact assessment, impact mitigation and site reclamation.

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dance with siting guidelines (10 CFR 960) and to establish a post-site characterization environmental database that describes the nature of the Yucca Mountain site prior to initiation of repository construction (for the environmental impact statement (EIS) needed for repository licensing).

DOE's failure to present the State of Nevada with a comprehensive, integrated plan for protecting the environment gives rise to concerns that the department's program is insufficient. Because the State of Nevada is responsible for protecting the interests of its citizens, the alternative program described in the NWPO report has been proposed.

Nevada's concerns with DOE's program are summarized in the report as follows:

1. Comprehensive site-specific studies at Yucca Mountain were not performed for the EA, and that document cannot therefore serve in planning DOE environmental monitoring,

mitigation, and compliance activities during site characterization and in resolving key environmental issues.

2. DOE contends that the environmental baseline for the repository EIS begins only after site characterization is completed. DOE also contends that environmental studies are not needed for the SCP even though NWPA Section 113(a) refers to the site characterization plan alternatively as an environmental assessment. Consequently, it is unclear how DOE intends to fulfill its environmental review requirement for site characterization.
3. The EMMP proposed by DOE does not include monitoring activities that will be required to comply with environmental regulations. The draft plan also does not include reclamation measures for site characterization, thus giving rise to concerns that reclamation for site characterization may be overlooked by DOE.

4. Components of the DOE environmental program are being planned in a manner that precludes coordinated and integrated review by the state. DOE has not prepared a comprehensive overview of the program. As a consequence, the program risks being redundant or suffering omissions.

5. An environmental survey and audit program was implemented recently by DOE Headquarters as a means of identifying all environmental requirements that apply to major programs. The program involves establishing an environmental baseline, planning in a comprehensive manner for meeting regulatory requirements, coordinating compliance actions and assuring that environmental requirements are met in a satisfactory manner. DOE has failed to include repository siting in the environmental survey and audit program and has not provided substantive assurances to the State of Nevada that effective measures to protect the environment will be carried out at the Yucca Mountain site.

The report concludes that DOE should not proceed with site characterization until a comprehensive, integrated program plan for protecting the environment at Yucca Mountain is completed and made a part of the SCP.

A proposal and application for grant funds to support the state's environmental program has been submitted to DOE in accordance with NWPA provisions that allow affected states to determine environmental impacts and to engage in monitoring and evaluation with respect to DOE site characterization activities. In proposing independent environmental field studies and associated activities, the state has not attempted to supplement the DOE environmental program. It is anticipated that the state's program will be implemented this fall, pending receipt of the grant.

DOE Names New Nevada Boss

In a reshuffling of Department of Energy Nevada offices, Donald L. Vieth has been removed as director of the program to study Yucca Mountain as a possible high-level nuclear waste dump.

Vieth, who had been director of the Waste Management Project Office in Nevada since 1982, was named deputy director of the Environment, Safety and Health Office. Carl P. Gertz, who has been manager of the Special Isotope Separation Project Office at DOE's Idaho Operations Office, was named manager

of the Waste Management Project Office and took over Vieth's former duties.

The change was announced in August by Nick C. Aquilina, who became manager of the Nevada Operations Office in July after six years as deputy manager of the DOE Idaho Operations Office.

"I have only the greatest praise for Don Vieth," Aquilina said. "I just felt I needed someone I knew in that position because of the nature of the waste management program."

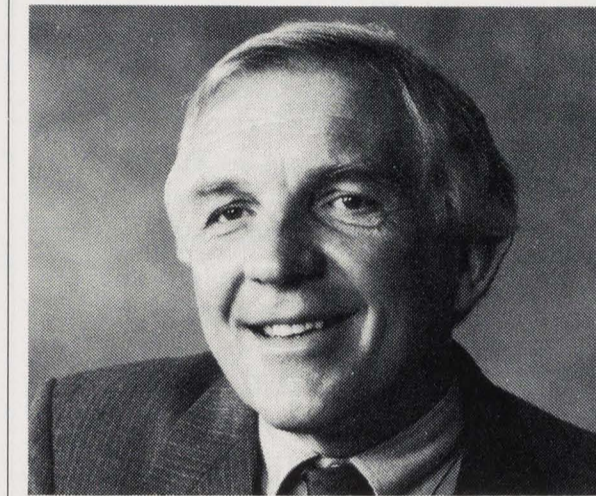
Aquilina said the changes were part of a

reorganization of six key offices within the DOE. He said he elevated some of the offices so they will report directly to him. Before the realignment, each of these departments reported to an assistant manager who then reported to the operations manager.

"I elevated the office of Waste Management and the Office of Environment, Safety and Health to an assistant manager position," he said. "This shows the focus I intend to put on both of these topics."



Donald L. Vieth



Carl P. Gertz



Nick C. Aquilina

Governor Appoints First Bullfrog County Commissioners

Gov. Richard Bryan chose three people to serve as the first commissioners of newly created Bullfrog County, and their first order of business was to pass a resolution opposing a high-level nuclear dump within its boundaries.

Bryan appointed Mike Melner of Reno, former director of the state Commerce and Human Resources departments; Las Vegas real estate broker David Powell, and Dorothy Eisenberg, past president of the League of Women Voters of Clark County.

Bullfrog County, carved out of Nye County in the closing minutes of the 1987 Legislature, is a 144-square-mile area that includes the proposed nuclear waste dump at Yucca Mountain. The vote capped a dispute among lawmakers over whether potential revenues from a nuclear dump should go to Nye County or to the state for distribution to all counties.

Melner said he agreed with the governor that any potential revenues should be distributed statewide, but that the state should oppose locating a repository at Yucca Mountain. The commission's resolution supports Bryan's opposition.

"We want Washington to know that Nevada speaks with one voice," Melner said. "We do not want the nation's high-level garbage dumped in our backyard."



While stressing that they don't want a repository in Nevada, the bill's sponsors said a dump could generate millions of dollars in grants and other revenues and that the money should be divided equitably among Tall the counties. They said that, although the proposed repository would not be in Clark County, the neighboring Las Vegas area would receive much of the impact and should be compensated accordingly. They said the tactic of forming a new county would enable the state to reap up to 40 percent more in federal funds than would a separate taxing district favored by Nye County. The state and the county are entitled to Grants Equal to Taxes funds (GETT) retroactive to May 28, 1986, when Yucca Mountain was approved for site characterization.

There are no residents of Bullfrog County. Under the bill, the county seat is in Carson City, the state capital. The measure authorized the governor to appoint the county officers who would receive the repository revenues and distribute them according to a state formula. Nye County claims the Bullfrog plan is unconstitutional. Attorney General Brian McKay said that a bill enacted by the Legislature is presumed to be constitutional and his office is obligated to defend it. At press time, however, he said he would not.

(continued from page 5)

\$1 million each a year to maintain.

This is the picture painted by both the nuclear industry and its critics.

Nuclear power plants have finite life spans, generally about 30 years. They wear out mainly because the steel containment vessels and metal piping become too brittle after years of bombardment by neutrons, the product of fissioning atoms. Restoration rarely makes sense economically.

Power companies cannot, however, simply walk away from aging plants. Parts of a nuclear reactor become dangerously radioactive after years of use. Much of the radioactivity requires several decades to fade.

Power companies have three options.

The first two essentially involve a waiting game. Plants can be entombed in concrete or mothballed behind fences and guards for dozens of years until the radioactivity subsides. In the short run, these methods are the cheapest and easiest, for they involve relatively little up-front money and allow dismantling after the plant has cooled off.

But the specter of dozens of aging, vacant, radioactive plants dotting the national landscape does not evoke enthusiasm among some, particularly those who live nearby. To them, a mothballed nuclear plant resembles in many ways a giant hazardous waste dump site.

The third option is immediate dismantlement - the option being tried at Shippingport. Three small research reactors already have been dismantled, but the current effort is seen as the prototype for how to handle a modern commercial reactor.

The Shippingport decommissioning project began with a \$6 million, 12-volume engineering and cost study, completed by the DOE in 1983. The spent fuel rods were removed the next year, and contractors - headed by a team from General Electric - began the physical dismantling in September 1985.

Taking apart Shippingport will cost an estimated \$98.3 million and require five full years - twice as long as it took to build the plant. The mammoth effort involves thousands of hours of tedious manual labor and complicated logistics.

Workers wearing protective overalls and radiation sensors move through yawning, vacant expanses that once formed the heart of the reactor's activity. They crawl through winding passageways and climb into the four cavernous containment vessels, set below ground level. They scrub walls, strip asbestos insulation, cut about 21 miles of metal pipe. They slice up tanks and knock down walls. They sort out contaminated materials and box them for shipment to the federal waste disposal site at Hanford, WA.

But the climax of the DOE's efforts will involve a tricky bit of business.

The workers eventually must deal with the heart of the reactor - the pressure vessel, a steel

cylinder 25 feet high and 10.5 feet across, with walls more than eight inches thick. A steel pressure vessel remains highly radioactive even with the fuel removed, so it requires a protective shielding. Getting rid of this hot behemoth will be the decommissioning team's greatest challenge.

Sometime in the early spring of 1989, workers will build a tower above the Shippingport pressure vessel. They will fill its insides with other radioactive elements from the plant, then pour cement into the cavity. A winch will hoist the 870-ton package to a specially tracked transporter, which will slowly roll it to a barge at a dock to be built on the nearby Ohio River.

From there, the barge will begin a 7,800-mile journey down the Ohio and Mississippi rivers, into the Gulf of Mexico, through the Panama Canal, north along the Pacific Coast to the state of Washington, and east into the Columbia River. One month after leaving

“

The greatest difference involves radioactive waste disposal. Shippingport, being federally owned, has places to send its waste. Other plants face a tougher situation.

”

Shippingport, it will dock at the federal waste depository in Hanford.

Although Shippingport is far smaller and less radioactive than the big commercial plants, DOE officials argue that the basic techniques can be applied on any scale. They hope to show that a nuclear plant can be dismantled easily and safely at a reasonable cost.

“If you have something that's contaminated, you go through all the same procedures no matter what the level of radioactivity,” said John Schreiber, the DOE's project manager here. “How you take the plant apart, store it and ship it can be applied elsewhere.” Others cannot share this view for several reasons.

Because the Shippingport pressure vessel is small enough to be removed and transported intact by barge, the DOE achieves a 10 percent reduction in worker radiation exposure while saving \$7 million, a year's worth of work, and 80 cross-country truck shipments of low-level waste.

Yet at larger plants, this method will not work. The pressure vessels there will have to be cut up into pieces and shipped by land.

“This method they're using is short-

sighted,” said Cynthia Pollock, a researcher for the non-profit Worldwatch Institute, a research organization funded by the United Nations and private foundations. “By employing cost-cutting measures now, DOE is depriving the international nuclear industry of invaluable lessons. The most difficult task decommissioning crews of the future face is dismantling the pressure vessel and its contents...Cutting it up is costly and dangerous, and the technology for it has not even been developed.”

There are also differences between Shippingport and other plants in matters of cost and who will pay.

The DOE's estimates for dismantling larger plants approach \$150 million, but other projections range up to \$400 million. In some of these estimates, a full 40 percent is allotted to the cost of waste disposal. If disposal costs rise significantly, as many expect, so will the costs of decommissioning. Predicting dismantling costs a decade or two from now is problematic.

The federal government is picking up the tab at Shippingport. Will current utilities, Pollock and others ask, even be around in 50 years to pay the bill at their plants? Will a future generation suddenly face a sharp rate hike to fund what is essentially a hidden cost of a plant built decades before?

None of these issues, though, represent the most glaring difference between Shippingport and other plants. The greatest difference involves radioactive waste disposal. Shippingport, being federally owned, has places to send its waste. Other plants face a tougher situation.

Each year of its operation, an average pressurized-water reactor sends about 400 cubic meters of low-level wastes - everything from torn-up concrete blocks to used gloves and tools - to one of three commercial disposal sites operating in this country. By comparison, a dismantled reactor will produce an estimated 18,000 cubic meters of such waste.

Shippingport is sending its huge volume of dismantled waste to the federal reservation at Hanford. Private power companies for the time being must hope that the three existing private sites, one each in Nevada, South Carolina and Washington, possess the capacity and inclination to handle their greatly increased loads.

This is not likely. Each of the sites in recent times has set limits on the volume of waste it will accept and has instituted substantial surcharges for future shipments from outside its own region.

Congress in 1980 passed the Low-Level Radioactive Waste Policy, requiring each state to be responsible for its own low-level waste by the start of 1986 and encouraging bordering states to form regional disposal sites. But local politicians, looking at public protests and technical problems, did not rush

to meet this deadline. An amendment to the law passed in 1985, allowing a seven-year extension.

The plants face an even greater problem with high-level waste which is composed mainly of spent fuel. Shippingport sent its spent fuel to a federal military facility in Idaho. Private companies have no place at all to send their spent fuel.

At every nuclear power plant in this country, the spent fuel - now comprising some 12,000 metric tons - is being stored on site in temporary water-filled “swimming pools.” The utilities have no other choice. There are no permanent high-level radioactive waste disposal sites operating anywhere in this country.

This void was dealt with only recently. In 1982, Congress passed the Nuclear Waste Policy Act, mandating that the federal government develop two such permanent sites, the first by 1998. But political and legal squabbles over where they will be located threaten to delay their creation well into the next century.

Plans for a temporary high-level storage site in Tennessee have also faced legal and political opposition.

The DOE does not see the problem of spent fuel as one lying at the feet of the decommissioning team. Spent fuel, they point out, comes from a plant's operation, not its retirement.

But power companies will not be able to dismantle their nuclear plants and walk away from their sites until they have a place to send their spent fuel.

As it happens, this situation does not particularly trouble the power companies or the DOE. There is considerable logic in waiting dozens of years to dismantle the plants.

Cobalt, the chief radioactive element in a shuttered plant, has a five-year half-life. If the utility waits 30 years - six half-lives, the radioactivity will be reduced to less than three percent of its original level. After 50 years, it will be down to one-tenth of one percent.

While they wait, the utilities can be gradually setting aside, in interest-bearing accounts, the sums they will eventually need to finance dismantling.

For these reasons, mothballing promises to be the fate of most nuclear plants as they are retired, not dismantlement.

Three other commercial nuclear power plants besides Shippingport have been retired and await decommissioning of some sort - Humboldt Bay in Northern California, Indian Point 1 in New York and Dresden 1 in Illinois.

By Barry Siegel
L.A. Times/Washington Post
News Service
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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 news-magazine 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. You might even organize one in your community.

- 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.

For more information:

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

U.S. Department of Energy
Nevada Operations Office
P.O. Box 98518
Las Vegas, NV 89193-8518
(702) 295-3521

U.S. Department of Energy
Office of Civilian Radwaste Mgmt.
Mail Stop RW040
Washington, D.C. 20585
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We Want to Hear From You...

I'd like you to send me:

1. Former Newsletters (if in print)
2. Yucca Mountain Repository Map
3. Nuclear Waste Fact Sheets:

- A Yucca Mountain Repository:
What will it look like?
- A Yucca Mountain Repository:
How would it operate?
- The Nuclear Waste Policy Act
of 1982: What does it do?
- What is spent nuclear fuel and
how much waste is there?
- Why Yucca Mountain?
- A Yucca Mountain Repository:
What are Nevada's Concerns?
- Yucca Mountain: Transportation
to a Repository.

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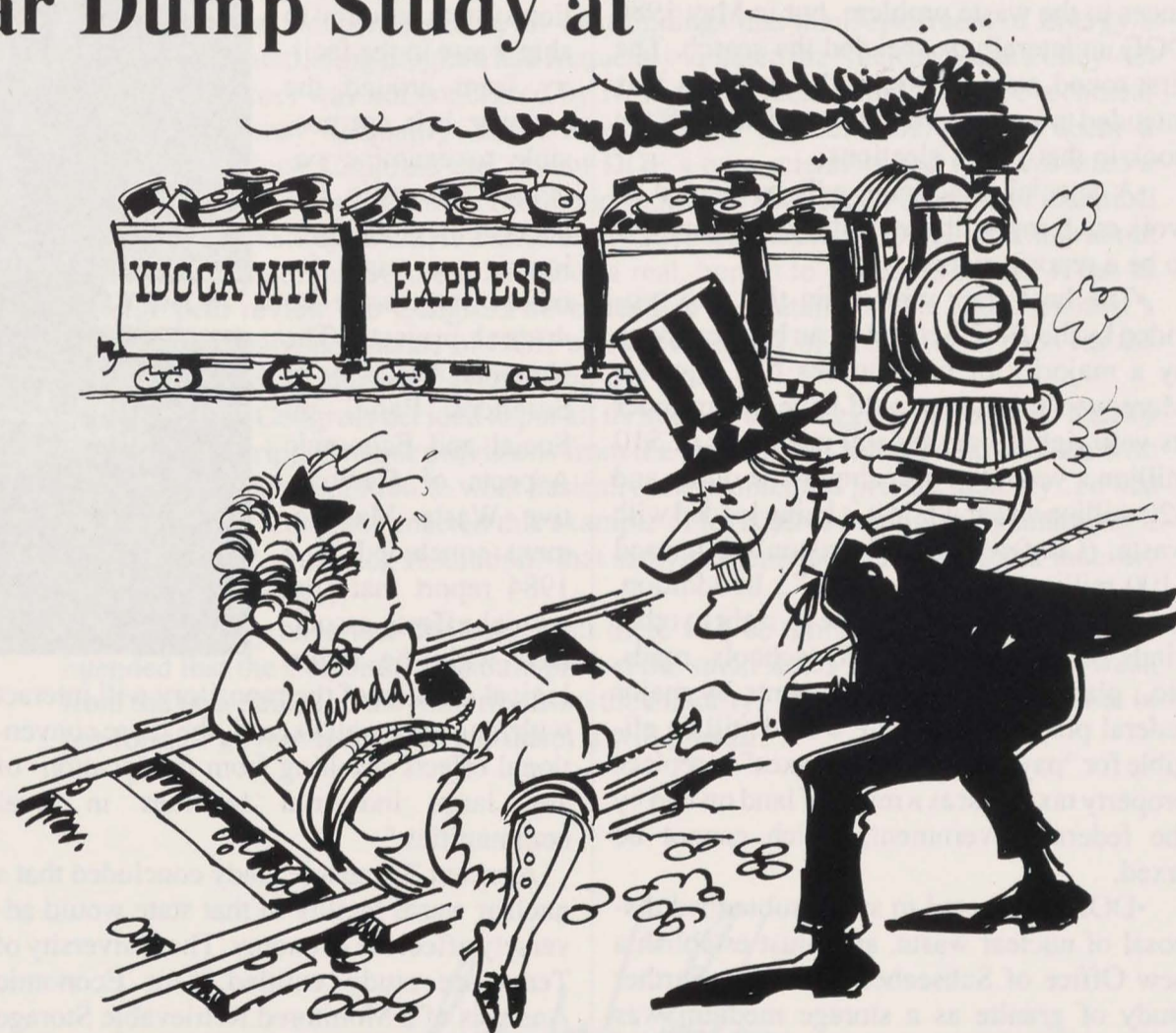
Congressional Christmas Gift to Nevada? Single-site Nuclear Dump Study at Yucca Mountain

In the rush to go home for Christmas, House-Senate conferees gutted the Nuclear Waste Policy Act of 1982 and left Yucca Mountain as the only site to be studied for suitability as the country's first high-level nuclear waste dump.

The decision came December 17 as conferees considered a House bill pushed by Rep. Mo Udall, D-AZ, and another by Sen. J. Bennett Johnston, D-LA, which was favored by the nuclear power industry. Udall, heeding claims the Department of Energy had violated the Act and had pursued a politically oriented course, called for a moratorium on the site selection process so that Congress could determine what went wrong and get the program back on track. Johnston's "screw Nevada bill" offered \$100 million a year to the host repository state, and appeared to target Nevada as the host because Yucca Mountain would likely be the first of three candidate sites to be characterized. During the conference, one Congressman after another was assured his state would not get the dump. Finally, the House conferees moved to let every state except Nevada off the hook. Johnston, who had sought approval of an MRS, agreed to postpone it until the repository is built. Thus, conferees adopted amendments that specifically named Nevada for the study. Nevada's four-member delegation, lacking seniority, was not represented on the conference committee.

The amendments, tacked on to a budget reconciliation measure that subsequently cleared both houses, contained these provisions:

•Sites in Texas and Washington, recom-



mended in May 1986 for site characterization along with Yucca Mountain, were eliminated from further consideration. Yucca Mountain was named as the site where the Department of Energy (DOE) will drill the first exploratory shaft for a permanent waste dump. If DOE finds the site unsuitable, it must cease work, report to Congress and await new directions. Under the original Act, site screening was to be reduced to three potential candidates, all of which would be characterized to determine the most suitable. Nevada had contended that

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Issue Highlights

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- 5** Many Countries Seek Solution to Nukewaste Storage Problem
- 8** Judge Rules Bullfrog County Legislation Unconstitutional

Gift to Nevada

(continued from page one)

the "winner" must be selected from three sites, all judged suitable, otherwise DOE could include two candidates it knew would not be qualified in order to assure its favorite would be the finalist.

•A monitored retrievable storage (MRS) facility was authorized, but cannot be constructed until the permanent dump is licensed. This postponement assured support from states that were candidates for the MRS. Under the original Act, the MRS siting program would be concurrent with the repository search.

•Consideration of a second repository in the eastern half of the country was scrapped. Years down the line, the secretary of energy must advise Congress of the possible need for a new one. The 1982 Act required there be a second repository to provide regional balances to the waste problem, but in May 1986 DOE unilaterally suspended the search. The first-round states claimed the decision was intended to get eastern state candidates off the hook in that year's elections.

•A special negotiator will be named to work out terms with a state that may volunteer to be a repository host.

•The host state will retain the veto provided by the 1982 Act, but it can be overridden by a majority of both houses of Congress. Moreover, the state would have to surrender its veto right to get federal payments of \$10 million a year after agreeing to the dump and \$20 million a year while it is being loaded with waste. (Conferees said Johnston's proposed \$100 million was "too lavish".) In addition, the state would have to waive its right to other kinds of federal impact aid (schools, roads, etc.) placed on local governments by major federal projects. The state would still be eligible for "payments in lieu of taxes" to replace property taxes lost as a result of land owned by the federal government, which cannot be taxed.

•DOE is directed to study subseabed disposal of nuclear waste, and must establish a new Office of Subseabed Research. Further study of granite as a storage medium was banned.

•DOE is directed to give "special consideration" to proposals from the repository state in siting federal research projects. (Nevada competed for the multibillion-dollar Super-conductor Super Collider project, but was not on the list of finalists issued after the Yucca Mountain decision).

Study to Show Potential Impact of Repository on the Economy

The State of Nevada is embarking upon a study of social and economic impacts linked to a potential high-level nuclear waste repository at Yucca Mountain. The Agency for Nuclear Projects/Nuclear Waste Project Office (NWPO) says that researchers will study selected groups of individuals crucial to the state's economy.

They include tourists, retirees who are considering relocation to Nevada, convention planners, and business executives responsible for location decisions.

Because of the "nuclear" nature of the repository itself and the "nuclear" transportation system required to ship waste to the facility from around the country, it is not possible to examine potential economic impacts in the same fashion as one might for other large-scale industrial projects. The National Academy of Sciences Panel on Social and Economic Aspects of Radioactive Waste Management concluded in a 1984 report that "the special effects associated with the radiological mission of the repository will interact with, and may well exceed, the more conventional effects resulting from the location of any large industrial facilities in rural communities."

A recent Tennessee study concluded that a nuclear waste facility in that state would adversely affect the economy. The University of Tennessee study entitled, "An Economic Analysis of a Monitored Retrievable Storage Site for Tennessee," (December 1985), in-

cluded a survey of 306 randomly selected, out-of-state individuals. More than 47 percent of them said they would alter previously set vacation plans if they later learned that their vacation site was located near a Monitored Retrievable Storage facility (MRS). Of those who indicated they would alter plans, more than half said they would still change them even if the facility were 100 miles away from their destination, and more than two-thirds said they would change plans if the facility were 50 miles away. The same study also looked at possible impacts on economic development. Of 130 business executives interviewed, 55 percent indicated that an MRS would reduce their willingness to locate a business in a county that contained such a facility.

When one considers that tourist-generated revenues account for much of the tax base in Nevada and that tourism-related industries are the state's largest employer, any reduction in visitors could have catastrophic consequences. If a repository or a repository-related accident caused tourism to decline even a few percentage points - let alone the 40-50 percent reflected by the Tennessee study - Nevada could be faced with a significant economic downturn. Likewise, any impact on the willingness of new businesses to locate in Nevada would be a severe blow to the state's economic diversification efforts.



“

Any reduction in visitors could have catastrophic consequences. Likewise, any impact on the willingness of new businesses to locate in Nevada would be a severe blow.

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Legislators Visit High-level Nuclear Waste Facilities in Europe

Nevada legislators who visited high-level nuclear waste facilities in Europe said reprocessing and salt storage should be investigated as alternatives to a repository in Yucca Mountain tuff.

Six members of the Legislature's High-Level Committee on Radioactive Waste went on the September tour sponsored by the National Conference of State Legislatures. A total of 22 legislators from six states visited the facilities in Sweden, West Germany and France.

Committee Chairman Senator Thomas J. Hickey of North Las Vegas said the participants "were able to exchange ideas and to observe first-hand the effectiveness of each nation's efforts in dealing with scientific, environmental, economic and political issues related to radioactive waste management."

Assemblymen Gaylyn Spriggs and James Schofield said they were impressed with the Asse salt dome in West Germany, which will receive spent fuel rods in tests to see if the salt is suitable for storage. Spriggs said the Department of Energy should offer to put the country's first repository in New Mexico salt, as that state's governor suggested. She also said reprocessing waste offers a more practical solution and a Monitored Retrievable Storage (MRS) facility would be good because it would reduce the volume of waste to be transported to a repository.

Assemblymen Matt Callister and Jack Jeffrey said the tour was helpful. Hickey said he hopes to bring European waste management experts to a Las Vegas meeting.

Where to Write

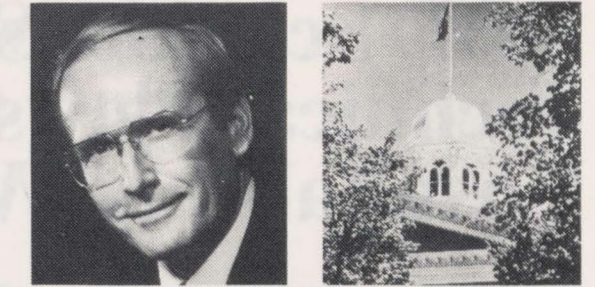
Readers of the Nevada Nuclear Waste Newsletter who desire additional information about issues or documents discussed in the Newsletter are encouraged to write to the offices listed below.

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

Department of Energy, Nevada Operations Office, P.O. Box 14100, Las Vegas, NV 89114. 702/295-3662.

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Governor's Statement

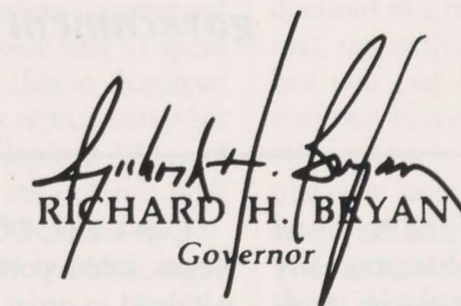


In the bicentennial year of the Constitution, Congress gave a shameful demonstration of constitutional government. Forty nine states ganged up on Nevada and said they intend to locate the country's first high level nuclear waste dump at Yucca Mountain. Like sharks in a feeding frenzy, the states attacked Nevada. They said, "We're giving you the nuclear dump and there's nothing you can do about it. As long as we don't have to take the dump, we don't care what happens to you." Nevada's small congressional delegation wasn't even invited to take part in the House-Senate conference that singled out their state.

Congress was not concerned by its own findings that the Department of Energy's politically oriented siting program had frequently violated the Nuclear Waste Policy Act of 1982. Congress was not concerned by Nevada's evidence that there are technical problems that may disqualify Yucca Mountain. Of course, DOE did not deem it necessary to advise Congress that one of DOE's own scientists had just presented a report strongly suggesting Yucca Mountain should be abandoned because of technical flaws. But shucks, says DOE, it wasn't really a report. Sure, says DOE, we knew about it and what it said, but before it becomes a real, honest to goodness report, it has to undergo peer review. So Congress never learned the details of this DOE scientist's study. I doubt anyone outside of DOE would ever know of it, had it not been for the author's courage in making it available to the state.

At any rate, Congress decided to put all its nuclear waste eggs in one basket, a leaky one at that. It stripped major provisions from the original Act and saddled Nevada with a federally dictated solution to what basically is a problem of private industry. To add insult to injury, Congress enacted this example of legislative ineptitude by attaching it to another - a "continuing resolution" that sadly demonstrates congressional inability to formulate a budget.

Nevada may have lost this battle, but there will be more. The Founding Fathers intended that the Constitution should protect the small states from the large, the weak from the powerful, and the minority from the majority. That principle is a keystone of our form of government. I am confident it will prevail.


RICHARD H. BRYAN
Governor

DOE Scientist Supports Nevada Claim That Technical Flaws Make Yucca Mountain Unsuitable as Waste Dump Site

Gov. Richard Bryan has accused the Department of Energy (DOE) of covering up a report by one of its scientists who said DOE should consider abandoning Yucca Mountain as a potential nuclear waste dumpsite because of technical flaws.

Bryan obtained the report from Jerry Szymanski, a physical scientist who has worked for four years at DOE's Waste Management

Project Office in Las Vegas. The governor said DOE had it in November, a month before Congress named Yucca Mountain as the only site to be studied as a potential dump. He said DOE, which lobbied for the selection of Yucca Mountain, failed to inform Congress of the contents and implications of the report.

The Szymanski report said that, because of potential faulting problems with geologic and hydrologic conditions, "serious consideration should be given to abandoning the Yucca Mountain site and declaring it as unsuitable for the purposes of permanent disposal of the high-level nuclear wastes."

Bryan said withholding such a report at a time Congress was debating amendments to the Nuclear Waste Policy Act of 1982 was "an indictable offense" and "bureaucratic arrogance of the highest order." He said the report was presented to DOE officials at least as early as last November, but that it draws on information that was available for more than three years.

"It confirms what state researchers have been saying for some time—that geologic and hydrologic conditions at Yucca Mountain not only make the site a poor repository choice, but actually constitute an unacceptable environment for long-term geologic disposal of nuclear materials."

Bryan said DOE should suspend its study of Yucca Mountain while an independent panel reviews the report, which theorizes that future pressures deep beneath Yucca Mountain could force water into the storage caverns through cracks in the rock. This could result in corrosive water eating away at the canisters that contain the waste, eventually allowing the radiation to reach the biosphere.

ally be built there.

"We have contended all along that the site is geologically unsuitable for isolating radiation from the biosphere for 10,000 years as the law requires," he said after the December decision. "We have argued that earthquake faults running through there could become pathways along which water could pick up radionuclides. Moreover, there is new evidence that nearby cindercones represent volcanism that is more recent and active than had been thought.

"It will be DOE's burden to prove that these problems are not automatic disqualifying features under the Nuclear Waste Policy Act. We will track DOE's site characterization work very closely. Any shortcomings will be challenged when DOE asks the Nuclear Regulatory Commission to license the construction of a repository."

He said the site characterization and licensing procedures won't be completed until around the turn of the century.

"That leaves time for scientists to come up with a better way to dispose of nuclear waste, other than putting it in a hole in the ground. In addition, we still have suits pending that challenge DOE's repository program."

Bryan also said he would like to have the Supreme Court review the manner in which Congress made its site selection decision.

"Political hardball is one thing, but it is political rape when a weak state is forced by the other states to accept something it does not want. This is not the way a constitutional government should operate.

"The bottom line is that the fight is not over. A lot of things can happen before it ends," he said.



This is not the way a constitutional government should operate.

—Gov. Richard Bryan

Carl Gertz, DOE project manager in Las Vegas, told reporters the report had not been withheld in order to influence Congress. He said DOE had not yet had a chance to review it, but was setting up a process of peer review to verify the study's accuracy. He called it a preliminary report by one person whose conclusions could be wrong or interpreted in different ways.

The report supported Bryan's contention that congressional action to study only Yucca Mountain does not mean the dump will actu-

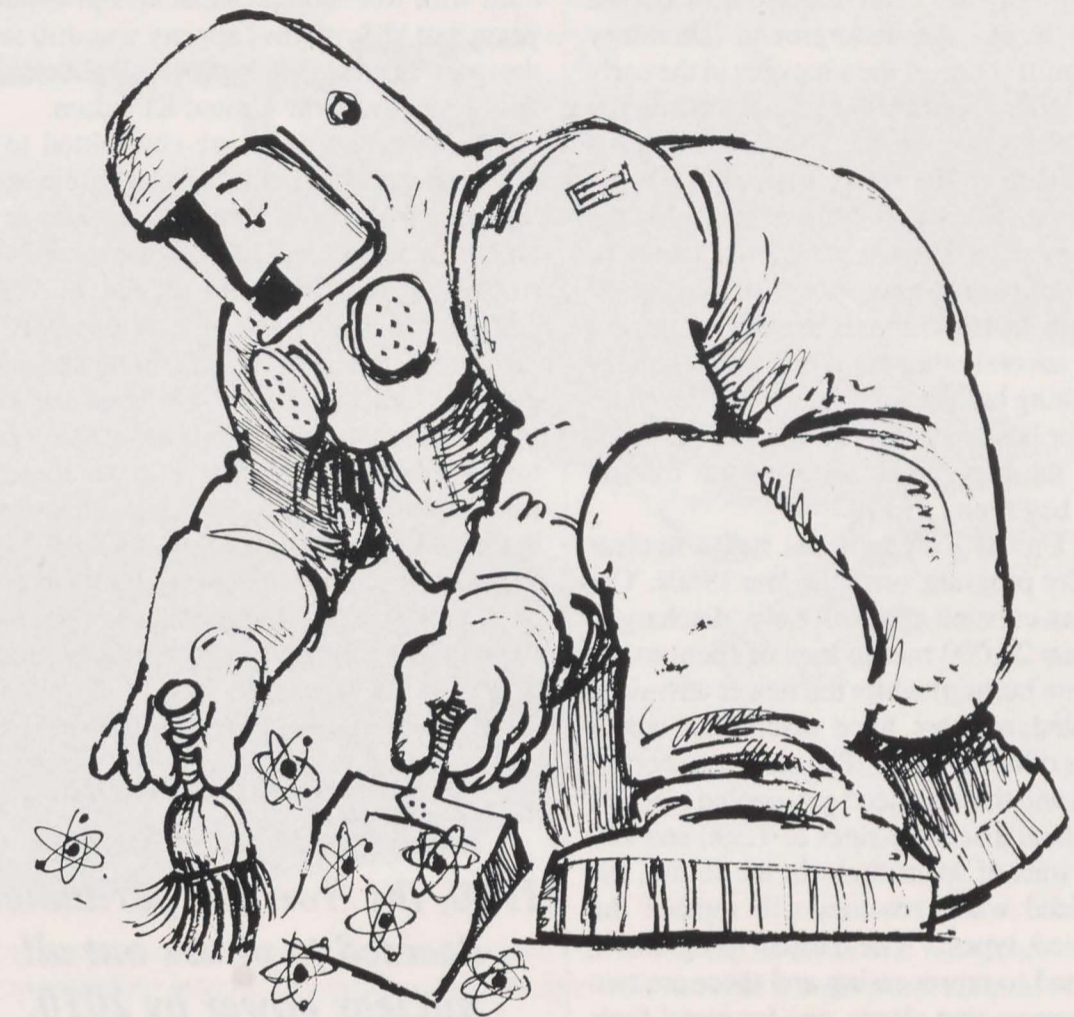
How Foreign Countries are Dealing with the Challenge of Effective Nuclear Waste Dumps

The nations generating electricity by nuclear power are contending with the challenges of nuclear waste management in diverse ways which are dictated by the type of operating reactors, the decision to reprocess, and the types of geology available for a repository. The most common reactor is the light water reactor (pressurized water reactor) and the boiling water reactor which uses enriched uranium oxide fuel. The fuel burnup, the amount of uranium 235 used up in the fissioning process is high, but the amount of uranium and plutonium left in the spent fuel is still significant.

France and the United Kingdom are major reprocessors of oxide fuels. Japan and the Federal Republic of Germany are constructing large reprocessing complexes. Nations that cannot afford the expensive reprocessing plants have contracts with France and the United Kingdom for the reprocessing of their oxide fuels through the early 1990s.

Recycled plutonium in the form of an oxide mixed with slightly enriched uranium, also in the form of oxide, is now used light water reactors. The fuel is known as mixed oxide fuel. Canada has pioneered the heavy water moderated and light water cooled reactor which uses natural uranium and is known also as CANDU. It is not clear whether there is an economic incentive in the foreseeable future for reprocessing spent fuel from the CANDU reactor. However, India, which has no uranium enrichment facilities, is reprocessing fuel from its heavy water moderate light water cooled reactor, with the intent of becoming a nuclear power.

From 1976 to 1980, the United States had adopted a policy of no reprocessing of commercial spent fuel. The policy was lifted in 1980, but there has been no interest by the private nuclear industry in reprocessing. Currently, the Department of Energy (DOE) is preparing to dispose of all the commercially spent fuel in a deep geological repository. Canada and Sweden also may dispose of the spent fuel directly in a geological repository. France, the United Kingdom, West Germany, Japan, and the Soviet Union are committed to reprocessing. A large, affluent country like the United States could consider the luxury of characterizing three different geological sites for a repository, even though only one site eventually will be developed. Smaller nations can give consideration only to one site and to the geological formation available. Sweden is committed to granite, while Belgium is seriously considering a clay formation. This article summarizes various foreign programs. For comparison, a brief summary of the United States effort is included at the start.



The United States currently has the most operating nuclear powered generating plants (more than 100). Their total output leads any other country. With one exception, the power plants are light water reactors. There are over 16,000 metric tons of spent fuel in storage and about 2,000 metric tons that are added annually (almost entirely oxide fuels). Almost all the commercial spent fuel is stored at the reactor sites in deep pools of water. More recently, older spent fuel elements have been transferred to dry storage (massive casks of nodular cast iron or forged steel) at those reactor sites that are running out of wet storage space. There is no program to reprocess commercial spent fuel, but there is reprocessing of spent fuel from Navy reactors (Idaho National Laboratory, ID) and there is reprocessing for weapons grade plutonium (Hanford, WA, and Savannah River, NC). All the defense high level waste is to be vitrified before disposal. One large vitrification plant is nearly completed at Savannah River.

The activities to develop the first repository are governed by the Nuclear Waste Policy Act of 1982. The DOE has been entrusted with the management of all activities which now center on site characterization of Yucca Mountain, a tuff formation. The repository must be licensed by the Nuclear Regulatory Commission (NRC). Currently, the first repository is scheduled to 2003. It will

be designed to store the commercial spent fuel and the vitrified high level waste from defense activities. A small amount of commercial vitrified waste will come from a decommissioned reprocessing plant at West Valley, NY.

France also has a large electric nuclear power program. The older power plants are gas-cooled reactors that have produced more than 17,000 metric tons of spent fuel (metal) of low burnup. The newer and great majority of plants are of the PWR type, which have produced more than 3,000 metric tons of spent fuel (oxide). The gas-cooled reactors and pressurized water reactors have annual productions of 2,600 and 700 metric tons of spent fuel, respectively. The French program also has two fast breeder reactors. The French program is committed to the reprocessing of all spent fuel. There are several reprocessing plants in operation and under construction, mostly at La Hague on the English Channel. The storage of spent fuel at the reactor sites is short. The fuel is shipped to storage pools at the reprocessing plant after an initial cooling period of about a year. The high-level waste resulting from reprocessing is immobilized by vitrification. The French nuclear waste agency ANDRA is in the process of selecting four sites in granite, clay, shale and salt for further evaluation. A granitic site has been chosen near Poitiers in western France. A salt

continued

Effective Nuclear Waste Dumps...

Continued

site reportedly has been selected near Bresse (French Jura). An underground laboratory will be built at one of the four sites in the early 1990s. After about two years of construction and several years of study, a determination will be made on the suitability of the laboratory for transformation into a deep geological repository. The French program expects to have an operating repository for high-level waste after 2010. France is reprocessing spent fuel for several other countries and is storing the resulting high-level waste. The French reprocessor has announced the intention of returning the high-level waste to the foreign owners beginning in 1992.

The United Kingdom has had a nuclear electricity program since the late 1950s. The older gas-cooled reactors have discharged more than 27,000 metric tons of spent metal fuels (low burnup) while the newer advanced gas-cooled reactors have discharged about 900 tons of oxide fuels. The older gas-cooled reactors and the advanced gas-cooled reactors have annual discharge rates of 1,300 and 120 metric tons of spent fuel. In the future, the pressurized water reactors will replace the gas-cooled types. The British program is committed to reprocessing and there are two large reprocessing plants, one for metal fuels and one for oxide fuel (THORP which is under construction) at Sellafield. The metal fuel has a magnesium cladding (magnox fuel) and cannot be stored long in water because of corrosion. The fuel is stored up to 12 months at the reactor site and then is shipped to Sellafield for further storage and reprocessing.

The magnox reprocessing plant has come under serious criticism and there have been demands for closure because it is discharging low-level liquid radioactivity into the sea. The oxide fuel, which is stainless steel clad, is wet-stored at the reactor site for one to two years and then shipped for further storage and reprocessing in the oxide reprocessing plant. Sellafield also stores light water reactor fuels for reprocessing from Japan, Germany and other countries. All the high-level waste will be immobilized by vitrification and stored for decades. A large vitrification facility is under construction.

The United Kingdom has discontinued a research drilling program for a high-level waste repository and will concentrate on using the information gathered by foreign programs. The final disposal of high-level waste is not contemplated before 2040.

The Federal Republic of Germany (FRG) has a nuclear power program that is built around light water reactors. The cumulative discharge of spent fuel is more than 3,100 metric tons and the annual discharge rate is 400 metric tons. Power plants in the FRG are

built with wet storage capacities of about 10 years, but little of this capacity was utilized in the past because of reprocessing contracts with France and the United Kingdom.

The West Germans are committed to reprocessing. Construction of a large reprocessing complex, which includes dry storage facilities for aged spent fuel elements, and a vitrification plant has been begun at Wackersdorf. The FRG has had an underground laboratory in the Asse salt mine for many years. A salt dome near Gorleben has been selected for the first high-level waste repository. An experimental shaft is under construction. The Gorleben repository is scheduled to begin receiving high-level waste after 2000.

Swedish utilities operate 12 light water nuclear power plants that produce about half of the nation's electricity. The cumulative pro-

“ Following a national advisory referendum in 1980, the Swedish parliament decided to phase out all nuclear power by 2010. **”**

duction of spent fuel is about 2,000 metric tons and the annual discharge rate is 250 metric tons. Following a national advisory referendum in 1980, the Swedish parliament decided to phase out all nuclear power by 2010. Spent fuel discharged in the 1970s had been contracted for foreign reprocessing but, with the adoption of the phaseout plan, Sweden has switched to a policy of direct disposal of spent fuel. The Swedish utilities have built an intermediate wet-storage facility known as CLAB that is being expanded to a capacity of 7,500 metric tons. It eventually will store all discharged spent fuel. All reactor sites are located on the Baltic coast and all spent fuel is transported by ship to CLAB. There, the spent fuel elements are placed in large stainless steel-lined concrete vats that are stored under water in an underground cavern. It is planned to store the spent fuel elements at CLAB for about 40 years. Sweden has had an underground laboratory in granite at Stripa for many years. The site is an abandoned century-old iron mine. The geological repository is planned in crystalline rock. Two or three sites will be selected during the 1990s for detailed investigations. The final repository is expected to become operational in 2020.

The Canadian nuclear power program is based on the CANDU reactor that burns natu-

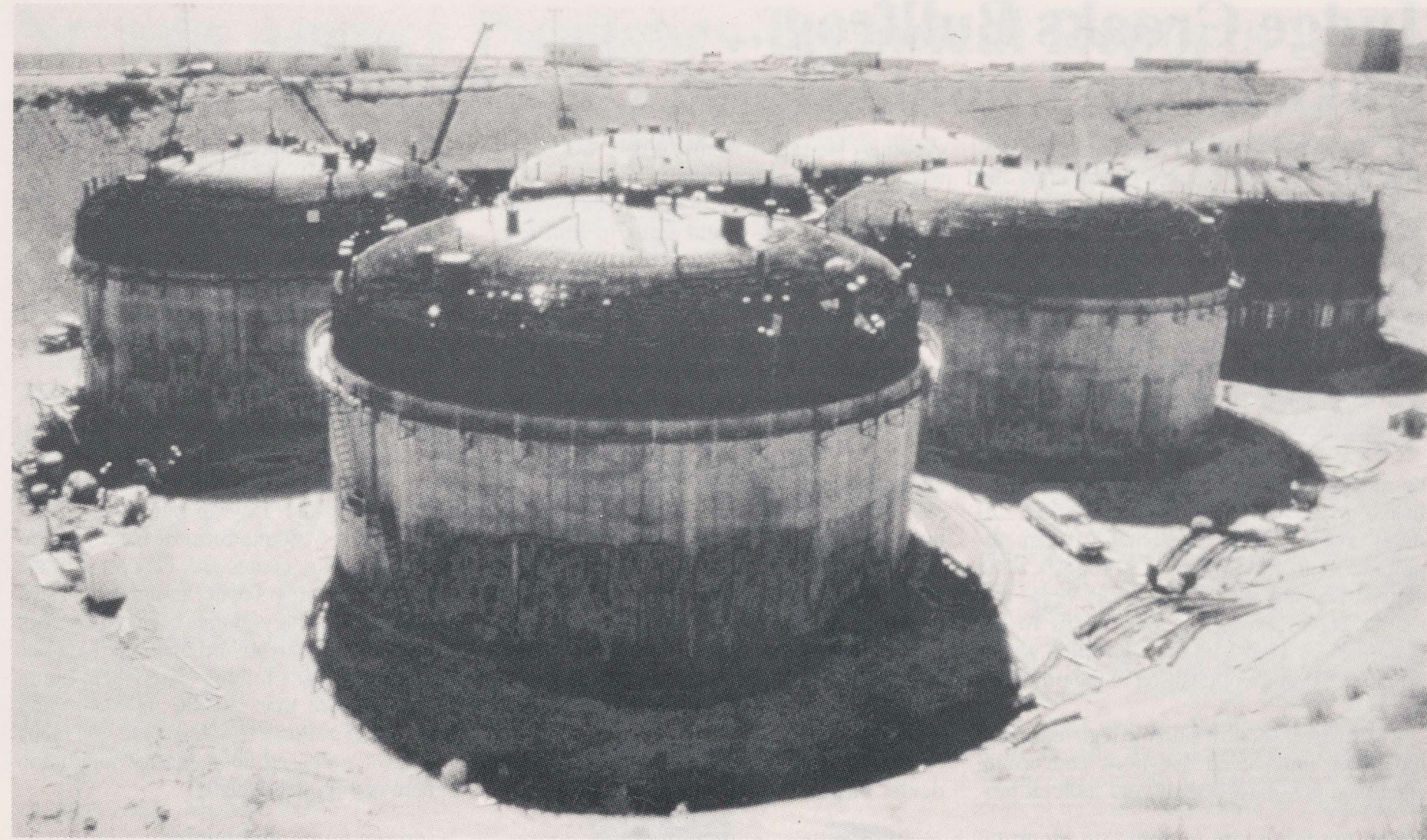
ral uranium. This type of reactor discharges large amounts of spent fuel of low burnup. The cumulative amount of discharged spent fuel is nearly 12,000 metric tons and the annual discharge rate is 1,500 metric tons. Canadian reactors are constructed with extensive wet-storage capacity for spent fuel, but additional dry-storage facilities are planned for the 1990s. All spent fuels are currently stored at the reactor sites. Canada has adopted a policy of direct disposal of spent fuel, but reprocessing has not been dismissed completely. Canada is expanding an underground laboratory in the Lac Du Bonnet granite in Manitoba. The final geological repository will be constructed in granite. The United States had been funding some of the work as part of its crystalline rock program. The final repository is not scheduled to operate before 2020.

Japan also has a sizable nuclear power program. The power plants are light water reactors that have discharged more than 5,000 metric tons of oxide fuel. The annual production of spent fuel is more than 800 metric tons. The Japanese program is committed to reprocessing and a large facility is under construction at Rokkashomura in northern Honshu, Japan's main island. Currently, reprocessing is done under contract in France and Great Britain. The spent fuel is stored in the reactor storage pool for an initial cooling period of two to three years. Since all the Japanese power plants are on the coast, transportation of spent fuel is by ship. The contracts with the European reprocessors expire in 1990. The spent fuel discharged after that time may be stored in a pool near the reprocessing plant under construction.

The Japanese plan to immobilize the high-level wastes from reprocessing by vitrification. The vitrified waste will be stored for 30 to 50 years. A deep geological repository is not expected to be operational before 2020.

Belgium has seven PWRs producing nearly 60 percent of the country's electricity. Figures on cumulative spent fuel production and annual rate of discharge were not available for this article. However, Belgium seems to be committed to reprocessing. A small reprocessing plant had been in operation at Mol but was decommissioned. A vitrification plant has been built at the site to immobilize all the high-level waste in storage. Reprocessing is now done under contract in France. Belgium has some granite formations, but it also has a very large formation of "boom clay" near Mol. An underground laboratory is under construction.

Switzerland has five operational light water reactors. At the writing of this article, no literature was available about the amount of discharged spent fuel, the annual discharge



Waste from government research and weapons programs is reprocessed at federal plants in Idaho, North Carolina and Hanford (above). However, the private nuclear industry has expressed no interest in reprocessing. Double-wall tanks at Hanford store liquid resulting from reprocessing of defense waste.

rate and the storage management of spent fuel. Switzerland is committed to reprocessing and all the nuclear fuel is under contract for reprocessing in France or Great Britain. The option for direct disposal of spent fuel is kept open for fuel to be discharged after 1993. Switzerland is considering disposal of high-level waste in either granite, Alpine marl, and anhydride beds. Three promising sites, one for each geological formation, have been singled out for further evaluation. The Swiss have built a test tunnel, 3.5 meters in diameter and 900 meters long, in granite at Grimsel Pass. The United States had been funding some of the hydrological studies at Grimsel Pass under a bilateral agreement.

The Netherlands is a good example of a country with a small nuclear power program. There are two small nuclear power plants that produce about 7 percent of the country's electricity. The spent fuel was sent for reprocessing to France and the United Kingdom. As mentioned previously, the French reprocessor has announced the intention of returning the high-level waste starting in 1992. The Dutch have begun planning for the annual receipt of 20 cubic meters of vitrified high-level waste and 70 cubic meters of conditioned low-level waste. The Dutch are completing a 30 hectares storage site for all their high-level and low-

level nuclear waste. After a storage period of 50 to 100 years, a total of 100,000 cubic meters of radioactive waste will have been accumulated, and an economic exploitation of a geological repository will be feasible.

No technical literature on waste management was available for a number of countries that have significant nuclear power programs. However, there have been many reports in the news media. Spain has a significant program based on the light water reactor. Spain had chosen a site in granite near Aldeadavila for the construction of a research facility to dispose of the high-level waste. The site touched off protests in Portugal since it is only four miles from the border and eventually was cancelled. Italy has a small nuclear program.

Taiwan and Korea have significant nuclear programs that are based on American manufactured light water reactors. Both countries have agreements with the United States to ship back their spent fuel in exchange for foregoing reprocessing. The agreements date back to the administration of President Ford. Some spent fuel from Taiwan was shipped in casks to the United States recently. This drew protests from West Coast port authorities. Korea has a large scientific exchange program with Canada. This indicates a strong interest in granite. Australia has announced that it plans to ship

450 spent fuel elements for reprocessing to the United States where the fuel was produced. India has a nuclear power program that is based on the CANDU type reactor using natural uranium. India is committed to fuel reprocessing. Argentina, which has three CANDU type reactors, has announced plans for a geological repository that will be operational by 2005. A site has been chosen in Patagonia near the town Gastre.

The Soviet Union, Czechoslovakia, the German Democratic Republic and Hungary all have large nuclear power programs that use pressurized water reactors and light water-cooled graphite-moderated reactors (Chernobyl type). All the reactors are of Soviet design and origin. No literature has been found on the amount of spent fuel in storage, the annual discharge rates, and storage practices. The Soviets and their satellites are firmly committed to reprocessing. Presumably all the reprocessing is done in the Soviet Union which assumes responsibility for the high-level waste. As for the ill-fated Chernobyl reactor, the site and the spent fuel were disposed of by being covered with lead and contaminated dirt from the immediate surroundings. The man-made mound was then entombed in a blanket of reinforced concrete.

Judge Croaks Bullfrog... Nuke Dump County Ruled Unconstitutional

A judge has scrapped legislation that created Bullfrog County surrounding the site of a potential high-level nuclear waste dump at Yucca Mountain. State Senior Justice David Zenoff, in a bench ruling following a 40-minute hearing February 11, said "I cannot in good conscience uphold this law." Nye County, from which the county was carved by the 1987 Legislature, challenged the legislation on grounds Bullfrog failed to provide representative government.

The 144-square-mile county contained no inhabitants, so the county seat was established at Carson City, the state capital 270 miles away. Governor Richard Bryan appointed Reno attorney Michael Melner, civic activist Dorothy Eisenberg of Las Vegas and realtor David Powell of Las Vegas to the commission. They said the legislation would point up Nevada's opposition to the proposed dump.

However, Zenoff said the legislation left too many unresolved questions concerning elections, law enforcement and judicial pro-

ceedings. He said it seemed likely the county would remain uninhabited.

"I get the impression that, given average circumstances that would apply to Bullfrog, chances are great that one person, the governor, would end up running that county — maybe forever."

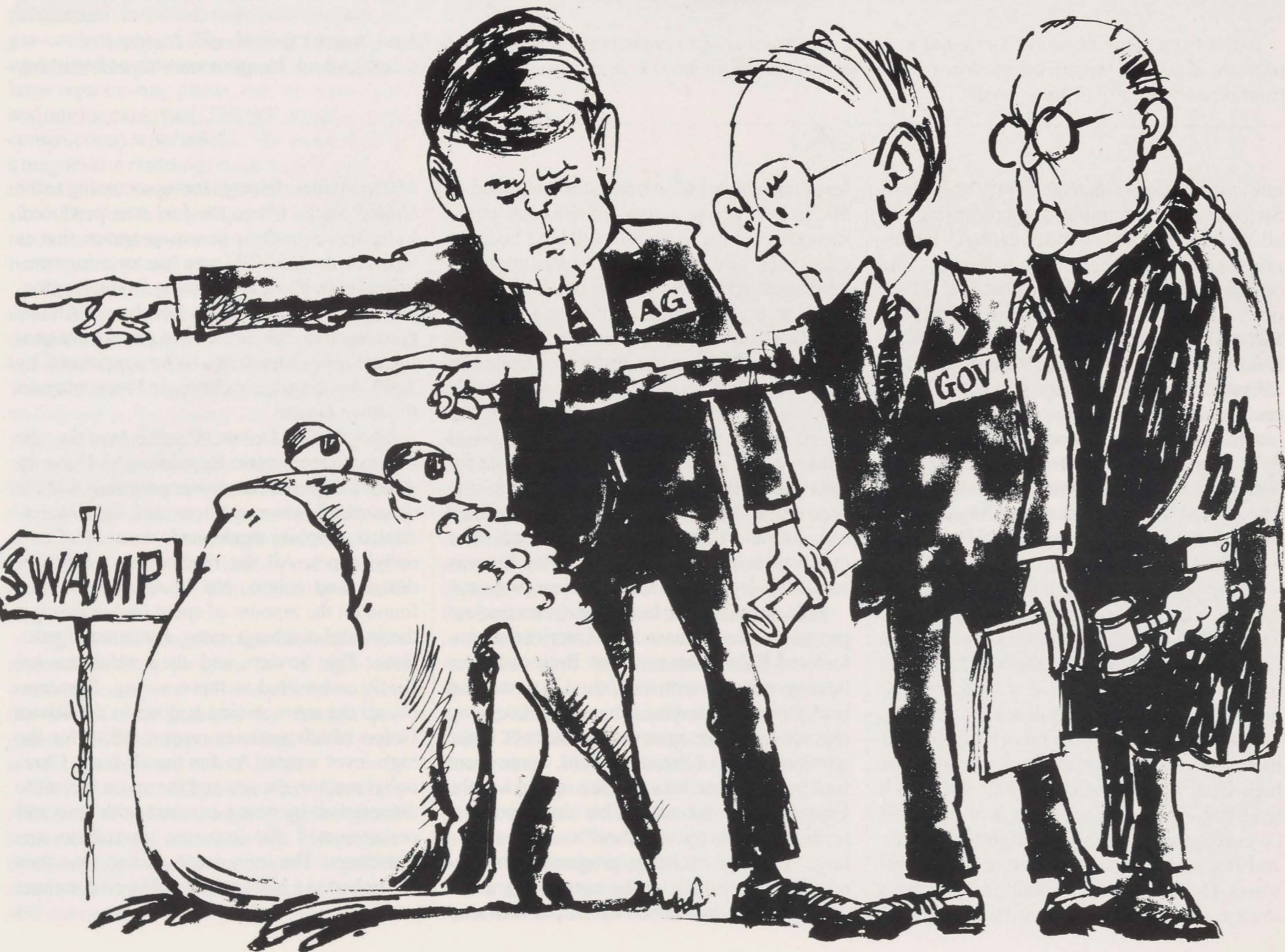
Nye County officials contended the state's purpose in drafting the legislation was to channel possible federal grants to the state, thus violating a statute prohibiting special interest legislation. They said the lack of law enforcement, a court system, or provisions for election in the county also raised constitutional questions.

In October, Attorney General Brian McKay agreed with Nye County's claim the legislation was unconstitutional, although he previously had said a law passed by the Legislature is presumed valid and his office is obligated to defend it. He told reporters, "After a lengthy and exhaustive review, the bottom line was we couldn't defend this particular piece of legislation." He said it con-

flicted with a constitutional article that requires all laws to be applied uniformly and requires county governments to be uniform throughout the state.

With McKay's opinion, Governor Bryan withdrew his support of the Bullfrog legislation. He said, "I have every reason to believe the attorney general. My job as governor is not to play lawyer."

However, the Legislative Commission, which oversees legislative matters between regular sessions, filed to intervene and hired former Legislative Counsel Frank Daykin to defend the county. Daykin said Bullfrog did not represent a unique form of local government, as McKay contended. Daykin said the Legislature merely set up another class of county — one with a population of 10 people or fewer — and laws to govern them. He said this is not unusual in a mining state where boom towns of more than 30,000 have virtually disappeared within a few years. He said many state laws are based upon county population and are not applied equally.



Nevada Agency Publishes Technical Reports

The Nevada Nuclear Waste Project Office (NWPO) has issued five technical reports dealing with certain aspects of the hydrology and geochemistry of the proposed Yucca Mountain repository site. The reports were prepared for NWPO by the University of Nevada System's Desert Research Institute.

The reports are:

- "Physics and Chemistry of the Transition of Glass to Authigenic Minerals," by Maurice Morgenstein, NWPO-TR-002-87;

- "Technical Review: Two-Dimensional Steady-State Model of Groundwater Flow, Nevada Test Site and Vicinity, Nevada-California. (By Richard K. Waddell - USGS WRI 82-4085)" By M. E. Campana, NWPO-TR-003-87;

- "Review of Modeling Efforts Associated With Yucca Mountain, Nevada," By GeoTrans, Inc., NWPO-TR-004-87;

- "Characterization of Infiltration into Fractured, Welded Tuff Using Small Borehole Data Collection Technique," by William Linderfelt, NWPO-TR-005-87;

- "Inventory of Numerical Codes Available for High-Level Nuclear Waste Repository Performance Modeling at Yucca Mountain, Nevada," by Zahra Panahi, NWPO-TR-007-87;

"Physics and Chemistry of the Transition of Glass to Authigenic Minerals" reviews the topic of volcanic-glass hydration and the diagenetic formation of authigenic minerals from the hydrated-glass products. The Department of Energy (DOE) Yucca Mountain Environmental Assessment (EA) indicates that:

1. Most of the available glass in the proximity of the repository horizon has been already hydrated and authigenic minerals which could form have already done so.

2. Zeolites could form from as yet unreacted glass during transport of water exiting from the repository.

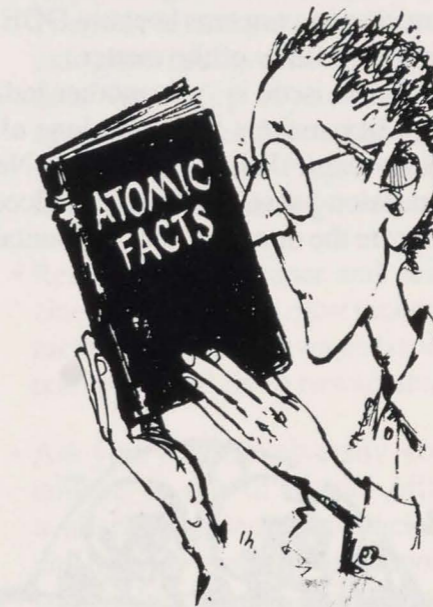
3. Zeolites and other authigenic minerals provide sorptive barriers to radionuclide migration.

References supplied with the EA provide little supporting information. In fact, conclusions 1 and 2 appear contradictory. This technical report surveys the available literature and concludes that the topic appears more complex than treated in the EA. The concern is that a determination of which authigenic minerals - if any - may form from the alteration of volcanic glass cannot be made with certainty. Consequently, radionuclide retardation leading from this reaction process is undeterminable.

The USGS report, "Two-Dimensional Steady-State Model of Groundwater Flow, Nevada Test Site and Vicinity," developed a finite-element model of the groundwater flow system of the Nevada Test Site and vicinity in

Nye and Clark counties, and Inyo County, California. The objective of the USGS study was to estimate groundwater fluxes for use in predictions of transport of radionuclides and to evaluate the effects of uncertainty in model parameters on flux estimates. The technical review of Campana concludes the model developed by Waddell is reasonable given the numerous assumptions required and the great uncertainty inherent in the limited data base. Campana cautions that this is a first cut regional model and should not be used for site-specific application at Yucca Mountain. He also concludes that other models of equal relevance could be applied to the data with vastly different results.

"Review of Modeling Efforts Associated with Yucca Mountain, Nevada" reviews five



modeling efforts of DOE associated with fluid flow in a fractured rock mass; hydrologic mechanisms governing fluid flow in partially saturated, fractured rock; the SPARTAN performance assessment code; percolation rates in deep, partially saturated zones; and heat and fluid flow in partially saturated tuff. The review evaluates the assumptions used in each effort, the analytic solutions, the optimum data bases for the particular application, and the technical appropriateness of the actual model application.

The report concludes that many of the technical assumptions underpinning the theory of the models are not supported by observed field conditions, much of the data is assumed and not field measured, many of the problems simulated have insufficient information to allow reproduction of the computed results, and that the accuracy of some of the results is questionable. The report questions the appropriateness of these modeling efforts for application to the Yucca Mountain groundwater flow system.

"Characterization of Infiltration into Fractured, Welded Tuff Using Small Borehole Data Collection Technique" reviews the use of small bore drill holes to access the near

surface fractured rock environment for the purpose of better understanding the chemistry and flow of the near surface water flow regime. The study evaluates various field techniques at a Yucca Mountain analog site in the Pah Pah Range in northern Nevada. Results of the study suggest that small diameter boreholes provide an effective, inexpensive means for gaining access to water flowing through rock. The experimental techniques and results presented in the report demonstrate the usefulness and application of small boreholes in understanding near surface flow conditions at Yucca Mountain.

"Inventory of Numerical Codes Available for High-Level Nuclear Waste Repository Performance Modeling at Yucca Mountain, Nevada" reviews predictive computer models of hydrogeologic systems which may have application to a Yucca Mountain repository site. The purpose of the study is to inventory and generally characterize numerical computer codes and to identify information required to apply the codes to Yucca Mountain. No attempt is made to evaluate each code in terms of reliability and utility. It is planned to update the inventory as new codes are developed to address the recognized complexities of unsaturated fractured tuffs.

Copies of the reports can be viewed at or obtained from the Nevada Agency for Nuclear Projects/ Nuclear Waste Project Office in Carson City.

New Publications and Documents

Environmental Program Planning for the Proposed High-Level Nuclear Waste Repository at Yucca Mountain, Nevada, NWPO-TR-001-87.

Physics and Chemistry of the Transition of Glass to Authigenic Minerals, By Maurice Morgenstein, NWPO-TR-002-87.

Technical Review: Two-Dimensional Steady-State Model of Groundwater Flow, Nevada Test Site and Vicinity, Nevada-California, (By Richard K. Waddell - USGS WRI 82-4085), By M.E. Campana, NWPO-TR-003-87.

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Characterization of Infiltration into Fractured, Welded Tuff Using Small Borehole Data Collection Technique, by William Linderfelt, NWPO-TR-005-87.

Inventory of Numerical Codes Available for High-Level Nuclear Waste Repository Performance Modeling at Yucca Mountain, Nevada, by Zahra Panahi, NWPO-TR-006-87.

Potential Nuclear Dump Raises Air Force Training Concerns

The potential siting of a high-level nuclear waste dump at Yucca Mountain has raised concerns about its effect upon Air Force training flights and the testing of nuclear weapons.

The surface facility of the proposed dump would be under the corridors used by Nellis Air Force Base fighter planes to enter the Nellis Gunnery Range. The range is the scene of "Top Gun" competition and "Red Flag" exercises in which pilots fly simulated combat missions against supposed Soviet fighters.

Nellis, located outside Las Vegas and about 100 miles south of the range, is the largest tactical fighter training center in the country. It is the home base of the Thunderbirds flight demonstration team. Senator Harry Reid and Representative Jim Bilbray, both of Nevada, asked the Air Force for comments on the possible defense impacts of a nuclear dump. In response, Colonel Timothy Titus, a chief in the Air Force's congressional liaison office, said if the supersonic flights, live munitions

training or other exercises at Nellis were restricted by the presence of a repository, it "would reduce the utility of the Nellis Range Complex and lessen the payback from our tremendous capital investments made there."

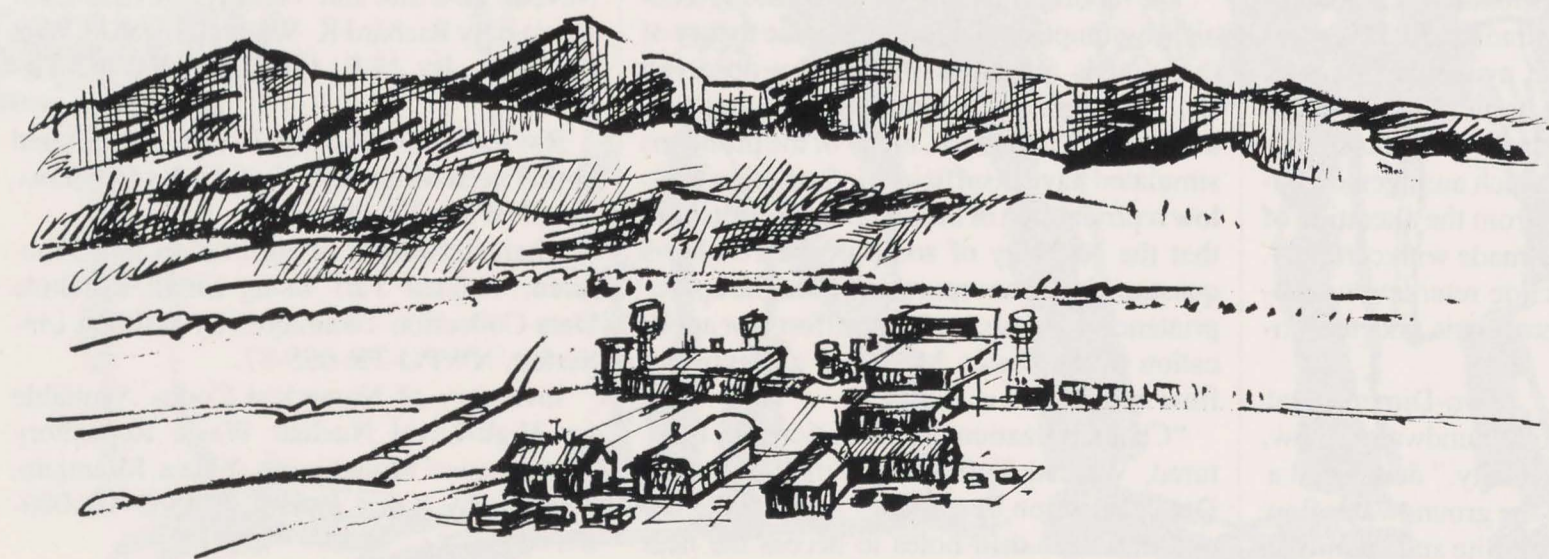
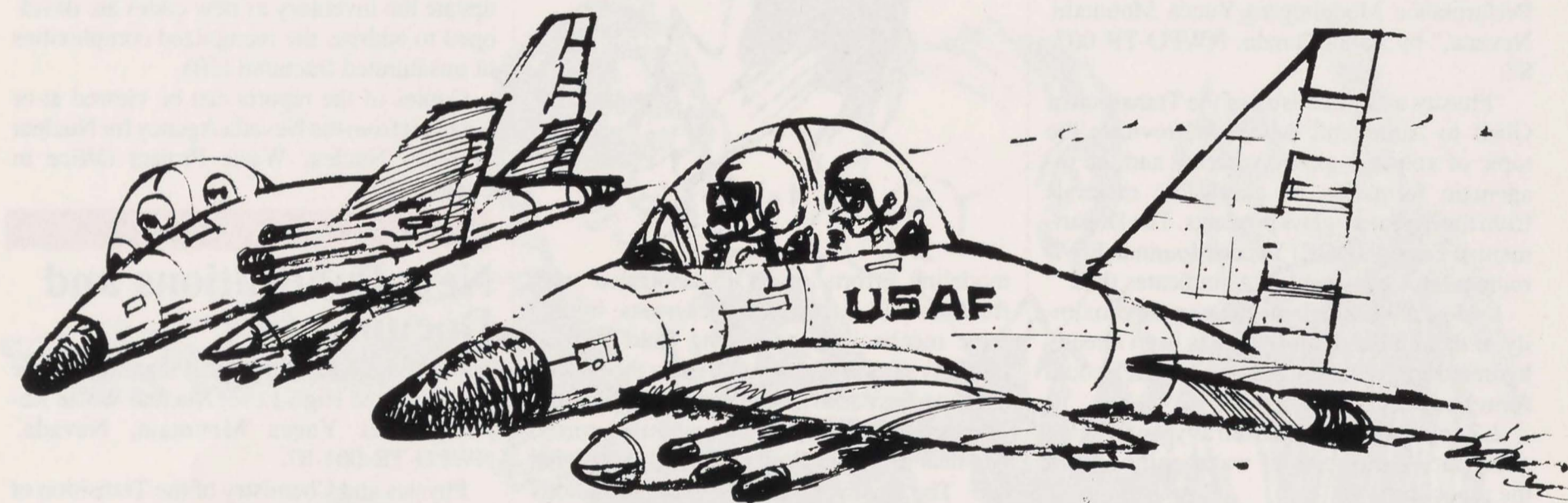
He called Nellis the "most important combat readiness training and testing resource" in the tactical Air Command. He said the Air Force expects to expand use of the range to 20 hours a day, six days a week, by the year 2000. The proposed waste dump would open in 2003.

Titus said the Department of Energy has not indicated whether flight restrictions, such as limits on supersonic fly-overs, would be imposed near the proposed dump. He said the Air Force is raising its concerns because DOE has contracted for a study of the matter.

Reid said the issue is "yet another indication that policy-makers have not done all of their homework." Bilbray said the Nellis training mission "should not be sacrificed in order to locate the dump at Yucca Mountain."

The Nellis budget is vital to southern Nevada. The Nevada Development Authority said the base contributed \$757 million to the area economy this year, including a \$443 million payroll, \$54 million in contracts and \$51 million in construction.

Aside from the Nellis matter, there are concerns about the potential impact of a repository on defense activities at the Nevada Test Site, adjacent to Yucca Mountain and enclosed on three sides by the Nellis range. NTS is the country's only nuclear testing area, and its approximately 8,500 workers comprise another vital segment of the southern Nevada economy. The testing program and its related pay roll might be jeopardized if the seismic jolts from nuclear tests adversely affected a Yucca Mountain repository. Current testing is done along an arc about 25 miles from Yucca Mountain but, as more land is required, the testing may have to move closer.



Task Force Will Help Citizens Become Involved in Yucca Mountain Nuclear Dump Program

A coalition of concerned citizens and civic groups has formed the Nevada Nuclear Waste Task Force, designed to make it possible for people to become actively involved in the program to locate a nuclear waste dump at Yucca Mountain.

Judy Treichel, one of three incorporating founders, said the organization is "simply attempting to make available, whenever and wherever possible, the information that will allow people to make up their own minds as to whether or not Yucca Mountain is an appropriate and safe site."

The organization has been awarded a contract by the state Agency for Nuclear Projects/ Nuclear Waste Project Office, which published a Request For Proposals on how to conduct a public participation program on the Yucca Mountain controversy.

"Recent congressional action singling out Nevada as the only potential dump site to be studied makes it very important for all Nevadans to become familiar with and involved in this program," Treichel said. "The Department of Energy's document concerning the proposed site is 7,000 pages long and weighs 28 pounds. There must be an organized system to help the people understand it."

She said the task force will ask DOE to hold workshops and hearings at times and locations that will encourage public participation. She said the task force hopes to have material available that explains the laws and issues relating to nuclear waste, its transportation, storage and disposal.

"In order for any nuclear waste program to be successful, the public in the affected area must be informed and be able to decide that the program is safe and credible," she said.

Treichel, of Las Vegas, joined Abby Johnson of Carson City and Frank Clements of Las Vegas as incorporators of the task force. Together, they are representative of a wide range of interests including business and labor, the Nevada Parent-Teacher Association, the League of Women Voters and the American Association of Retired Persons. The Task Force telephone number is 702/878-1885.

Here's What You Can Do...

The Department of Energy has moved 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 news-magazine 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.

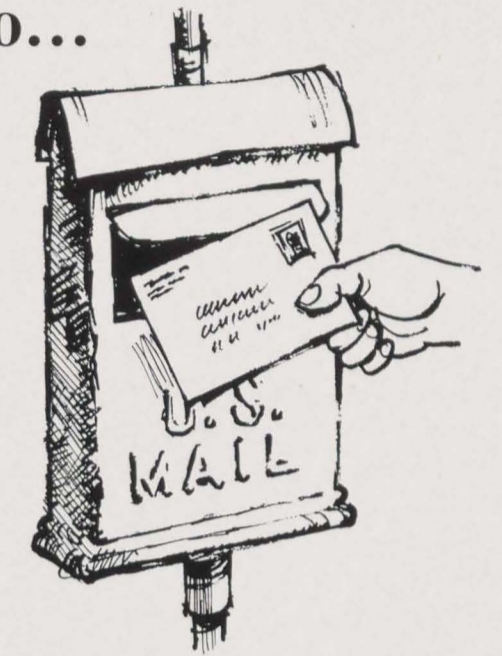
2. **COMMUNICATE** with friends, neighbors and public officials.

- 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. You might even organize one in your community.

- 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.

For more information:

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

U.S. Department of Energy
Nevada Operations Office
P.O. Box 98518
Las Vegas, NV 89193-8518
(702) 295-3521

U.S. Department of Energy
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Nevada Nuclear Waste Newsletter

Governor Bryan Says "No"

Gov. Richard Bryan has refused to sign a benefits agreement with the Department of Energy (DOE) to obtain federal funds related to the proposed high-level nuclear waste repository at Yucca Mountain.

In a letter to Energy Secretary John Herrington, Bryan said signing such a contract would "signal the state's consent for the acceptance of high-level radioactive waste and spent fuel," and the state would have to accept a fixed amount of money.

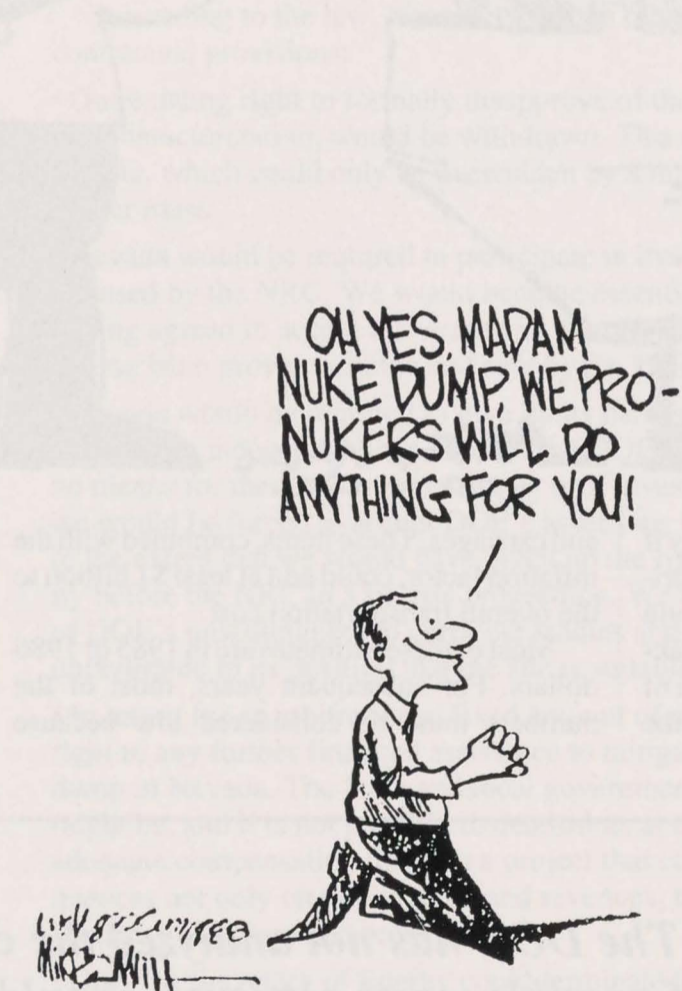
"It would be impossible to agree to such 'acceptance' at this time, when the geologic suitability of Yucca Mountain for safe waste isolation is very much in doubt," Bryan said.

As for funds, Bryan said neither the state nor DOE knows how much money Nevada will need to mitigate repository-related impacts on emergency services, social programs, medical necessities and other things. When Congress amended the Nuclear Waste Policy Act last December, lawmakers set a limit of \$10 million a year until the repository is constructed and \$20 million a year once it begins operating.

"At the current early stage of DOE's planning for implementation of the program in Nevada, neither the state nor DOE can even generally estimate the financial burden that the program could impose on the state," Bryan said.

He also objected that a benefits agreement would require Nevada to give up its veto of a DOE recommendation to build a repository in the state, should one eventually be forthcoming. The veto could be overridden by Congress.

Bryan said that, in place of a formal agreement, the state Agency for Nuclear Projects/Nuclear Waste Project Office will continue to work with DOE's repository project office. He said the state will continue to monitor DOE activities and, once DOE submits a final site



OH YES, MADAM
NUKE DUMP, WE PRO-
NUKERS WILL DO
ANYTHING FOR YOU!



See story page 10

characterization plan, state officials will review and comment on it. The state agency had requested grants totaling \$23 million for 1988-89 to conduct independent studies at Yucca Mountain, but Congress allowed \$11 million.

During a discussion at the May 27 meeting of the state Commission on Nuclear Projects, Commissioner James Cashman III of Las Vegas said, "The governor turned down the benefits agreement that was offered in the Amendments and I think very wisely so." To sign it would basically leave the state with no future voice in the process, he said.

Issue Highlights

- 2** Cost of a Repository
- 6** Consultation Draft Site Characterization Plan Released
- 9** Governor Bryan's Mailbag

How Much Would a Repository at Yucca Mountain Cost?

What would be the eventual cost of a proposed high-level nuclear waste repository at Yucca Mountain?

Even before an exploratory shaft is drilled in 1989 to allow detailed study of the site, the Department of Energy (DOE) will have spent about \$1 billion since it became interested in Yucca Mountain as a potential location. If there were a repository, the total cost from that point until sealing of the facility would likely exceed \$12 billion. This would include site characterization, construction, operations, decommissioning and transportation, but would exclude the administration costs of DOE headquarters and inflation.

A study by Sandia, a DOE contractor, estimated the construction and operations cost of a repository would be about \$6 billion to \$6.5 billion (1986 constant dollars) during its 50-year life span. The lower figure would apply if the waste canisters were emplaced in a horizontal configuration, while the higher would apply for vertical emplacement. The breakdown is about \$1.5 billion for construction of all facilities, \$4.4 billion to \$4.8 billion for the operation over a 25-year period, and up to \$370 million during decommissioning.

As of May 1988, DOE had not published a comprehensive cost analysis of the site characterization program. However, the Nevada DOE budget is approaching \$300 million a year (the total budget including headquarters now exceeds \$450 million a year). Characterization will last seven years, so an estimate of \$3 billion-plus seems reasonable. Additionally, DOE has estimated the transportation cost of the waste at about \$2.5 billion. This includes the cost of shipping the waste to a repository, procurement of equipment, maintenance, and con-

struction of an access road from the main highway and/or rail spur to the site. However, the estimate does not include potential increases in costs that may result if construction of highway or rail bypasses were required around densely populated areas such as Las Vegas, and research and development of casks



and carriages. These items, combined with the inflation factor, could add at least \$1 billion to the overall transportation cost.

Most of these estimates are in 1985 or 1986 dollars. For subsequent years, most of the numbers must be considered low because

The DOE has not analyzed the cost of possible waste retrieval, should that option be exercised prior to decommissioning of the repository.

DOE does not attempt to include a contingency for inflation. For example, of the operation cost, about \$600 million goes to the purchase of 41,000 canisters and overpacks that would contain the 70,000 metric tons of spent fuel and defense high-level waste. The cost estimate is based on bids obtained in 1985 from

manufacturers assuming austenitic steel would be the container material. DOE is considering two additional types of steel canisters and three copper canisters. The prices of finished steel and copper have increased significantly since 1985. A more up-to-date cost estimate for steel would be closer to \$1 billion, and it would be considerably more should DOE be forced to use copper as the container material.

The DOE has not analyzed the cost of possible waste retrieval, should that option be exercised prior to decommissioning of the repository. However, retrievability appears to be such a complex task that it would exceed the minimum \$4 billion estimated operational cost for emplacement.

Construction labor and repository staffing are significant cost components of the repository life-cycle. The pay scale would be based on agreements at the Nevada Test Site. It is not known how much of the work force would come from the regional labor pool. Historically, major contractors on big Nevada projects have been from out of the state and so have many of the workers. Presumably, most of the repository workers would live in the Las Vegas area, and most of the supplies and materials for the project would be purchased there.

The study says there would be approximately 2,200 workers during the peak of construction, but this figure is inflated because of a contingency of from 20 to 40 percent to account for the "uncertainty normally associated with preliminary design estimates." Thus, instead of the listed work force of 2,238 in 1996, the actual work force would be 1,664.

Commission Asks Legislature to Oppose Nuclear Dump

The state Commission on Nuclear Projects has asked the Nevada Legislature to take an official stand in opposition to a proposed high-level nuclear waste dump at Yucca Mountain.

The Commission voted May 27 to send a resolution to the 1989 Legislature asking lawmakers to support Nevadans who fear the federal government will build the facility despite objections that Yucca Mountain is not technically suitable. The resolution originated with Clark County and the city of Las Vegas.

Former Gov. Grant Sawyer, the Commission chairman, said, "Once they set the tone, succeeding legislatures will have a harder time explaining a change in position."

The Commission also asked the Legislature to refuse to approve the withdrawal of land for "characterizing, building or operating a repository." The state has filed suit to set aside a right-of-way reservation which the Bureau of Land Management (BLM) granted to the Department of Energy (DOE) to permit such work. Robert Loux, executive director of the state Agency for Nuclear Projects, said the agency had filed for an access permit long before DOE's application, but did not receive a reply. He said the state is entitled under the Nuclear Waste Policy Act to conduct independent scientific studies, but cannot do so without proper access.

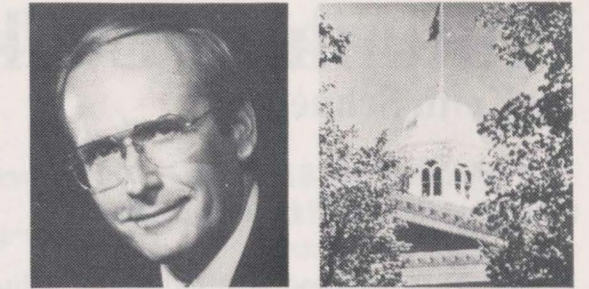
Deputy Attorney General Harry Swainston told the Commission the Legislature's approval is necessary under Article X of the Constitution. As an example, he said the 1949 Legislature voted to approve the creation of the Nevada Test Site, but could have vetoed the necessary land withdrawal.

Sawyer said the Commission resolution offers the Legislature a chance to go on record against the land withdrawal tactic.

"The point of the resolution is for the Legislature to announce now that it will not consent. It is a positive position that this Legislature can take now."

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Governor's Statement



Dear Readers:

On May 20, 1988, I wrote to Energy Secretary John Herrington informing him that I would not seek, on behalf of the State of Nevada, the "benefits agreement" for acceptance of nuclear waste at a repository at Yucca Mountain. As you recall, the "benefits agreement" was made available to Nevada in the Nuclear Waste Policy Act Amendments passed by Congress in December 1987, in which Nevada was singled out as the only site to be further studied by the DOE for a nuclear waste dump.

It was not difficult to come to the decision that signing the agreement, as defined by the Congress, is simply bad business for the State, and it would be irresponsible of me, as Governor, to sign away the State's basic and existing rights and duties in our dealings with the federal government on the nuclear waste program.

Let me tell you what Nevada would get in return for accepting the fixed sum of \$10 million per year during site studies at Yucca Mountain, and then, if a dump is licensed by the NRC, \$20 million per year for as long as it operates. I believe you will agree with me that the so-called benefits are akin to a wolf in sheep's clothing.

According to the law, Nevada would be required to agree to the following contractual provisions:

- Our existing right to formally disapprove of the Yucca Mountain dump site, after site characterization, would be withdrawn. This means that Nevada's ability to veto the site, which could only be overridden by a majority vote of Congress, would no longer exist.
- Nevada would be required to participate in the DOE's effort to have the site licensed by the NRC. We would become essentially a co-sponsor with the DOE, having agreed to accept the waste and advocate the site's suitability, prior to the site having been proven suitable and safe by the DOE.
- Nevada would be required to give up its hard-won court victory over DOE to assure our right to independent oversight of the DOE program. In reality, this would leave no means for the State to carry out its own investigation of the safety of the site, and we would be forced to accept DOE's assertions that the site is suitable and safe, even to the extent that we would have given up the right and ability to contest its suitability before the NRC in a license proceeding. We have already seen enough examples of DOE's unwillingness to carry out studies and release information that might prove unfavorable to its position that the site is suitable for nuclear waste disposal.
- In return for an arbitrary and fixed amount of money, Nevada would give up its right to any further financial assistance to mitigate short and long-term impacts of a dump in Nevada. The State and local governments are studying what the impacts might be, and it is not possible to determine, at this early date, what might be fair and adequate compensation for such a project that could have severe economic consequences not only on public costs and revenues, but on a mainstay of Nevada's economy - tourism and recreation.
- Only the Secretary of Energy could terminate the agreement. Furthermore, if the Secretary of Energy failed to live up to his end of the agreement, even in the event of non-payment, the provisions of the Act are such that the State could not take the Government to court.

The Yucca Mountain site has no more factual information to support its safety and suitability now than it did five years ago, and the additional information that has emerged about the site confirms that we were correct and well-justified in our skepticism about its suitability over the years.

We must, with a unified voice, continue to inform the DOE and Congress that Nevada will not be lulled into accepting this dangerous and ill-conceived nuclear waste dump - and that our basic and fundamental legal rights to protect ourselves are not for sale.

Richard H. Bryan
RICHARD H. BRYAN
 Governor

Plutonium Leak in Idaho Symptom of Atomic Ills

By Keith Schneider

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Idaho Falls, Idaho - The discovery of a plutonium leak in one of the nation's oldest and largest nuclear waste dumps has presented both a problem and an opportunity in the Federal Government's effort to deal with a legacy of dangerous wastes from the buildup of the nation's nuclear arsenal.

Against a pristine panorama of mountains, desert and brilliant sky in southeastern Idaho, engineers using delicate monitoring equipment have confirmed that traces of plutonium have drained from shallow waste pits at the Radioactive Waste Management Complex. They are moving through rock layers toward a vast underground water reservoir that supplies thousands of southern Idaho residents. The deadly elements have been confirmed 110 feet beneath the waste site and tests indicate they are as deep as 240 feet, nearly halfway to the reservoir.

The leaks at the 26-year-old waste site, part of the Government's Idaho National Engineering Laboratory, were first identified in June 1987. It is a problem that has arisen in 12 other states at the national laboratories and industrial plants that spent almost five decades making nuclear weapons for the military, leaving behind radioactive waste that could take until the 22nd century to clean up.

A Long Cleanup Process

At the same time, the Idaho plant is one of those at which the government is attempting to develop methods for stopping leaks at nuclear waste sites as well as developing methods for disposing of other radioactive substances, including contaminated soil.

"We're going to be in this cleanup business 50, 100, 150 years from now," said George Kritz, a physicist and director of the Energy Department's hazardous waste and remedial action division in Germantown, Md.

The Energy Department said last month that it would cost a total of about \$100 billion to determine how much waste there is at sites nationwide, to contain it and to clean it up. This is an effort that emerged this year as one of the department's principal missions.

\$895 Million Waste Plan

In the fiscal year 1988, the department will spend \$895 million to manage its radioactive wastes, or nearly 12 percent of the \$7.5 billion budget for nuclear weapons production. Two years earlier the amount was \$618 million, 8 percent of the department's weapons budget.

Engineers in Idaho say the particles of plutonium that have penetrated to the deep rocks do not pose an immediate threat to any

of the 10,000 employees at the Idaho laboratory, the 40,000 residents of Idaho Falls, or to any other citizen. Health specialists agreed.

But Federal engineers said they are concerned about future generations. Plutonium remains radioactive for 250,000 years and even microscopic particles can be lethal if they are inhaled or swallowed. If enough of the man-made element penetrates to the underground reservoir, the aquifer's use to farmers or households could be limited or ruined, the Federal authorities acknowledged.

"We're Watching Carefully"

"We don't expect that to happen," said James E. Solecki, director of waste management at the Idaho laboratory. "The levels of

“

...traces of plutonium...are moving through rock layers toward a vast underground water reservoir that supplies thousands of southern Idaho residents.

”

plutonium we've found are very low, about the same as what you'd find on the ground in New York or Washington from atmospheric testing in the 1950s. We're watching the situation very carefully."

According to studies by the General Accounting Office, the investigative arm of Congress, the Idaho site is one of 1,300 in which wastes from atomic weapons production were buried or stored. The agency said many had become substantial environmental and public health threats. Here are some of those situations:

Radioactive substances from waste pits holding 11 million gallons of uranium at an Energy Department plant in Fernald, Ohio, are leaking into an aquifer and have contaminated wells a half-mile south of the facility.

More than 500,000 gallons of highly radioactive liquids have leaked from tanks at the Hanford Reservation near Richland, Wash. Other radioactive substances have contaminated water under the ground. In another part of the reservation, billions of gallons of contaminated water were poured into the ground

and a steady stream of radioactive tritium is flowing into the Columbia River.

Chemicals and radioactive material have contaminated the aquifer beneath the Savannah River Plant near Aiken, S.C., and are now present at levels 400 times greater than what the Government considers safe. The General Accounting Office and environmental and scientific groups say the 300-square-mile region could be irreversibly contaminated.

"Government's Biggest Challenge"

"The nation faces a formidable task to clean up thousands of sites owned by the Federal Government at which uncontained hazardous and radioactive wastes are contaminating soil and ground water," Dexter Peach, Assistant Comptroller General of the G.A.O., told a House Energy and Commerce subcommittee last month. "Cleaning up the Energy Department's nuclear facilities may be the Government's biggest challenge."

The department is completing a \$1.3 billion plant to turn highly radioactive liquid wastes stored at the Savannah River Plant into glass logs for safer storage and a similar plant is planned for the Hanford Reservation. A \$700 million waste repository is under construction in New Mexico to permanently store plutonium-contaminated wastes.

The agency is also studying how to decontaminate old reactors and production facilities that have been abandoned. Since 1982, workers clad in protective suits and outfitted with acetylene torches have been dismantling a laboratory building in Miamisburg, Ohio. Taking the plutonium-contaminated laboratory apart by hand and transporting the pieces to Idaho or New Mexico will not be completed until the mid-1990s when the cost is expected to total \$50 million.

An Opportunity for Learning

In interviews, Government experts said the atomic waste disposal program will tax the agency's technical abilities. One of the sites where the agency hopes to learn how to plug nuclear leaks is at the 144-acre Radioactive Waste Management Complex in Idaho.

Set down in the shadows of the jagged Lost River Range and marked by a pair of white inflatable buildings, the desert complex resembles an encampment in a lonely lunar valley. Federal officials said that only the Soviet Union could have a plutonium waste site that is larger than the one cleared from sagebrush and juniper in the southwestern portion of the 890-square-mile atomic reservation.

Since 1970, 128,000 barrels and 10,500 Fiberglass-coated wooden boxes containing 2.3 million cubic feet of plutonium wastes

have been stored above ground on tarmac inside the inflatable buildings and in 30-foot mounds covered by plastic and earth. These wastes, most of which were generated by other Federal facilities, were intended to be disposed in the repository being mined from salt beneath the desert near Carlsbad, N.M.

However, geologists discovered that water is seeping into the repository and its fate is uncertain. Meanwhile the Rocky Flats weapons plant in Colorado continues to send plutonium waste by train and every month the pile grows by 280 barrels.

Of far greater concern, scientists in Idaho said, is the older 88-acre waste site adjacent to the bubble buildings and mounds. The Government has maintained monitoring equipment at the dump since it was opened in 1952. Last October, engineers discovered that trace amounts of trichloroethylene and other toxic solvents buried with the plutonium waste had reached the Snake River aquifer 580 feet below the surface. The trace amounts of plutonium are suspected of being halfway toward this aquifer.

This year, Congress authorized a \$6 million program at the Idaho laboratory to take more samples, and develop a plan to curtail the leaks.

Among the ideas experts in Idaho are considering to prevent particles of plutonium from contaminating the aquifer is digging up thousands of tons of contaminated soil, storing them in steel drums, and eventually moving the wastes to New Mexico. The excavation would have to be contained in sealed buildings to prevent plutonium dust from blowing around the desert, engineers said.

Scientists have also thought about melting the ground with powerful electric currents and turning the entire site into a giant glass-like mass that would prevent liquids or particles from escaping.

Idaho engineers may end up injecting a thickening agent into the pits, a grouting material like plaster or concrete to solidify the wastes permanently. After a concrete cap was built, the site would then be marked with enormous granite burial monuments engineers hope will ward off intruders for tens of thousands of generations to come.

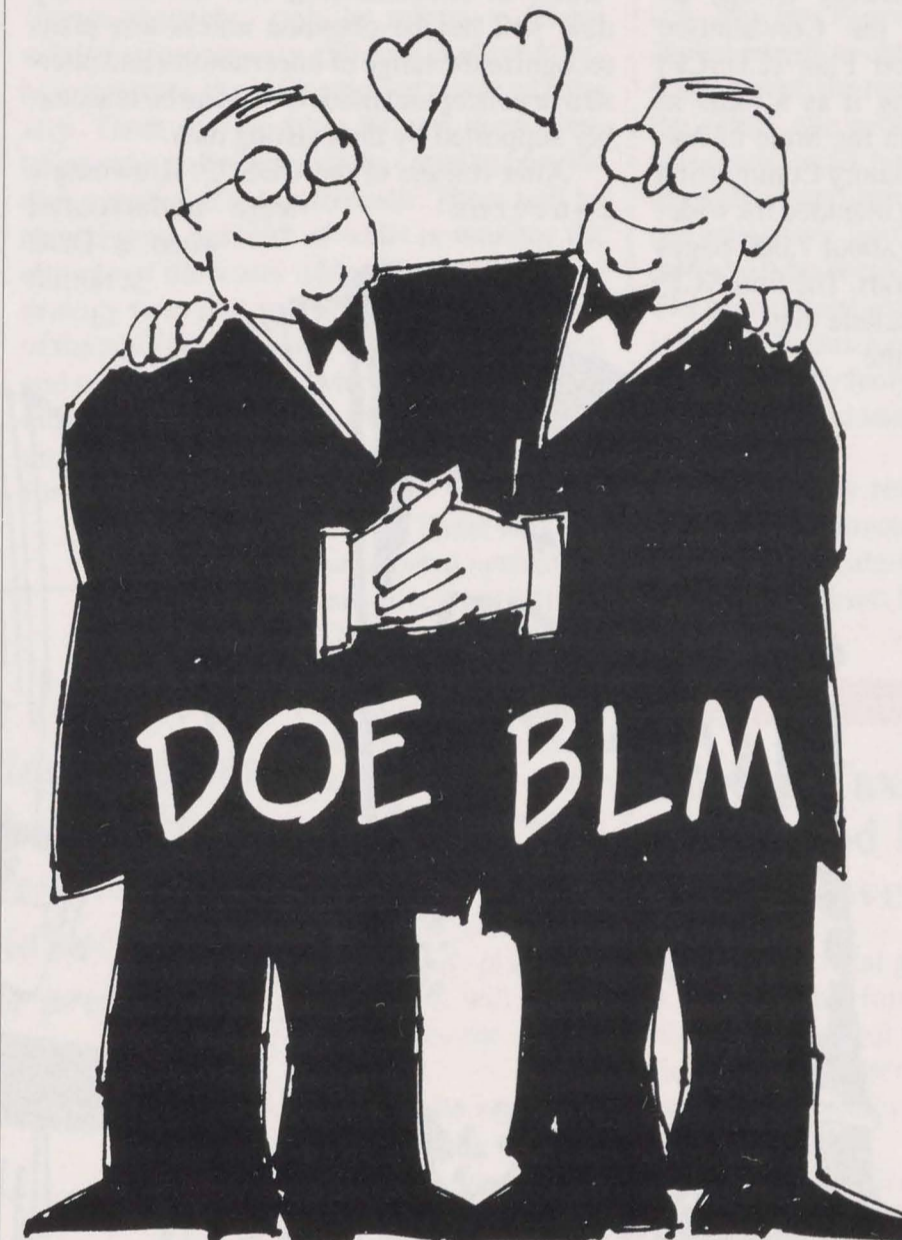
Where to Write

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 Agency for Nuclear Projects/
Nuclear Waste Project Office, Capitol Complex, Carson City, NV 89710. 702/885-3744.

Department of Energy, Nevada Operations Office, P.O. Box 14100, Las Vegas, NV 89114. 702/295-3662.

DOE and BLM Accused of Arranging a "Sweetheart Deal"



A State of Nevada lawsuit contends that federal agencies arranged a "sweetheart deal" to grant access to Yucca Mountain for site characterization as a potential high-level nuclear waste storage facility.

The suit filed by Deputy Attorney General Harry Swainston in U. S. District Court seeks to stop the right-of-way reservation given to the Department of Energy (DOE) so it can begin studies on the site. Attorney General Brian McKay said the Bureau of Land Management (BLM) failed to get required approval from Congress and the state Legislature.

"A sweetheart deal was arranged at the highest levels between the BLM's parent Interior Department and the Department of Energy - a deal that completely circumvents the law," McKay said.

McKay said the deal removed Nevada from the approval process and resulted in an arrangement that would restrict traditional multiple use purposes, such as minerals exploration, on approximately 52,000 acres of public land. He said access restrictions could be expected in a "properly developed" repository siting program, but the law provides the way

to set aside the area with properly administered controls. He said DOE and BLM "appear to go out of their way to circumvent the law at every turn."

Swainston said that both federal guidelines and Nuclear Regulatory Commission policy require DOE to have ownership and control of the site before starting studies. He said that before DOE can withdraw more than 5,000 acres, it must meet the Federal Land Policy Management Act (FLPMA), but failed to do so. To get withdrawal, he said, DOE needs permission from Congress and the state Legislature.

"When Congress wanted to put the Nevada Test Site out here, it got the consent of the state, so there is a precedent that must

be followed at Yucca Mountain," he said.

Swainston said the case reaches the heart of the constitutional issue of state versus federal rights. He said DOE assumes that congressional direction to characterize Yucca Mountain means "anything goes."

"That is just what the small states rightly feared, and spoke to, during drafting of the Constitution. It is the reason the 10th Amendment was adopted that gives us the right to have a say in what happens in our state," he said.

"If 49 other states can gang up on one state to take care of a purely commercial problem, we've lost something. Nevada can see the nation has a problem and needs a repository for nuclear waste, but when it's done in a manner that breaches the process of constitutional government, we've lost something more important than a hole in the ground. Congress should recognize that."

Jurisdiction over the proposed repository area is divided among three federal agencies. DOE controls the eastern fringe, but jurisdiction over the major portion - the one including the underground storage area - is split between the U.S. Air Force and BLM.

Consultation Draft Site Characterization Plan Released

The Department of Energy (DOE) on January 8 released the Consultation Draft Site Characterization Plan (CDSCP) with the intention of using it as a basis in workshop discussions with the State of Nevada and the Nuclear Regulatory Commission (NRC). The document, not intended for widespread public release, has about 7,000 pages and weighs close to 28 pounds. The final SCP, which presumably will include suggestions arising from the workshops and which must be issued at least six months before the start of sinking the first experimental shaft, is expected to be released in January 1989.

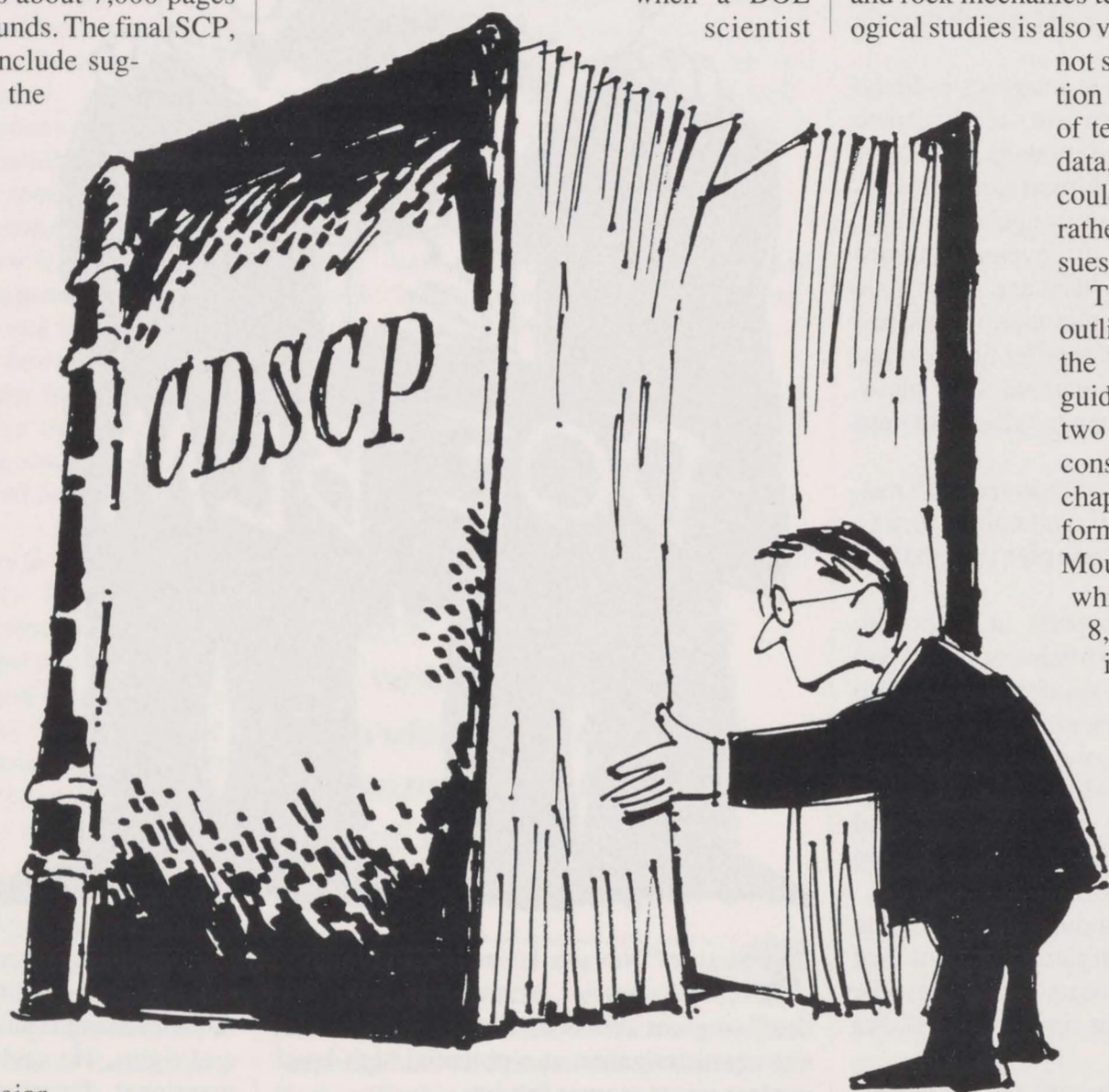
The NRC conducted a technical review of the CDSCP Chapter 8 and forwarded it to the State and DOE on March 8. The review listed 5 "objections," 108 "comments" and 48 "questions." Objections were defined as very serious concerns that must be resolved immediately or licensing may not be possible in the future. Comments also are serious deficiencies that could affect the licensing process, but they are not as serious as objections. Questions are major concerns with the presentation of the program.

In a letter to Stephen H. Kale, director of the DOE's Office of Geologic Repositories, Robert E. Browning said the most fundamental technical concern is the failure of the CDSCP to recognize the range of alternative conceptual geological and hydrological models of the Yucca Mountain site that can be supported by the existing limited data base.

"Although efforts have been made in the CDSCP to identify more than one conceptual model of the Yucca Mountain site, the site characterization program presented appears primarily designed to gather evidence in support of a preferred conceptual model rather than to obtain a thorough understanding of the site and the data necessary to reduce the uncertainties about which conceptual model best portrays the Yucca Mountain site," said Browning, director of NRC's Division of High-Level Waste Management Office of Nuclear Material Safety and Safeguards.

"Such an understanding and the necessary data will not be obtained unless test plans recognize the range of uncertainties and alternative conceptual models that can be reasonably supported by the existing data."

After release of the CDSCP, Browning's concerns were underscored when a DOE scientist



sections of Chapter 8.

The CDSCP is difficult to read, especially Chapter 8 which has numerous redundancies. However, the size of the experimental program is very impressive since it includes applications of nearly every known geological, geophysical, geochemical, hydrological and rock mechanics test. The list of climatological studies is also very impressive. What is not so clear is DOE's intention should a large number of tests provide ambiguous data, as is often the case, that could fuel more controversy rather than resolve the issues.

The CDSCP follows the outline recommended by the NRC in its regulatory guide 4.17. It is divided into two parts: Part A, which consists of the first seven chapters, summarizes information of the Yucca Mountain site; Part B, which consists of Chapter 8, addresses unresolved issues and discusses the plans to resolve these issues during site characterization.

Chapters 1 through 5 describe the geology, the rock parameters, the hydrology, the geochemistry and the climate (past and present) of the Yucca Mountain site. Chapter 6 summarizes the conceptual design of the repository, which is described in great detail in a supportive document prepared by Sandia National Laboratory and is called the Site Characterization Plan-Conceptual Design Report (SCP-CDR). The waste package is discussed in Chapter 7.

Chapter 8 actually goes beyond the NRC's request in regulatory guide 4.17. It not only describes the earth science studies, waste package studies, engineering studies and performance assessment studies to be done, but more importantly it describes the site characterization program as it is structured around the "issues hierarchy" and the "issues resolution strategy," two esoterically defined phrases that play important parts in DOE's Mission Plan. The "issues hierarchy" consists of key issues, issues, and information needs.

Key issues, which are stated in the form of questions, are derived directly from the DOE siting guidelines 10 CFR 960, which in turn

are derived from the NRC's regulation 10 CFR 60, based on the EPA standard 40 CFR 191. Issues, which are subordinated to key issues and also are stated in the form of questions, are derived mostly from the qualifying conditions to the technical guidelines in 10 CFR 960, which are derived from the NRC's regulation 10 CFR 60 and the EPA standard 40 CFR 191. The issues are divided into performance, design, and characterization issues. Information needs indicate the type of information necessary to answer the issues. The key issues are resolved by answering each of the subordinate issues. For each key issue there is also a subordinate issue that addresses the

Implementation

Guidelines of 10 CFR 960, which are sets of disqualifying and qualifying conditions each of which can be answered by a higher and lower level finding, a precise statement on the suitability of the site. Based on the data base available, the DOE assigned, with one or two exceptions, lower level findings to all the conditions at the writing of the Environmental Assessment for the Yucca Mountain site. Higher level findings

are required to nominate the site for construction of a repository. This is an important constraint that governs the resolution of the issues. However, the licensing of the site is an academic exercise once higher level findings have been determined.

There are four key issues that address the following topics: (1) postclosure performance requirements; (2) preclosure performance requirements; (3) environmental protection and transportation performance requirements; (4) cost of construction and ease of operation. The SCP is addressed to the resolution of topics 1, 2 and 4. The resolution of topic 3 will be left to special reports. Key issues 1 is further broken down into 20 issues, key issue 2 into 11 issues and key issue 45 into 9 issues.

Chapter 8 is broken into seven sections. Section 8.3 - planned tests analyses and studies - is broken down further into five subsections that list and describe in some detail all the earth science studies planned, the repository program, the seal program, the waste package program, and the performance assessment program.

The activities of the subsection describing

the earth science studies are linked to the "issues hierarchy" only by reference. There will be approximately 150 new shallow boreholes to study the infiltration of water into the area. There will be 40 to 80 new deep boreholes, many of which will be cored to provide rock samples from underneath. There will be an elaborate network of wells to monitor the altitude of the water table. There will be hydrology tests that will allow characterization of the aquifer. There will be seismic refraction and reflection studies. Many trenches will be dug across faults to study the movement of the ground. Numerous samples will be collected for isotope geology.

There will be a monitoring system for tectonic activities. There also will be many laboratory tests on core samples to obtain data on rock mechanics and on the sorption of radionuclides to the rock. The studies will be described in great detail in 107 study plans that, combined, will be several times the size of the SCP.

The repository program, the seal program, the waste package program, and the performance assess-

ment program are linked to the "issues hierarchy" directly, i.e., the appropriate issue is stated first and underlined before an activity and its purpose is discussed. The seal program discusses activities pertaining to the closing of the boreholes, drifts, shafts and ramps after the repository is no longer used. The repository program discusses activities pertaining to design criteria, operation issues, and safety issues. The waste package program details laboratory experiments on the various stainless steels and copper alloys under consideration for the making of the canister. The DOE must demonstrate that the canister will not fail for at least 300 to 1,000 years. The program also includes experiments on the leaching of radionuclides from the spent fuel using Yucca Mountain water. The performance assessment program includes numerous modeling studies that are intended to demonstrate that the repository will be safe during operation and for at least 10,000 years thereafter, a requirement spelled out in the EPA standard.

Section 8.4, planned site preparation activities, describes the experimental shaft program. Six months after the release of the SCP, the DOE intends to sink two shafts by drill and

blast techniques to the horizon of the repository. The first experimental shaft will then be drilled deeper to obtain geological data on the rock beneath the repository. On the way down the shafts, the geology will be mapped and numerous small boreholes will be drilled in the walls to perform rock mechanics studies. At the repository horizon, about 7,000 feet of drifts will be excavated by drill and blasting. The excavations will include rooms for hydrological and rock mechanics studies, and three drifts to nearby faults. Many rock samples will be obtained and subjected to tests in the laboratory.

The State is reviewing the SCP, mostly through its contractors. They include the University of Nevada-Las Vegas (tectonic studies) and the Desert Research Institute (hydrologic studies).

Special Taxation Districts Supported by State and Local Governments

State and local government officials have agreed that formation of special taxation districts is the best way to handle the grant in lieu of tax payments generated by the proposed high-level nuclear waste repository at Yucca Mountain.

A proposed bill detailing how the revenues would be received and distributed was unveiled May 11 at a meeting of the Nevada Legislature's Committee on High-Level Radioactive Waste. Federal, state and local government officials supported it. A similar proposal was offered during the 1987 Legislature but it was rejected in favor of a plan to create Bullfrog County, which would receive all the revenues for subsequent distribution by the state. Nye County, from which Bullfrog was carved, contended the bill was unconstitutional and the courts agreed.

Sen. Thomas Hickey, committee chairman who supported the ill-fated Bullfrog bill, said the new plan should accomplish the objectives of the Bullfrog legislation but will avoid the controversy.

Nye County lobbyist Steve Bradhurst said he supports the taxation district bill because it will "keep Nye County whole and the money to be derived will be the same."

Chief Deputy Attorney General William Isaef said the legislation is keyed not only to the repository, but also can be used in other areas that may be impacted by hazardous activities and facilities, where the hazard extends beyond the facility or location of the activity. He said, "It certainly appears to meet constitutional muster."

Budget Slashes Weaken Nevada's Ability to Oversee DOE Program

State officials say congressional budget slashes have emasculated Nevada's ability to oversee the Department of Energy's program to locate the country's first high-level nuclear waste repository.

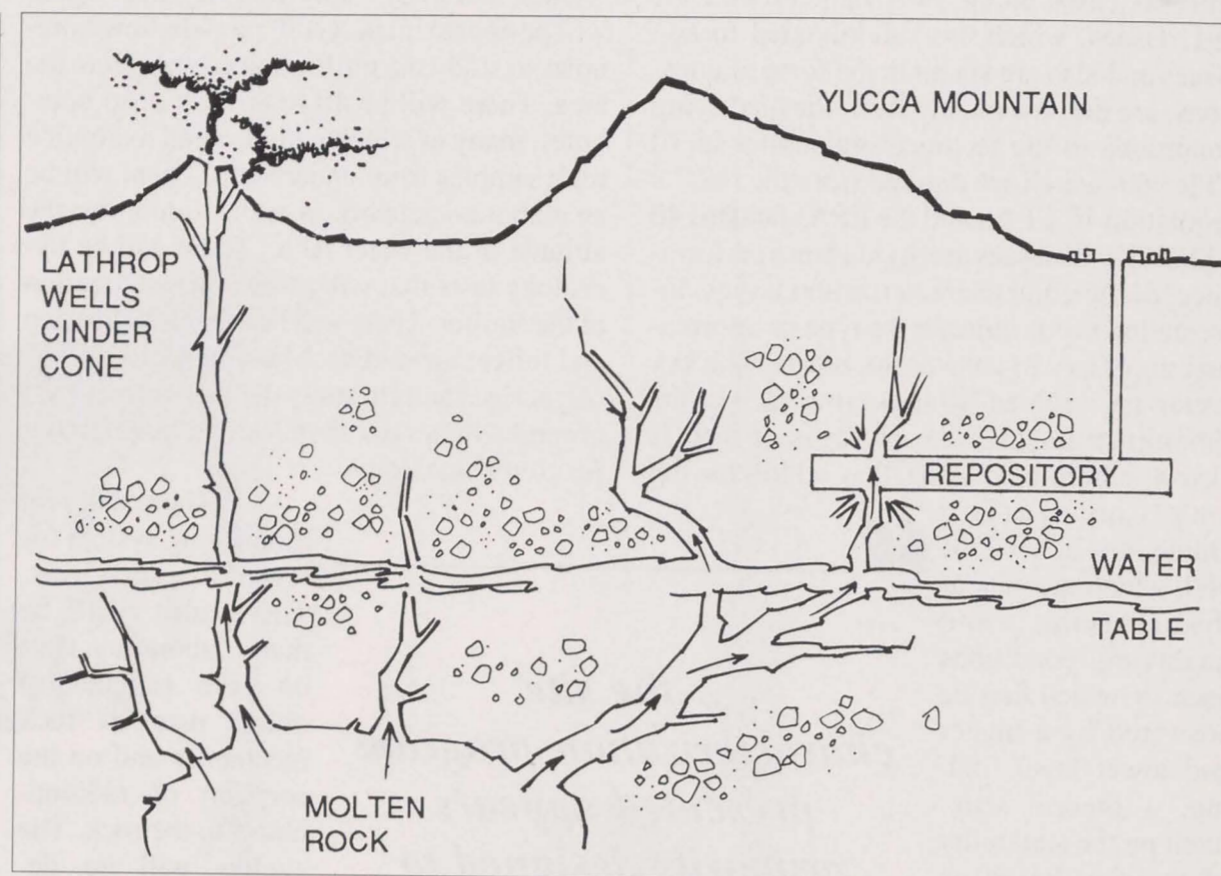
In June, Congress reduced Nevada's grant request of \$23 million to \$11 million for fiscal year 1989. It was placed as a line-item in the DOE budget, thus preventing the state from spending the total in a manner deemed best to comply with the oversight requirement of the Nuclear Waste Policy. The new budget specified that \$1.5 million could be used for transportation studies of repository-related impacts within the state. It limited socioeconomic studies to \$1.5 million. In addition to the \$11 million, it allocated \$5 million for grants to local governments in the affected area.

The budget restrictions were pushed through by Sen. J. Bennett Johnston, D-LA. In December, Johnston succeeded in amending the Act with what was called a "screw Nevada" bill to provide that only Yucca Mountain in southern Nevada would be characterized for suitability as a repository.

"This is Screw Nevada II," said Gov. Richard Bryan. "This is a reprisal against the state because of our activities that have revealed serious technical concerns at the Yucca Mountain site."

He explained that the state consistently had turned up flaws in DOE's program. The state made public a report by DOE scientist Jerry Szymanski, who said the scope of DOE's geohydrological model of Yucca Mountain was too narrow. He argued that underground pressures could force water into the repository and allow radionuclides to be transported to the regional aquifer. Although DOE had this report at the time, it did not present it to Congress when it was debating the proposed amendments in December. DOE said it had not undergone peer review. More recently, a University of New Mexico scientist supported Nevada's contention that possible volcanic action could threaten the proposed repository. The report said a cinder cone a few miles from Yucca Mountain may be only 5,000 years old instead of possibly 300,000 years as had been believed. He said that a press release announcing this major change had been submitted to DOE, but DOE declined to publicize it.

The state also has been conducting a wide-ranging socioeconomic study of the impacts a repository could have on the region, and on the impacts that thousands of shipments of nuclear waste could have on Nevada as well as the corridor states through which the waste would be routed. DOE has refused to make grants to the corridor states for their separate



studies. DOE also has refused to specifically identify the routes it would prefer for shipping the waste from the East to Yucca Mountain. Nevada has pressed for the route identification and has made its own grants to corridor states for impact studies and emergency response programs. The new budget limits transportation spending to in-state purposes.

Robert Loux, executive director of the state Agency for Nuclear Waste/Nuclear Waste Project Office, said his agency was justified in asking that the state budget be raised from \$10 million in 1988 to \$23 million in 1989.

"In December, Congress pointed to Nevada as the only potential repository host state," he said. "DOE says it will have a Site Characterization Plan ready this year. It says it will start drilling the exploratory shaft next year. The Nuclear Waste Policy Act directs us to conduct oversight to make sure DOE acts according to law, and the courts have ruled DOE must provide the funds for technical studies."

"The surge of activity connected with site characterization requires that Nevada step up its oversight sharply in order to comply with the Act and to represent and protect Nevada citizens. It will cost a lot of money to do what we believe we must do to make sure they will not be saddled with a repository unless it can be proven beyond a shadow of a doubt it will be safe for 10,000 years, which is the Environmental Protection Agency standard for the facility," he said.

He said the state had been assured frequently by Carl Gertz, DOE project manager

in Las Vegas, that there would be "no problem" in approving the new grant request. Loux said Gertz had gone on record with such assurances in public meetings of the Legislative Committee on High-Level Nuclear Waste and the state Commission on Nuclear Projects.

"He told me weekly for the last four months there would be no problem with the grant whatsoever," Loux said. "He certainly has misrepresented the facts to us. He had to know this action was going on."

Gertz denied misleading Loux. He told a reporter he first "had a sense" of the Johnston proposal a week before it came out of the Senate Energy Appropriations Subcommittee June 8. He made no mention of it during DOE public "repository update" meetings at Amargosa Valley June 6 and Las Vegas June 7. At a similar session in Reno June 9, he said DOE also had taken budget cuts.

Loux said Johnston, supported by the nuclear industry, and the DOE have "conspired to ensure that DOE's program is not subjected to any meaningful substantive oversight."

"At the University of Arizona Waste Management sessions in Tucson, Ben Cooper, Johnston's chief aide, suggested that Johnston and Congress amended the Act last December because the states have been too successful in discovering and publicizing the flaws in DOE's program and, as a result, the program likely would have collapsed had congress not taken action. Apparently Nevada, by publicizing the Szymanski report and the volcanic issues, was on the verge of collapsing the Yucca Mountain project," Loux said.

Governor Bryan's Mailbag

My office receives many letters concerning the proposed nuclear waste facility at Yucca Mountain. They follow the trend of polls indicating that about three out of four Nevadans oppose it, as I do. Many ask questions to clear up doubts caused by conflicting information about the project. Here is a summary of the most frequent questions and our answers.

Q: If you support nuclear testing in Nevada, why do you object to storage of nuclear waste?

A: The two are as different as apples and oranges. Testing is vital to the national defense. Nevadans have always supported national defense. Nuclear waste, aside from that resulting from the weapons program, is primarily spent fuel from commercial power plants. Storage is basically a problem of private industry. The solution should not be one that is imposed upon one state by the other unwilling states, through Congressional action.

Q: If nuclear devices are detonated underground at the Nevada Test Site, thus contaminating the ground, why not store similar contaminants in a Yucca Mountain repository?

A: For one thing, Yucca Mountain is not in the contaminated testing area. The proposed underground repository would be off the Test Site, although the surface facility would be on it. The fission product inventory from 70,000 tons of spent fuel at Yucca Mountain would be equivalent to that of 2.3 million bombs of the type used against Nagasaki. Thus, the contamination at NTS is relatively insignificant, although potentially dangerous, in comparison to that possible from a repository. Moreover, the heat of underground tests creates a glassified bowl that prevents radioisotopes from moving from the immediate blast area.

Q: The Department of Energy says there is virtually no chance that water could carry radioisotopes to the underlying water table at Yucca Mountain, simply because there is so little water available to transport them out of a repository. DOE also says there is little chance of earthquake damage to a repository, based on experience of tunnels at NTS. Do you agree?

A: There is evidence that underground

pressures could force water up to the repository through faults in the rock. This concern is not only that of state experts, but also is shared by a DOE scientist. As for earthquakes, there is no conclusive evidence to prove the DOE tunnel theory. In fact, there is contrary evidence that repeated underground tests in NTS tunnels have weakened the rock

years. Why is 10,000 years the standard?

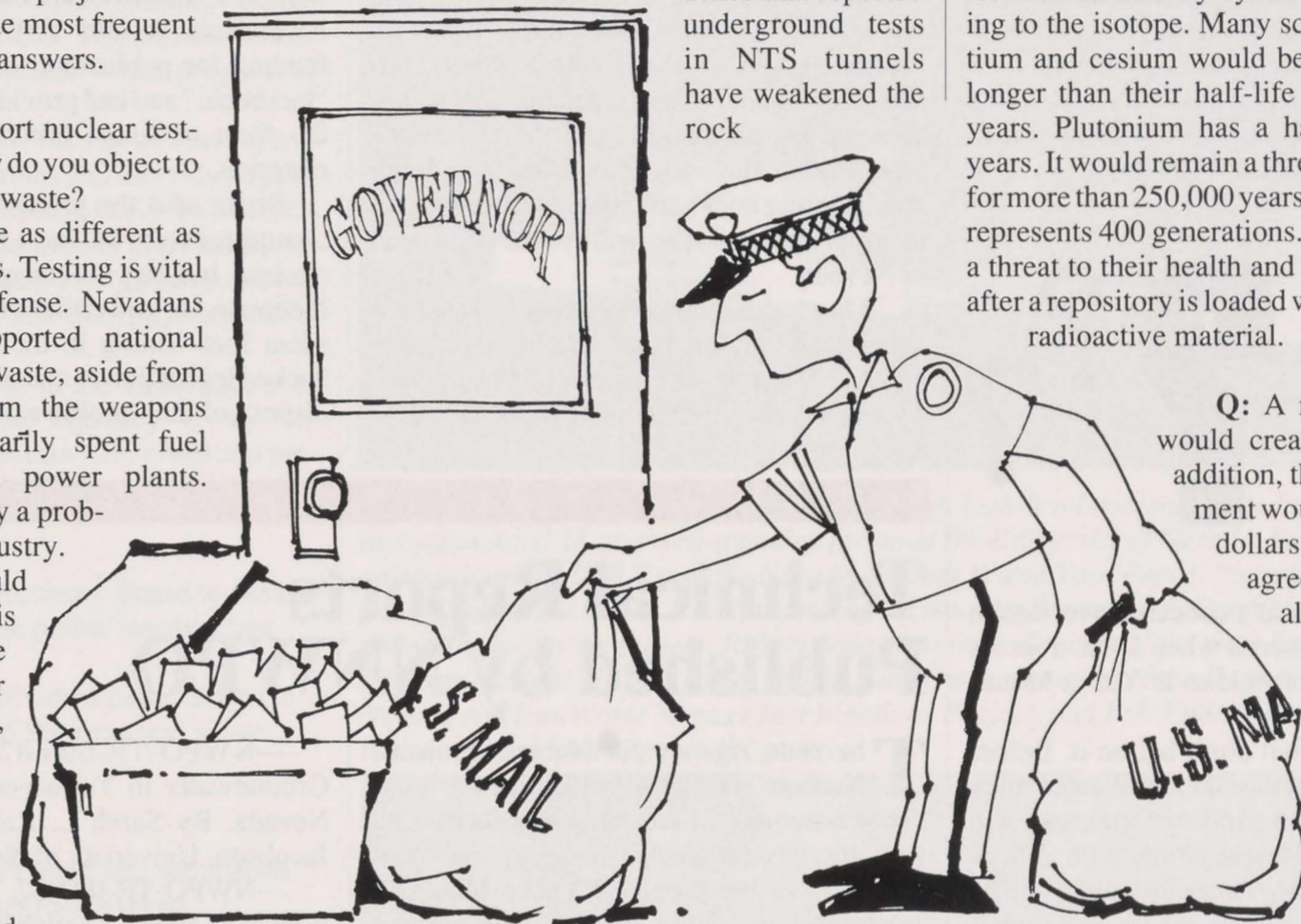
A: The Environmental Protection Agency calculated the standard. It is the best prediction of a future situation that scientists can make, based on current information. A half-life (the time required for a radioisotope to lose half its activity by decay) varies according to the isotope. Many scientists say strontium and cesium would be dangerous much longer than their half-life times 10, or 300 years. Plutonium has a half-life of 24,000 years. It would remain a threat to air and water for more than 250,000 years. The 10,000 years represents 400 generations. The time to block a threat to their health and safety is now, not after a repository is loaded with 70,000 tons of radioactive material.

Q: A repository project would create many jobs. In addition, the federal government would pay millions of dollars a year if Nevada agreed to host it. There also would be millions of dollars in revenues to the state in the form of payments equal to taxes on a repository. Why should you reject these economic benefits?

A: As governor, I could never place economic payoffs above the health and safety of Nevadans. Moreover, there is wide disagreement on how many jobs would be available, and for how long. It is not uncommon that major portions of federal projects are awarded to out-of-state contractors who tend to bring in much of their work force instead of offering the jobs to locals. Jobs are desirable, but after a few years of peak construction, the repository work force would taper off.

Q: DOE's presence at NTS has been good for Nevada. Why are you so critical of DOE concerning the proposed repository?

A: Nevada joined responsibly in the Nuclear Waste Policy Act of 1982, a compromise in which the states and federal government moved to solve the problem of how to dispose of nuclear waste. DOE, given the task of finding the best sites for the country's first two repositories, failed to comply with the letter and spirit of the Act. The site screening process was done in a manner that, from the beginning, seemed designed to target Yucca Mountain as the eventual site of the first repository. The program was conducted on a political bias, not on the basis of scientific (continued on page ten)



Gov.'s Mailbag

(continued from page nine)

soundness. For instance, congressional investigators found DOE documents that proved our contention that the 1986 election-year decision to scrap the search for a second repository in the East was intended to help candidates in heavily populated states whose people opposed a repository. Eventually, in December 1987, DOE successfully lobbied Congress for legislation that gutted the 1982 Act and left Yucca Mountain as the only site to be studied as a potential repository.



Q: Won't Nevada's concerns over health and safety be answered when DOE does its site characterization studies at Yucca Mountain?

A: Hopefully, but don't bet on it. Before the 1987 changes in the Nuclear Waste Policy Act, DOE had proposed characterizing sites in Washington and Texas along with Yucca Mountain. Now, only Yucca Mountain will be studied. There would be no backup site if Yucca Mountain were found unsuitable. The Yucca Mountain study will cost more than \$2 billion. It doesn't seem likely that DOE would spend that kind of money and then tell Congress that Yucca Mountain is unsuitable. Given DOE's past record, it would seem more likely that it would try to minimize possible disqualifying features as "not really that bad."

Q: What are the risks of shipping radioactive waste from the East to the proposed dump at Yucca Mountain?

A: DOE says the shipping casks would be superstrong and supersafe, and that there would be little danger. But there would be thousands of shipments over Nevada's rail and highway systems during the approximately 25 years during which the repository would be loaded. Even a minor accident would generate widespread media reports that could give the perception of a nuclear disaster. Nevada cannot afford to jeopardize its vital tourism and economic diversification programs, and I fear the presence of a nuclear dump and waste-laden vehicles would do just that. DOE says it intends to isolate these carriers from the motoring public, but to date has not disclosed the routes that would be used to accomplish this.

Nevada Pro-Repository Committee Supported by the Nuclear Waste Industry

Gov. Richard Bryan says the nuclear power industry is using a Southern Nevada organization to persuade Nevadans they would benefit by construction of a high-level nuclear waste dump at Yucca Mountain.

Bryan released a letter from the Nevada Nuclear Waste Study Committee, a pro-repository group of about 200 members, announcing an advertising campaign that would promote the project. He said the committee would push the idea that a nuclear dump would "bring bucks and jobs" to the state, and that it is inevitable the facility will be located in Nevada.

"The readers, viewers and listeners should understand that this is not an objective study group," he said. "It is a pro-nuclear group. This is the voice of the nuclear power industry."

Bob Dickinson, co-chairman of the NNWSC, said it was "absolutely false" that it is the industry's lobbying arm in Nevada. The committee issued a statement saying it had "never made a secret" of the fact it had drawn support from the U.S. Committee on Energy Awareness. It said USCEA had provided funding for publication of a newsletter and "fact book," and had provided other support in the form of films, brochures and handout materials.

Bryan said the promotions by the study committee were the most recent effort by the nuclear industry to target Nevada as the dumpsite. He said utilities have 17,000 tons of spent fuel "sitting in their back yards" and backed legislation to make Nevada "a place to dispose of their problems."

Technical Reports Published by NNWPO

The state Agency for Nuclear Projects/Nuclear Waste Project Office has published a number of technical reports dealing with the environment, hydrology and geochemistry of the proposed Yucca Mountain repository site. They are available without cost by contacting the agency office in Carson City. In addition, the agency has revised its public information series of factsheets, a repository map and a video. A form for receiving the publications and being placed on the quarterly Newsletter mailing list is on the back page of this issue.

The technical reports are:

—NWPO-TR-001-87. Environmental Program Planning for the Proposed High-Level Nuclear Waste Repository at Yucca Mountain, Nevada.

—NWPO-TR-002-87. Physics and Chemistry of the Transition of Glass to Authigenic Minerals. By Maurice Morgenstein.

—NWPO-TR-003-87. Technical Review: Two-Dimensional Steady-State Model of Groundwater Flow, Nevada Test Site and Vicinity, Nevada-California. (By Richard K. Waddell - USGS WRI 82-4085), by M.E. Campana.

—NWPO-TR-004-87. Review of Modeling Efforts Associated with Yucca Mountain, Nevada. By Geotrans, Inc.

—NWPO-TR-005-87. Characterization of Infiltration into Fractured, Welded Tuff Using Small Borehole Data Collection Technique. By William Linderfelt.

—NWPO-TR-006-87. Chemistry of Groundwater in Tuffaceous Rocks, Central Nevada. By Sarah L. Raker and Roger L. Jacobson, University of Nevada System.

—NWPO-TR-007-87. Inventory of Numerical Codes Available for High-Level Nuclear Waste Repository Performance Modeling at Yucca Mountain, Nevada. By Zahra Panahi.

The revised public information materials include the Nuclear Waste Factsheets:

—A Yucca Mountain Repository: What Would It Look Like?

—A Yucca Mountain Repository: How Would It Operate?

—The Nuclear Waste Policy Act of 1982: As Amended, What Does It Do?

—What Is Spent Nuclear Fuel and How Much Waste Is There?

—Why Yucca Mountain?

—A Yucca Mountain Repository: What Are Nevada's Concerns?

—Yucca Mountain: Transportation to a Repository

—Yucca Mountain: Contamination from Weapons Testing Or Spent Fuel... What's the Difference?

The Yucca Mountain map shows a photograph of the mountain, and diagrams of the proposed surface/underground repository works, the exploratory shafts and drifts, the location of the mountain relative to southern Nevada communities, and a cross-section showing the horizon of the proposed repository.

High-Level Nuclear Waste Disposal in Nevada? Citizen Involvement in the Federal Decision Process

The Nevada Nuclear Waste Task Force is a non-profit organization, serving the State of Nevada by developing and implementing a program which promotes public participation in the U.S. Department of Energy's high-level nuclear waste program in Nevada.

NNWTF believes this can be best accomplished by organizations and individuals joining together to learn and assist in the dissemination of factual information and resources.

Individuals, as well as organizations, can join the Task Force. There are no membership charges or fees.

The basic purpose of the Task Force is to promote an informed citizenry. Every Nevadan should be interested, involved and prepared to influence decisions.

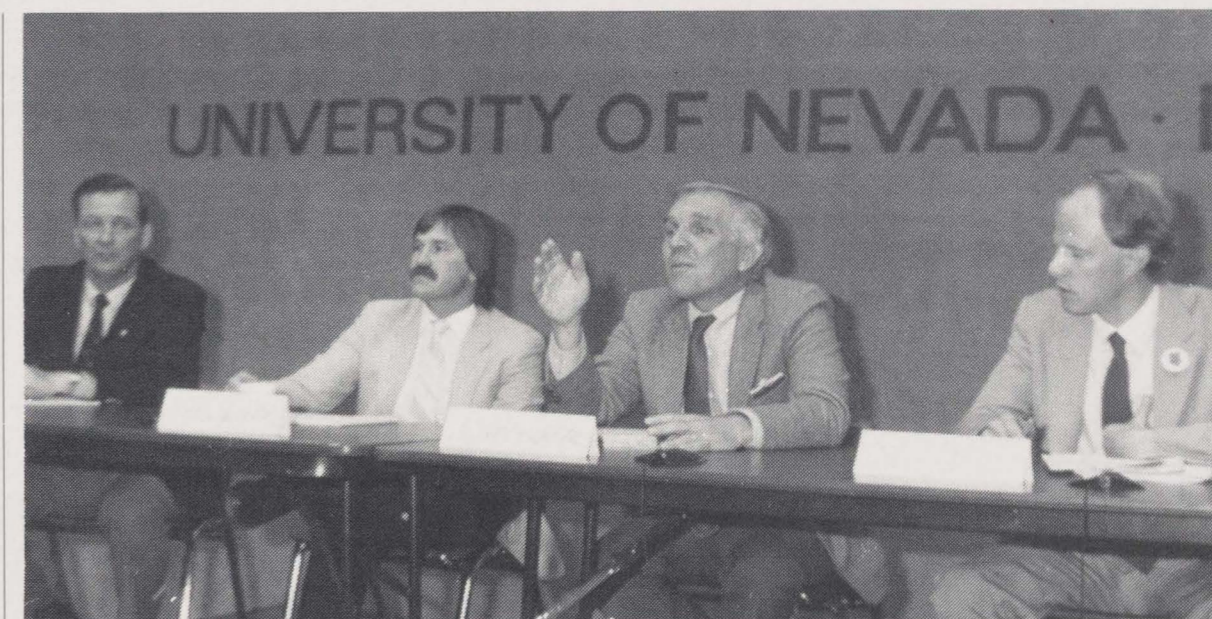
Action Plan:

- Form a State Advisory Board to advise and advance the public involvement program
- Provide for individual participation in the Federal and State nuclear waste programs

Support:

- Readable information and summaries prepared by qualified experts
- Workshops
- Debates
- Lectures with emphasis on question and answer sessions
- Direct mail information
- NNWTF will serve as a public information center and clearinghouse under the sanction of the State of Nevada
- Provide administrative support to the State Advisory Board

Join the Nevada Nuclear Waste Task Force, Inc. and learn more. Complete the form below and mail it to:
Nevada Nuclear Waste Task Force
4550 W. Oakey Blvd., Suite 111
Las Vegas, Nevada 89102



Pros and cons of the proposed Yucca Mountain high-level nuclear waste facility were discussed April 18 at a well-attended forum at the University of Nevada, Las Vegas. It was co-sponsored by UNLV and the Nevada Nuclear Waste Task Force. Pictured, from left, are panelists Bob Dickinson, co-chairman of the Nuclear Waste Study Committee which generally favors the project; Robert Loux, executive director of the state Agency for Nuclear Projects/Nuclear Waste Project Office; Carl Gertz, manager of the Department of Energy's Nevada Nuclear Waste Storage Investigations Project, and Bob Fulkerson, director of Citizen Alert which opposes the project.



Forum moderator Bob Rosenthal of campus radio station KUNV helps a woman from the audience direct a question to the panel.

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I know of the following groups that you should contact to become Organizational Members _____

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Nuclear Waste Project Office
Capitol Complex
Carson City, NV 89710

We want to hear from you...

Please add the following name and address to your mailing list:

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I have the following suggestions for Newsletter articles:

Please send me the following:

- Previous Newsletters
- Yucca Mountain Repository Map
- All Nuclear Waste Factsheets

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Nuclear Waste Project Office
Capitol Complex
Carson City, NV 89710

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