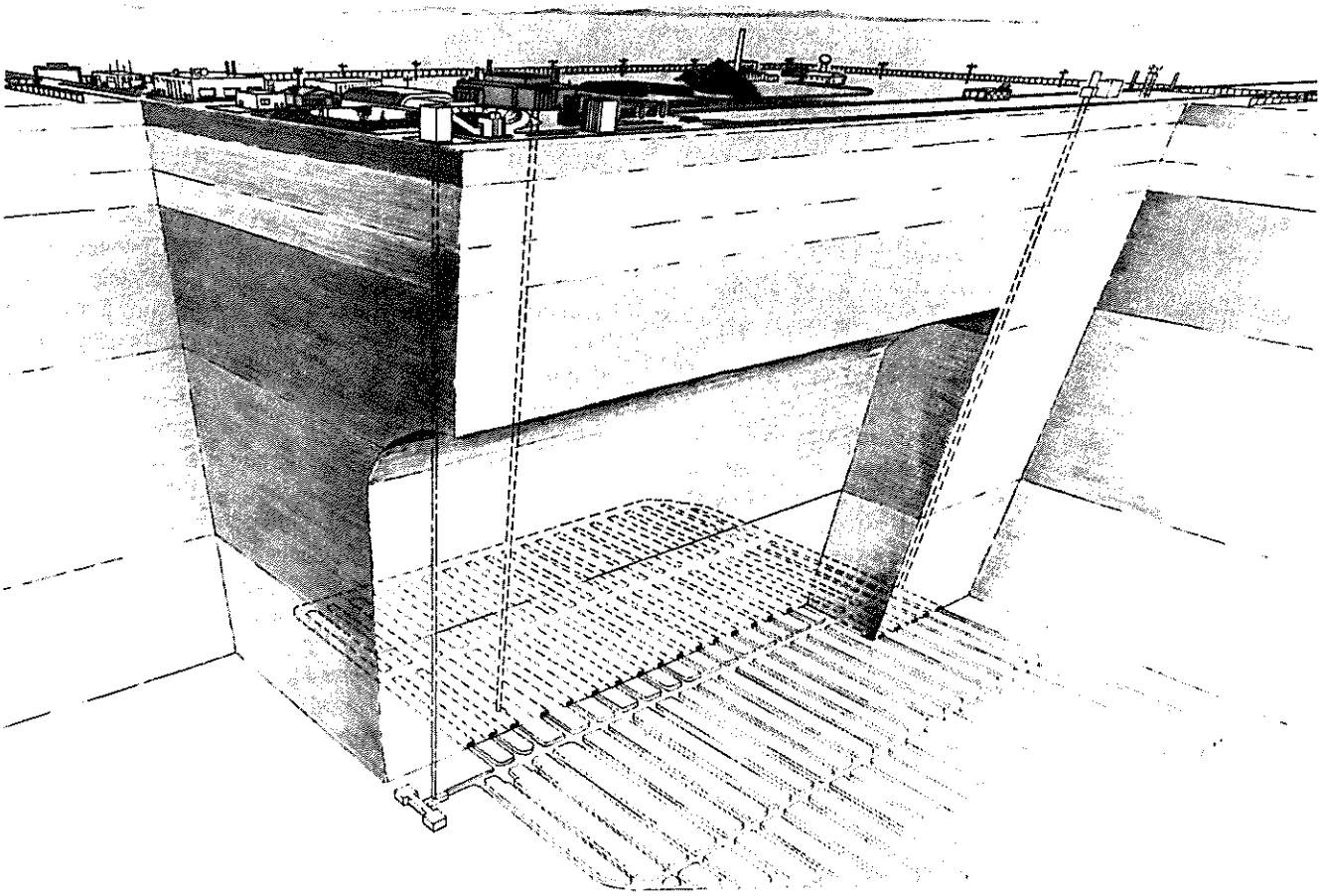
RESOURCES for SELF~RELIANCE

The Nuclear Legacy– How Safe Is It?



Artist's Concept of a Geologic Repository

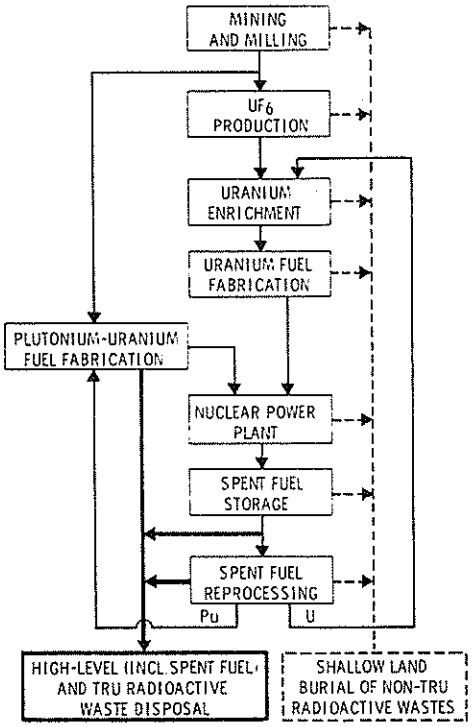
In the early 1970s, in an attempt to dispose of the nation's nuclear waste, the Atomic Energy Commission (AEC) decided that a salt mine in Kansas would become the nation's first nuclear waste repository. One Kansas congressman who had been a close observer of the activities wrote to the AEC and commented on its performance. The letter stated in part:

"[In Kansas the AEC acted] to carry out a previously adopted decision to install the waste dump regardless of the scientific facts that might be developed to alter or modify such a decision; to use legal technicalities and scientific verbiage in an effort to confuse and mislead non-scientifically educated persons. All in all, yours has been a shabby endeavor in this instance, not befitting any Federal agency, much less one supposedly dedicated to the scientific truth and therefore not afraid to face facts. Of course, I am disappointed and dissatisfied with the AEC and I am far from alone in the Congress in so believing."

--Congressman Joe Skubitz, June 22, 1971

"The Congress finds that...Federal efforts during the past 30 years to devise a permanent solution to the problems of civilian radioactive waste disposal have not been adequate."

--Public Law 97-425 (1983), Section 111(a)(3)



Processes and Waste Streams in the Commercial Fuel Cycle

INTRODUCTION

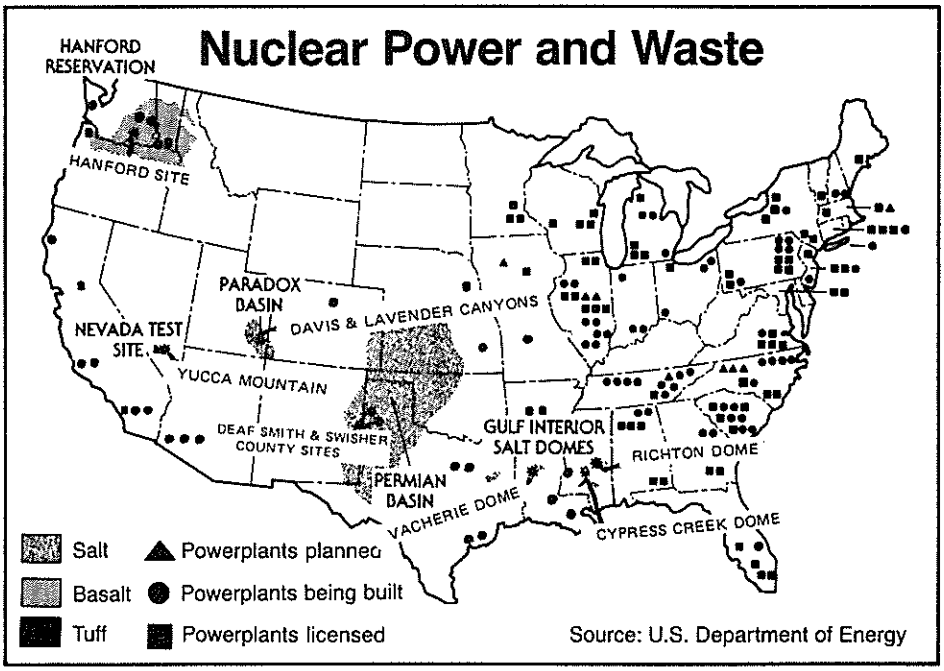
The firm conclusion of the Congress in the 1980s thus ratified what state governments, scientists, the nuclear industry, environmentalists, and antinuclear activists had been saying for many years, at least since the Kansas experience in the early 1970s, summarized by Congressman Skubitz. The federal government, after more than a quarter-century of trying to solve the problem, had no clear policy for permanently disposing of the steadily accumulating wastes generated by the nation's dozens of military and civilian nuclear reactors.

Those wastes, so highly radioactive that they will be a danger for thousands of years, have from the time they began to accumulate -- in the 1940s and 1950s -- presented an urgent demand for safe, long-term storage. Not only had the federal government lagged in developing a policy to deal with the problem, but its efforts to establish a program had come to be viewed as political, not scientific; unilateral, not consultative; and arbitrary, not systematic. In short, everyone agreed that the existing situation could not be tolerated and was a long-term danger to life and health, but not everyone could agree on the specifics of a comprehensive program to solve the problem.

The historic problems associated with developing and implementing a scientifically sound, publicly acceptable nuclear waste program did not arise solely because of government bungling. The problem of disposing of nuclear waste is not only *unique* in human history, but unfortunately it is also *unique in its complexity*, and it has thus far defied scientific efforts to find safe solutions.

Most commercially generated waste is currently in temporary storage at the more than 70 nuclear power plants operated by utility companies around the nation, while militarily generated waste is stored at two main locations -- the Savannah River Plant in South Carolina, and the Hanford Reservation in Washington -- with smaller amounts stored at the Idaho National Engineering Laboratory near Idaho Falls. The currently favored, and since early 1983 congressionally authorized, solution to the problem of permanently disposing of the waste -- burying it in one or two geologic repositories a few thousand feet below the surface -- will require scientists to go through a long and difficult technical process and the nation to go through an equally difficult political process.

Technically, scientists are faced with having to *predict* what can happen to highly toxic materials over hundreds of thousands of years, taking into account possible human intrusion and likely major changes in climate. The nuclear industry and its supporters in



Congress and the administration maintain, as they have for years, that the technology exists to permanently dispose of toxic wastes. However, after reviewing 25 years of research *and* the current program, the National Academy of Sciences concluded in 1983 that "the technology is not yet ready for completing a final design, construction, and operation" of a repository.[1]

Politically, popular support for burying and transporting hazardous materials must develop at a time when the public distrusts the government as a result of the Vietnam War and Watergate and is increasingly fearful of how all kinds of toxic wastes are handled as a result of the disasters at Love Canal and Times Beach. Because the public perceives the problem of safely disposing of toxic wastes to be a matter of life or death for present and future generations, it will not simply leave the solution to the experts and the politicians. Thus the technical uncertainties must be resolved scientifically, and the potential solutions must be made understandable to, and must substantially involve, the public, so that the ultimate decision makers -- the politicians in Washington, D.C., and in the states -- can make decisions that are technically and politically justified.

This article will summarize the nature and the history of the nuclear waste problem, but it will primarily focus on the current federal program as established in 1983 by the Nuclear Waste Policy Act (NWPA) and on the implementation of the Act by the Department of Energy (DOE). This will provide the necessary background for an outline of how citizens can be effectively involved in the development of solutions to the problem. People who are affected by the nuclear waste issue are not only those who now live, and will live in the future, in the repository host state, but also vast numbers of others -- all those who live along transportation routes and the tens of millions who are consumers of nuclear power nationwide and who pay the utility bills that fund the DOE nuclear waste program.

HISTORY OF NUCLEAR WASTE MANAGEMENT PROGRAMS

In its first effort to find a safe repository for nuclear wastes, the Atomic Energy Commission in the 1960s began conducting tests in a salt mine near Lyons, Kansas, in an operation known as Project Salt Vault (PSV). Oak Ridge National Laboratories, the contractor for PSV, concluded in 1971 that "most of the major technical problems pertinent to the disposal of highly radioactive wastes in salt have been resolved....The total costs for the operation of a salt mine disposal facility were estimated to be only a few thousandths of a mill for each kilowatt-hour of electricity produced."[2]

The AEC was so enthusiastic about what it saw as the success of PSV that it had announced on June 17, 1970, "the tentative selection of a site near Lyons, Kansas, for an initial salt mine repository for the demonstration of long-term storage of solid high-level and long-lived low-level radioactive wastes."[3] In June 1971 the AEC released its final Environmental Statement on the Radioactive Waste Repository,[4] which called for a demonstration phase with waste emplacement beginning in 1975. The expectation was that the site would be the repository for all transuranic and high-level wastes generated through the year 2000. (See accompanying box for a brief description of types of nuclear waste.)

TYPES OF NUCLEAR WASTE

Dangerous radioactive wastes are produced at each stage of the nuclear fuel cycle, which is shown in the chart. The general public fears radioactivity because some of its effects, including genetic damage, are long-lived and because other possible effects are not fully known. They fear it also because it is invisible, tasteless, and odorless, and the effects of exposure may not manifest themselves -- as cancers, most commonly -- until many years later. Since scientists still disagree about the risks of exposure to various levels of radioactivity, much technical uncertainly exists about whether there is a "safe" level of exposure.

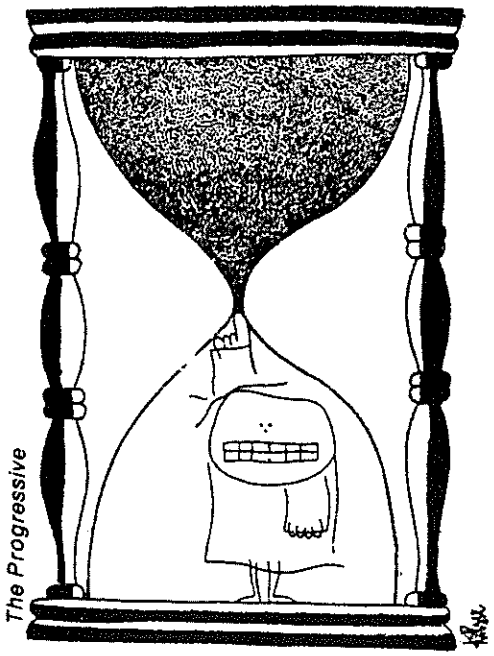
Uranium mill tailings piles are the source of the most chronic emissions of radioactivity in the nuclear fuel cycle. Low-level radiation is continuously released from the piles of tailings, the sandlike remains of the uranium milling process that extracts "yellowcake" from the ore. The tailings contain 99 percent of the volume and 85 percent of the radioactivity of the mined ore. By volume, more than 150 million tons of tailings are stockpiled on the surface near uranium mills in several states, principally New Mexico, Wyoming, Colorado, and Utah. Congress began to address the need for regulation and disposal of these tailings with the passage of the Uranium Mill Tailings Radiation Control Act of 1978 (UMTRCA). Five years after passage of the Act, no site has yet been reclaimed, and it will be at least 1995 before the tailings piles are disposed of.

Low-level waste is generated in every state by commercial and research reactors and by pharmaceutical companies and hospitals, but because most of the radioactive isotopes contained in such waste decay within a few years, and because certain radioactive materials generate health benefits as well as the wastes, there has not been general, nationwide public concern about such wastes. During the 1970s, three of the six commercial low-level waste disposal sites (where wastes are buried in shallow trenches) were closed because of leaks or because they were full to capacity. A crisis occurred in 1979 when two of the remaining three sites -- at Beatty, Nevada, and Hanford, Washington -- were closed temporarily because of problems related to the discovery of containers that had leaked during transportation. For several weeks only the Barnwell, South Carolina, facility was open. South Carolina officials then made it clear that Barnwell would not become the nation's only low-level disposal facility by substantially increasing fees and instituting a program to reduce the volume of waste Barnwell would accept. With the passage of the Low-Level Waste Act of 1980, Congress mandated that states form regional compacts and assume the responsibility of ensuring that additional waste sites are operating by 1986, as a means of sharing the burden of low-level waste disposal. Six regional compacts are now being developed, although both California and

Because of the political opposition of Congressman Skubitz and Governor Robert Docking, and because the technical problems of numerous unplugged drillholes in the area were emphasized by the Kansas Geological Survey, the AEC abandoned the Lyons site.

After this first "quick fix" solution ended in total failure, the search for another repository site in bedded salt shifted, settling on southeastern New Mexico only after Governor William Milliken of Mighigan forthrightly told the AEC it was not welcome to explore the salt beds of his state's Salina Basin. (It is interesting that even in DOE's "new" site selection program, the Salina Basin is not being considered.) But in New Mexico, the AEC encountered no opposition to its desire to conduct site explorations. On the contrary, various state government officials, the mayor of Carlsbad, and some business interests, including a now defunct potash company, extended the state's welcome to the AEC in 1972.

In 1975, work actually began at the New Mexico bedded salt site, called the Waste Isolation Pilot Plant (WIPP). The project has always been under the jurisdiction of the Armed Services Committees in Congress. To avoid the necessity of meeting the requirements for repository licensing established by the Nuclear Regulatory Commission (NRC), Congress decided in 1979 that the WIPP Project would be used only for military waste storage. President Carter, however, had misgivings and in 1980 attempted to



Texas have indicated that they will develop their own sites rather than participate in regional compacts.

The other three types of nuclear waste -- transuranic, high-level, and spent fuel -- were not provided for in the two earlier laws, but high-level and spent fuel are now covered by the Nuclear Waste Policy Act, enacted in 1983. Transuranic (TRU) wastes include uranium-233 and radionuclides heavier than uranium 238, which are generated during reprocessing, almost all of which takes place at military facilities. These materials generally have long half-lives. (A half-life is the time required for radioactivity to be reduced by decay to half its original strength). The half-life of plutonium-239 is 24,000 years, meaning that it is very hazardous for at least 240,000 years. More than two-thirds of the approximately 50,000 cubic meters of TRU waste is *stored* in 55-gallon drums and plywood boxes at the Idaho National Engineering Laboratory (INEL). Additionally, almost 400,000 cubic meters of TRU wastes produced prior to 1970 are *buried* in shallow trenches at INEL. There are no plans to remove the *buried* TRU wastes.

High-level wastes are the acidic, highly radioactive, heat-producing liquids produced by reprocessing at military reactors. Some commercially reprocessed wastes are stored in West Valley, New York, at the site of a now defunct commercial reprocessing plant. Of the 300,000 cubic meters of defense wastes, about 95 percent is currently stored at the Savannah River Plant in South Carolina and at the Hanford reservation in Washington. Those liquid wastes are extremely toxic and will require solidification before they can be moved to any permanent repository.

Commercial spent fuel, or irradiated fuel assemblies from commercial nuclear power plants, is usually stored in cooling ponds at the reactors. The ponds were originally designed to handle wastes for only five to ten years, at which time the wastes were to be removed to reprocessing plants. Therefore, the capacity of the ponds at most reactors has now been enlarged by reracking to handle additional fuel rods. Nevertheless, temporary storage facilities may be necessary to handle spent fuel from reactors where ponds fill to capacity before a repository becomes operational. Dry storage could also be resorted to -- fuel rods could be stored temporarily in air-cooled casks at reactor sites.

The Department of Energy currently intends to dispose of all *stored* military TRU waste at the Waste Isolation Pilot Plant (WIPP) in southeastern New Mexico. NWPA did not necessarily establish the final solution for military high-level waste, but the Act does require the president to determine whether there are strong reasons that such military waste should not be commingled with spent fuel in commercial repositories. Unless such a presidential determination is made, both military high-level and commercial spent fuel and high-level waste will be buried in the commercial repository, along with the relatively small amounts of commercial transuranic wastes.

cancel WIPP. The action stemmed from his belief that public policy required that all wastes should be disposed of in repositories licensed by the NRC and that cost effectiveness required that military wastes not be stored separately, but be disposed of in respositories that would also be built for commercially generated wastes.

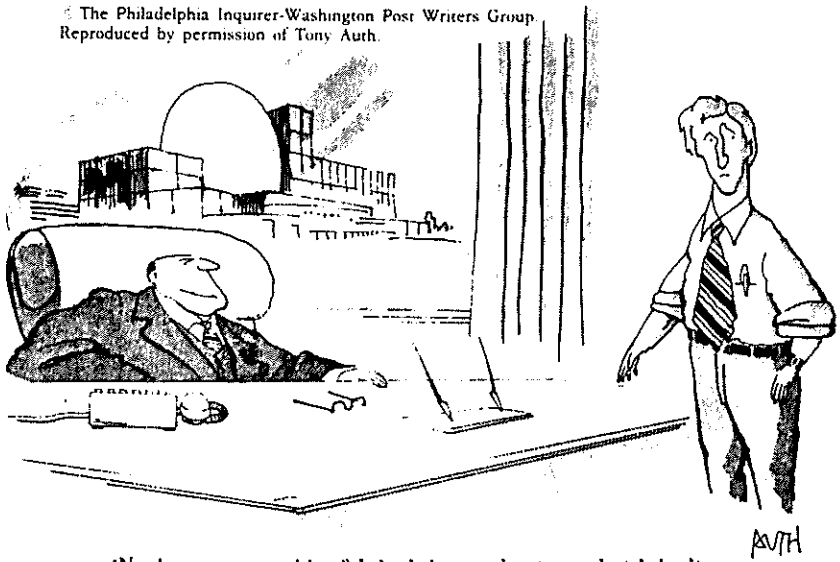
However, in an early action of the Reagan administration the DOE decided on January 22, 1981, that it would proceed with WIPP to "dispose of defense transuranic (TRU) waste" and as "an experimental facility" with "small volumes of defense high-level waste."[5] Three lawsuits, including one instituted by the state of New Mexico, were filed within six months of that decision and resulted in additional testing and in the reorientation of the repository away from a known brine reservoir. Despite opposition from the present governor of New Mexico, and even though a lawsuit by Southwest Research and Information Center was (and still is) undecided, the DOE on July 1, 1983, again reaffirmed its decision by announcing it would proceed with construction of WIPP as a permanent waste disposal site.[6] If construction goes ahead, this first nuclear waste repository will be in operation by 1988, though a current prohibition bars the disposal of any commercial waste or any high-level military waste at the site. Thus, the second "quick fix" solution proposed by the federal government has also failed to resolve the nations's nuclear waste problem.

"DON'T JUST STAND THERE! CALL THE SHERIFF AND HAVE HIM ARREST THIS BRINE FOR TRESPASSING!"

Parenthetically, it should also be stated that until another possible repository site is developed under NWPA, the possibility exists that the WIPP site will become, by default, the nuclear waste repository for all military wastes, and possibly for the commercially generated wastes as well. The governor of New Mexico is currently engaged in an effort with both the administration and the Congress to gain assurance that that will not happen.

In the late 1970s, as a result of significant scientific concern about the capabilities of salt as a waste repository medium -- concern clearly articulated by the Environmental Protection Agency (EPA),[7] the U.S. Geological Survey,[8] and the Interagency Review Group on Radioactive Waste Management[9] -- DOE expanded its program to consider other possible repository locations and to include nonsalt rocks. Curiously, at least from a scientific view, the DOE chose the easiest and quickest way to find other rock types by determining that the existing military reservation at Hanford, Washington, and the government's Nevada Test Site, near Las Vegas, were potentially acceptable as repository locations. Only because the NWPA requires a second repository and mandates that other rock types be explored is DOE now looking for additional sites beyond those previously chosen.

An important result of this limited site selection process was, of course, that the waste sites that were ultimately chosen and are now under active consideration are not necessarily the most desirable technically. The salt sites have been chosen from areas where the government was either invited to go (New Mexico) or where it was not prohibited from working (Utah, Mississippi, Texas). States with large underground salt formations where governors had objected to waste site work -- Kansas and Michigan -- were left out of consideration. The Hanford site and the Nevada site were chosen because the federal government controls the land. Understandably, this site selection process has been the subject of a great deal of criticism -- the technical community is not sure that the sites chosen have, beyond question, the most geologically favorable characteristics, and the public suspects that site selection is a political process in which nuclear waste is pushed off on the least politically powerful states (Texas, of course, being the exception).

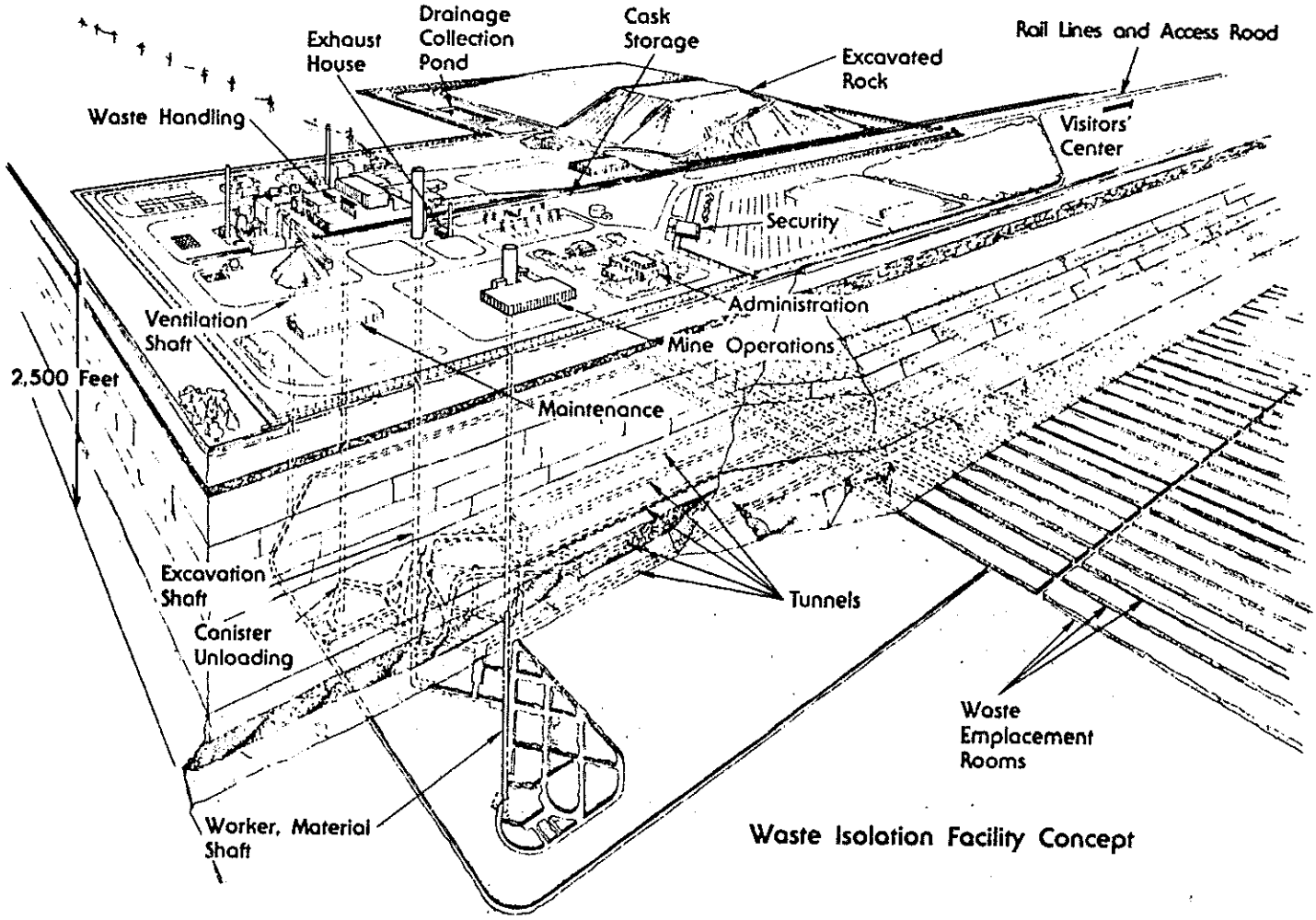


'Nuclear waste problem? I don't know about you, but I don't want my kids growing up in a world where there aren't any problems left to solve!'

The national importance of nuclear waste disposal was established with California's passage of restrictive nuclear legislation in 1976. Responding to pressure from a citizen initiative, the California legislature approved several laws that prohibit construction of new nuclear power plants in the state until the technology to dispose of the wastes is demonstrated. Other states followed that example and passed similar legislation. While attacking the legality of the California laws, which were ultimately upheld by the U.S. Supreme Court on April 20, 1983, the nuclear industry began pushing strongly in Congress for waste management legislation. Demonstrated technology was now crucial, and the absence of a national waste program was therefore a threat to the expansion of the nuclear industry. Further, it soon became clear that while most people then supported nuclear power plants, they opposed nuclear waste facilities -- at least in their own back yards.

In the 1970s, the discovery of leaking waste containers at long established nuclear storage sites, most notably the Hanford reservation, further raised awareness of the importance of finding permanent solutions to the disposal problem to replace the stopgap half-measures and "quick fixes" of the past. At about that time, the issue became further complicated by the emerging view that one "solution" previously proposed and for years taken almost for granted -- reprocessing spent fuel to remove uranium and plutonium so that they could be reused -- could not work economically, technically, or militarily. The failure of the first privately operated reprocessing plant in West Valley, New York, showed that the technology was not yet workable and that it could not support a profit-making industry. Increasing concerns about nuclear proliferation caused many people to fear that widespread reprocessing would virtually assure that bomb-grade plutonium would fall into the hands of people who could use it for destructive purposes. In 1976, President Ford decided to place a moratorium on federal government support for reprocessing.

Confronted with this confused and politically volatile situation, President Carter determined that a broad-ranging study of the waste disposal problem and its potential solutions was required. He commissioned a DOE task force, which recommended, with



Waste Isolation Facility Concept

presidential approval, establishing the Interagency Review Group (IRG), which brought together 14 federal entities to attempt to develop strategies and solutions. Coming at the same time various private and citizen groups were investigating the problem, the IRG process broadened to include various members of the public -- representatives of the nuclear industry, technical experts, and members of environmental and citizen organizations. The IRG's efforts led to the conclusion that geologic disposal of nuclear waste could be achieved, following a step-by-step scientific process of studying rock types, finding and evaluating potential sites nationwide, and testing facilities and engineering technologies. (The alternative of subseabed disposal was seen as not possible within 20 to 25 years, though research on all reasonable long-term alternatives was encouraged as a necessary backup for failure of the geologic program.)

In all of these efforts, the principle of involving the public and the scientific community was to be strictly observed. There was to be full compliance with the requirements for public involvement called for in the National Environmental Policy Act (NEPA), states were to be granted full "consultation and concurrence," and the standards for licensing requirements set by the NRC were to be met.

President Carter proposed this IRG approach on February 12, 1980, but Congress approved only a small portion, the Low-Level Waste Policy Act. Both houses passed legislation on high-level waste, but no compromise was reached before adjournment in December 1980.

THE NUCLEAR WASTE POLICY ACT OF 1982

After years of bills, hearings, lobbying, and debate, on December 20, 1982, Congress passed and on January 7, 1983, President Reagan signed the Nuclear Waste Policy Act of 1982 (NWPA). The four purposes of the law are:

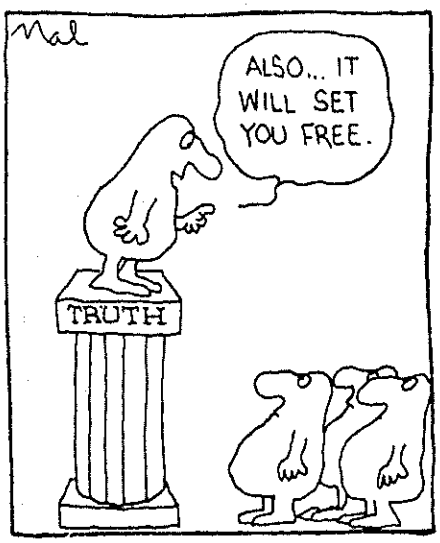
1) "to establish a schedule for the siting, construction, and operation of repositories that will provide a reasonable assurance that the public and the environment will be adequately protected from the hazards" of spent fuel and high-level nuclear waste;
2) "to establish the Federal responsibility, and a definite Federal policy" for waste disposal;
3) "to define the relationship between the Federal Government and the State governments" regarding such waste disposal; and
4) "to establish a Nuclear Waste Fund" with payments made by waste generators and owners to pay for disposal costs.

The Act also establishes a program for interim storage of spent fuel, requires further development of surface storage, or Monitored Retrievable Storage (MRS), as an alternative to geologic disposal, and allows DOE to develop one or more Test and Evaluation Facilities to do research and development.

The 63-page Act is complex and establishes many new procedures, as well as adopting some of DOE's previous program plans. The site selection process for the two repositories contemplated by the Act includes five phases.

1) *Repository Guidelines.* As the first step DOE must issue (after public comment, consultation with states and appropriate federal agencies, and the concurrence of the Nuclear Regulatory Commission) "general guidelines for the recommendation of sites for repositories. Such guidelines shall specify detailed geologic considerations that shall be primary criteria for the selection of sites in various geologic media. Such guidelines shall specify factors that qualify or disqualify any site from development as a repository" (Section 112(a)). Previously, there had not been such extensive guidelines, and these amounted to a new requirement for DOE.

2) *Site Nominations.* The secretary of DOE, using the guidelines, must "nominate at least five sites that he determines suitable for site characterization for selection of the first repository site" (Section 112(b)(1)(A)). Prior to the nomination, the secretary must notify the affected governor and legislature and any affected Indian tribe of the nomination and "basis for such nomination" (Section 112 (b)(1)(H)). Additionally, hearings must be held near each potential site to gather public comments on DOE's plans (Section 112(b)(2)). A draft environmental assessment (EA) must then be prepared and subsequently be reviewed at public hearings and through written comments. These comments and



DOE's responses must be included in the final EA which must accompany each nomination (Section 112(b)(1)(E)). This is another new step in DOE's process and has the important effect of requiring DOE to support its decisions legally and to justify them technically.

3) *Site Characterization.* From the sites nominated, the secretary must then recommend to the president three sites for detailed characterization, including sinking exploratory shafts (Section 112(b)(1)(B)). The president has 60 days to approve or disapprove the candidate sites or to delay his decision by up to six months, if he so advises the Congress (Section 112(c)). Prior to beginning this site characterization, the DOE must submit a detailed Site Characterization Plan to the NRC, the affected state, and the public and must hold public hearings on the plan (Section 113(b)(1) and (2)). At least every six months during site characterization, DOE must report to the NRC and the state as to its activities and the information developed (Section 113(b)(3)). Also, scoping hearings and hearings on the draft environmental impact statement will be required. While site characterization had become a part of DOE's program prior to the passage of NWPA, the Act established a more formal, rigorous process of state involvement, though it also eliminated the necessity for full environmental impact statements.

4) *Site Approval.* The secretary of DOE must choose one repository site to recommend to the president. The recommendation must be accompanied by, among other things, a final environmental impact statement, preliminary NRC comments on site characterization results, and views from the affected state along with DOE's response to those comments (Section 114(a)(1)). The president must then recommend one site to Congress as the repository (Section 114(a)(2)(A)). But this recommendation is not necessarily the final decision because the affected state may send a veto petition to Congress within 60 days after the presidential recommendation (Section 115(b)). The state's veto can be overridden only by a joint congressional resolution, which must be passed within 90 days after receipt of the veto (Section 115(c)). Such a veto is a new, unprecedented requirement and has not previously been part of any federal law.

5) *Site Licensing.* Before construction can begin, the NRC must use its licensing procedures (10 CFR Part 60, 46 *Federal Register* 13971) and technical criteria (10 CFR Part 60, 48 *Federal Register* 28194) to approve or disapprove the DOE license application. The Act did not significantly change NRC's process or procedures.

TABLE 1

SCHEDULED DEADLINES OF NWPA

June 30, 1983	Contracts with waste generators
July 6, 1983	Final Repository Guidelines
January 1, 1984	Final NRC technical criteria
January 6, 1984	Final EPA standards
April 6, 1984	Draft Mission Plan
June 6, 1984	Final Mission Plan
January 1, 1985	3 sites recommended for characterization
January 6, 1985	Presidential military HLW evaluation
March 1-August 28, 1985	President approves or disapproves characterization recommendation
March 31, 1987 (or 1-year delay)	President recommends first repository site to Congress
May 31, 1987(8)	State veto to Congress
90 days later	Congress can override state veto
January 1, 1989 (or 3-4 years after receipt of application)	NRC decision on construction license
July 1, 1989	Five states nominated for second repository
March 31, 1990	Presidential recommendation for second site
January 31, 1998	Repository in operation

OTHER PROVISIONS OF NWPA

Second Repository. The same process must be used to develop a second repository. A timetable for those actions, established by the Act, is shown in Table 1.

Project Decision Schedule. DOE must prepare and update an overall schedule "that portrays the optimum way to attain the operation of the repository," and federal agencies involved must meet stated deadlines (Section 114(e)(1)). Any agency that cannot meet any deadline must submit a written report to DOE and the Congress explaining why it is unable to comply and why it cannot agree with DOE on the schedule, and must estimate the time it will need to complete its work. DOE then has 30 days to send Congress its reply to the agency report.

The Mission Plan. Section 301 of the Act requires DOE to develop a comprehensive report that discusses all aspects of the waste management program, identifies unresolved technical issues, and sets forth the "financial, political, legal, or institutional problems that may impede the implementation of the Act, the plans of the Secretary to resolve such problems, and recommendations for any necessary legislation to resolve such problems" (Section 301(a)(3)).

Military High-Level Waste Disposal. The Act requires that military high-level waste be disposed of in commercial repositories unless the president decides by January 1985 that a separate military repository is required after evaluating "cost efficiency, health and safety, regulation, transportation, public acceptability and national security" considerations (Section 8(b)(1)). Any military-only repository would still require NRC licensing (Section 8(b)(3)).

Nuclear Waste Fund. The NWPA adopts the principle that the generators and owners of nuclear waste must pay into the fund to "ensure that the costs of carrying out activities relating to the disposal of such waste and spent fuel will be borne by the persons responsible for generating such waste and spent fuel" (Section 111(b)(4)). The Act establishes a fee of one mill per kilowatt hour for electricity generated after April 6, 1983, (Section 302(a)(2)). For previously generated waste, the DOE must set a one-time charge (Section 302(a)(3)). The fee must be reviewed annually, and the secretary may adjust the fee after reporting the adjustment to Congress, which has 90 days to disapprove it (Section 302(a)(4)). In return for payments into the fund, the DOE has entered into contracts with utility companies agreeing that "beginning not later than January 31, 1998, [it] will dispose of the high-level radioactive waste or spent nuclear fuel" they produce (Section 302(a)(5)(B)).

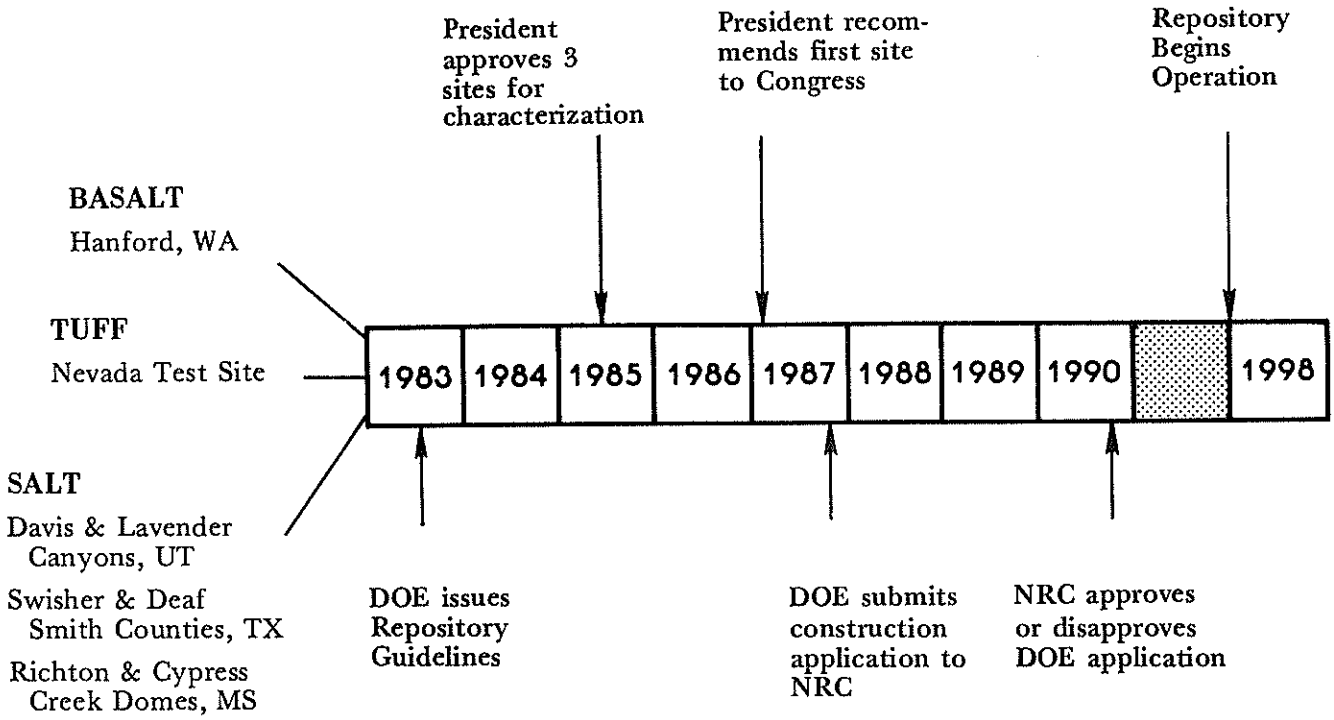
DOE's initial analysis of the fee finds that it is adequate to cover program costs, "assuming 3 percent annual inflation and nuclear installed capacity of 165 gigawatts-electric by the year 2000."[10] Since both of those assumptions are questionable and "the potential for unanticipated cost increases is very high,"[11] the current fee assessment may prove to be too low, though costs are already several hundred times higher than those predicted in 1971 following Project Salt Vault.

NEPA Limitations. The National Environmental Policy Act of 1969 (NEPA) is the basic environmental protection law, and fundamental to it is a requirement for broad public participation in the decision-making process. That requirement, applied in conjunction with the major environmental concerns associated with nuclear waste, could have made NEPA a major instrument for citizen involvement in nuclear waste repository siting. However, Congress chose to severely limit NEPA's application to the siting process. NWPA establishes specific requirements for the environmental assessments that must accompany site nominations. However, the comprehensive document required by NEPA -- an environmental impact statement (EIS) -- is specifically not required by NWPA until the very late stage when DOE makes its recommendation to the president for the repository site. The Act also limits the normally strict requirements of NEPA so that the only alternatives that must be described in the EIS are the three sites characterized and so that issues of need and timing for the repository need not be considered. Congress further limited NEPA's application by encouraging the NRC to rely on the FEIS already prepared by DOE, at least "to the extent practicable" (Section 114(f)), rather than preparing a separate EIS of its own.

STATE POWERS UNDER NWPA

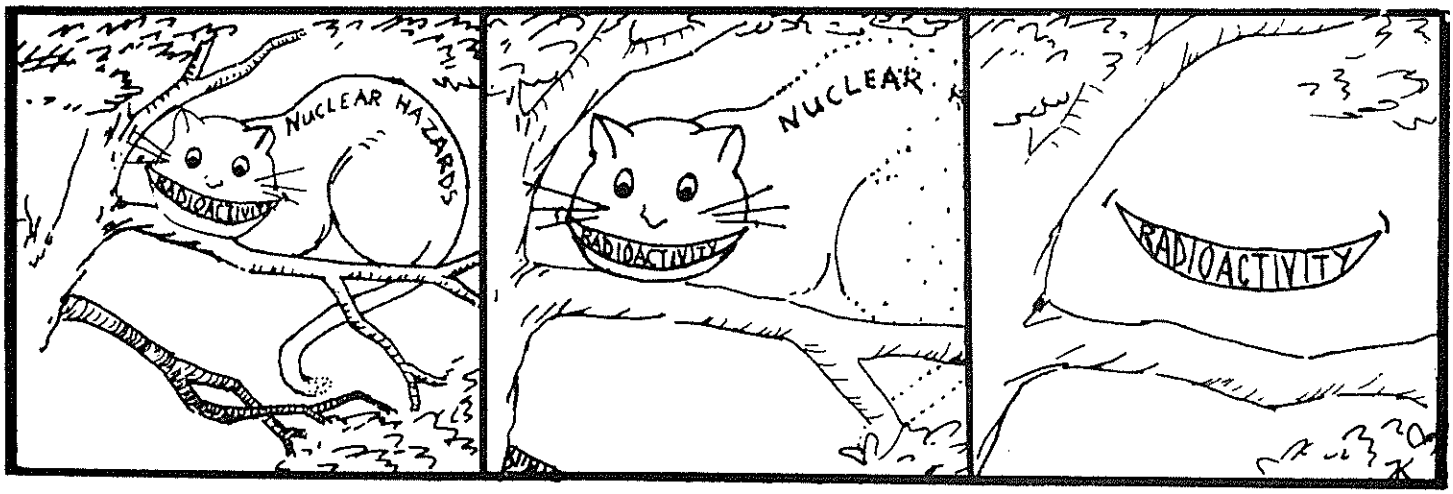
In the congressional tradeoffs involved in passing NWPA, advocates of strong state power and participation won significant victories, including requirements for state involvement throughout the process, financial assistance to the states to evaluate DOE's program and to mitigate negative impacts from a repository, and the veto power over any repository.

SCHEDULE FOR FIRST REPOSITORY



Explicit state involvement is mandated throughout NWPA. DOE must consult with the states in the development of the general guidelines (Section 112(a)). The secretary of DOE must consult with the governors of affected states before nominating sites (Section 112(b)(1)(A)) and must explain the reasons for the nomination (Section 112(b)(1)(H)). The president and the secretary must inform the states of their decisions regarding site nominations (Section 112(c)(1)).

At the site characterization stage, the secretary must submit to the states and the NRC a Site Characterization Plan (Section 113(b)(1)). During site characterization DOE must pay the state an amount equal to the sum the state and local governments would receive if they could tax the site characterization activities (Section 116(c)(3)). Further, DOE must make financial grants to each state to allow for state review, to provide information to the



By Janet Kailin, Sequim WA 98382.

THE CAT VANISHED QUITE SLOWLY, BEGINNING WITH THE END OF THE TAIL, AND ENDING WITH THE GRIN, WHICH REMAINED SOME TIME AFTER THE REST OF IT HAD GONE.... (with apologies to Alice in Wonderland's Lewis Carroll)

public, and to develop the request for impact assistance to mitigate adverse impacts of a repository (Section 116(c)(1)(B)).

The technical review process established by each state is very important, because it is the most legitimate and best funded source for alternative technical information about a site. There are various possible models for such review. In New Mexico an Environmental Evaluation Group (EEG) was established as part of the Health and Environment Department in 1977. During the past six years, EEG has received more than $3 million from DOE, its sole source of funding, to conduct its only mission -- acting as the state's independent reviewer of the WIPP Project. The advantages of this approach are that the expertise of a permanent staff is available, and a long-term view of the project can result. An important problem, however, can be that the EEG's continuation depends on WIPP's continuation.

In Texas, the Bureau of Economic Geology (BEG) has been a major DOE subcontractor for technical data on potential waste repository sites in the Panhandle. That approach has several advantages. For one thing, DOE is funding an existing agency that has significant expertise, thereby augmenting existing state research and resulting in DOE's becoming somewhat dependent on the state for a certain amount of important information. Also, this approach provides the state with significant information which can be used to critique DOE's program, if necessary. A disadvantage of such a system is that the agency can become very much accustomed to receiving several hundred thousand dollars a year from DOE.

Another possible model calls for setting up an independent review process that has a life limited to a definite number of years. Experts could be recruited to participate in the review process and make an independent evaluation of the suitability of a site. Such a process might avoid some of the bureaucratic pitfalls inherent in the other approaches and make it possible to recruit top experts, who are otherwise employed, for short periods of time. This approach assumes that the review would occur during site characterization so that it would have maximum impact in support of the state's position regarding the presidential recommendation to Congress.

Throughout the site selection process DOE is required to provide "timely and complete information to the state or affected tribe" (Section 117(a)(1)). If the governor or the legislature of a state requests such information in writing, DOE must provide it within 30 days. If the information is not provided, the state may then write to the president. Requests to either the secretary or the president which are not answered within the required 30 days will result in a suspension of "all activities in such state," and the activities cannot be renewed until the information is provided (Section 117(a)(2)).

DOE is instructed to "consult and cooperate" with the states to resolve any concerns "regarding the public health and safety, environmental, and economic impacts of any such repository" (Sec. 117(b)). Binding written agreements between states and DOE are required at least by the time of the site characterization phase, and they may be implemented earlier. Those agreements must set out procedures for information exchange, state review, DOE response to comments and recommendations, development of requests for impact assistance, dispute resolution, and resolution of such off-site concerns as accident liability coverage, emergency preparedness, monitoring of transportation, conducting baseline health studies, environmental monitoring, and decontamination and decommissioning.

Finally, as previously described, the state can also file its objection to a repository through its veto petition to Congress when the president recommends the site.

Provisions applicable to affected Indian tribes are generally similar to those of the states, including the provisions for veto and financial assistance (Section 118). The Yakima Tribe in Washington state has been granted status as an "affected tribe" by Interior Secretary James Watt because of its proximity to the Hanford site. The tribe will apparently be the only one directly affected in the first round of repository selection.

PUBLIC INVOLVEMENT REQUIREMENTS OF NWPA

Although the Act severely limits the applicability of NEPA, which normally provides a major channel of public participation and involvement, it does contain requirements for public hearings throughout the site selection process. Specifically:

--Hearings are required on the general guidelines.
--Before any of the five sites are nominated, public hearings must be held in the vicinity of the sites to receive comments and recommendations (Section 112(b)(2)).
--The nominations must be based on environmental assessments (Section 112(b)(1)(E)), which must be made available to the public (Section 112(b)(1)(G)).
--The Site Characterization Plans must be made available to the public, and public hearings must be held (Section 113(b)(2)).

The Wall Street Journal

'That's a good question which demands some real evasion.'

--After site characterization, public hearings must again be held before a recommendation is made to the president (Section 114(a)).
--The secretary's recommendation to the president must be accompanied by a Final Environmental Impact Statement (Section 114(f)), and thus a draft EIS must be prepared, followed by public hearings and opportunities to submit written comments which then must be responded to by DOE as part of the EIS process.

While these hearings and opportunities for comment provide for some public involvement, and while the EA and the EIS allow possibilities for judicial review, the public can enhance its role by working through state governments. Because of the powers granted to the states, significant public input to DOE could result if citizen groups take every opportunity to participate in the state's activities.

ROLES OF THE NRC AND EPA

The Act does not amend the NRC's responsibilities under the Atomic Energy Act and the Energy Reorganization Act, but it does give some strong directions to the commission. Its licensing and technical requirements must be promulgated by January 1, 1984 (Section 121(b)), but the agency finalized them ahead of schedule, on June 21, 1983. NRC will have to revise its licensing procedures to meet all of the requirements of NWPA.

The Site Characterization Plan must be submitted to the commission (Section 113(b)). The commission's own licensing requirements spell out in detail how the commission is to review the plan. After approval by the president, and after congressional override of a selected state's veto, if that occurs, the commission must grant a construction permit before actual construction can begin. The Act requires that such permit be granted within three years after the application is submitted, unless the NRC notifies Congress that it is extending the period for one additional year (Section 114(d)). The commission's licensing decision must include a Final Environmental Impact Statement, but, as explained above, the commission is to adopt the DOE EIS "to the extent practicable."

The Environmental Protection Agency (EPA) must promulgate environmental protection standards for off-site releases of radioactivity from repositories by January 6, 1984 (Section 121(a)).

DOE'S IMPLEMENTATION OF NWPA

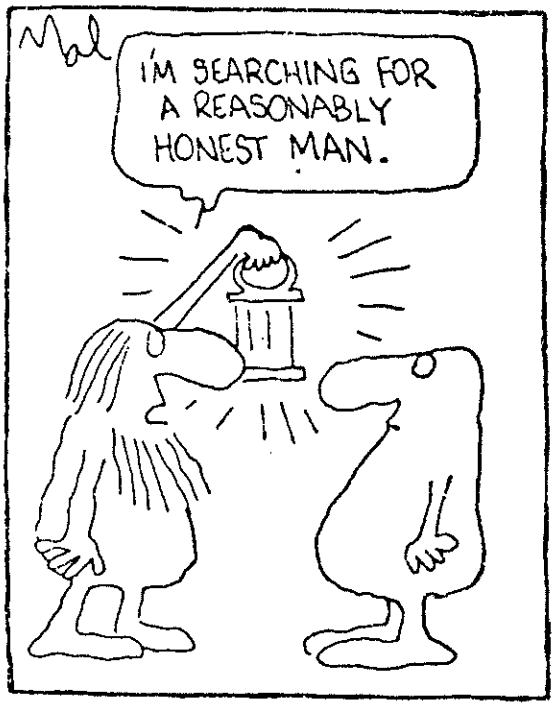
On February 2, 1983, DOE Secretary Donald Hodel sent letters to the governors of Washington, Nevada, Utah, Texas, Louisiana, and Mississippi, advising

them that sites in those six states were potentially acceptable for nomination. The nine sites, not surprisingly, were those DOE has been investigating for several years. On February 7, 1983, DOE issued its proposed repository guidelines and announced that there would be public hearings and a 45-day comment period and that "DOE expects to begin nominating such sites in 1983 and to have recommended three sites to the President by the end of the Summer of 1983" (48 *Federal Register* 5672). On February 14 DOE announced that five hearings -- in Seattle, Chicago, New Orleans, Washington, D.C., and Salt Lake City -- would be held by March 14 on the draft guidelines.

A storm of protest from state officials, citizen groups, and national environmental organizations greeted both DOE's process and its schedule. Critics charged that the guidelines were issued without consultation with states or federal agencies, that the guidelines were vague and contained few of the "qualifying and disqualifying factors" required by the Act, and that the guidelines and especially site nominations were premature in the absence of final NRC and EPA standards.

As a result of the strong opposition, DOE substantially delayed its schedule. On June 7, the guidelines were reissued to allow time for additional public comment and additional state consultation, and the guidelines will therefore not be finalized and submitted for NRC concurrence until several months after the Act's July 6 deadline (Sec. 112(a)). The NRC concurrence process and the absence of final EPA standards could cause further delay in site nominations, which must be based on the guidelines. Although the scoping hearings were held in Washington state and Nevada in March 1983 and in the proposed salt site states (Utah, Mississippi, Louisiana, and Texas) in late April and May 1983, nominations have been delayed until at least late 1983 or early 1984. Some observers expect that site nominations and, even more likely, selection of the three sites for characterization will be delayed until after the 1984 elections.

DOE recently established a program to investigate potential crystalline rock (granite) sites in 17 eastern states as possible locations for the second repository. While the Act excludes from second-round consideration the sites that were nominated but not



characterized in the first round (Section 112(b)(1)(C)), the two sites characterized but not selected in the first round will presumably be included with the newly nominated sites.

POTENTIAL SITES FOR THE FIRST REPOSITORY

While requiring some new procedures in the DOE approach to site selection, Congress in the NWPA allowed the agency to continue much of its basic program and schedule. As a concession to states under consideration for the first site, Congress did require DOE to develop plans for two repositories, so that eastern, nonmilitary sites can be considered for the second site. One result should be that some crystalline rock sites are included in the process. Internationally, research on suitable media for waste repositories has included an intensive study of granitic formations (particularly at the Stripa site in Sweden), and various experts have proposed that such formations in the U.S., which are extensive, be included in the repository selection process. However, for the early selection of the first repository as provided for in NWPA, DOE is continuing to use its previously identified locations.

Following is a short summary of those potential sites, their characteristics, and their potential problems.

Hanford, Washington. This basalt site on the military reservation in southeastern Washington is farthest advanced in the selection process, DOE having prepared a Site Characterization Report (DOE/RL 82-3, 3 volumes) in November 1982 and a draft Environmental Assessment (DOE/EA-0210) in

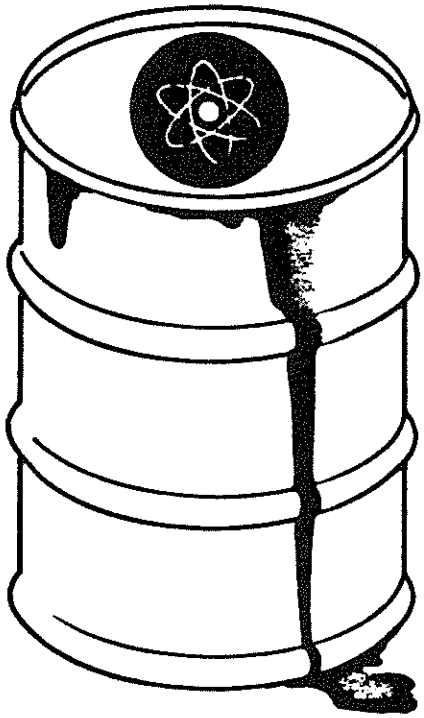
February 1983. DOE and the supporters of early characterization at Hanford believed that Section 112(f) of NWPA -- "Timely Site Characterization" -- would allow such work to begin at Hanford months before it could begin at other sites. However, state and public opposition, as well as the impossibility of doing an adequate EA because four other sites could not properly be evaluated in comparison with Hanford (as required by NWPA), has resulted in the characterization's being delayed for many months, even though a drill rig standing idle at the site costs about $10,000 a day.

NRC released its draft Site Characterization Analysis (NUREG-0960, 2 volumes) of DOE's Site Characterization Report in March 1983, even though DOE must issue a Site Characterization Plan to comply with NWPA's requirements. NRC was highly critical of the DOE document for placing "too much confidence in the suitability of the site for a repository on the basis of information collected to date. Preliminary DOE statements regarding groundwater travel time, geologic stability, and site geochemistry, in the view of the NRC staff, do not consider the present uncertainties about the geologic parameters affecting these site parameters."[12] NRC staff studies showed, for example, that in regard to groundwater travel time, DOE's calculations are totally unreliable since the data show their calculations of that time can vary "from 20 years to greater than 1 million years."[13]

The main difficulty at Hanford lies in the lack of basic understanding of the complicated groundwater situation. The underground basalt layers are fractured owing to the cooling of the lava flows at the surface. These fractures have varying and poorly known water-transmitting characteristics. Possible water flow into large aquifers that discharge into the Columbia River could be a source of significant exposures to the public. Further, repository excavation may be difficult because of possible flooding of exploratory shafts. Finally, the effect of repository excavation and waste-generated heat on basalt stability is unknown.

Since more than 180,000 cubic meters and 500 million curies of military HLW are currently stored at Hanford,[14] many citizens believe the site will become a de facto repository unless other sites are found. However, there is also significant support for locating the repository in the Richland area, where many people have been workers at Hanford for years.

Nevada Test Site (NTS). This tuff site (tuff is another volcanic rock) will be nominated, as Hanford will be, barring a total policy reversal by DOE. Thirty years of underground bomb testing have provided information on the geology of the area, but



only some of that information is useful since the site now being investigated is on the edge of NTS and partly on Air Force and Bureau of Land Management land, where the geology has been less studied and is less well understood.

At NTS, the granite formations and welded tuff below the water table were first investigated. Most recently, welded tuff about 400 feet above the water table and about 1,200 feet below the surface has become the target horizon.[15] Because of the relatively recent decision to propose this unsaturated tuff area of Yucca Mountain as the repository site, little detailed technical information has yet been published. In August 1982, DOE issued a Summary of the Area-to-Location Screening Activity but did not determine any definite target horizon.

Presumably, tuff has the favorable attributes of density, strength, and sorptive capabilities, which could reduce movement of radionuclides, and the fact that groundwater lies several hundred feet below the proposed site could greatly reduce the possibility of groundwater intrusion. Unknown attributes of welded tuff are its thermal conductivity, fracture permeability, and chemical stability, especially when it is significantly heated by waste. Additional problems could be caused by continued underground bomb explosions, the impacts of which could jeopardize the integrity of nearby rock formations.

In an additional matter of concern about NTS, Nevada's governor and many citizens question why Nevada should carry so much of the burden of the nation's nuclear weapons and nuclear power programs.

SALT SITES

More than 25 years ago, a National Academy of Sciences report[16] described the characteristics of salt that make it a favorable medium for nuclear waste disposal: it is abundant, self-sealing, easily minable, and relatively free of water. Ever since, DOE and its predecessor agencies have favored disposal in salt. Meanwhile, however, many scientists have concluded that some of the presumed favorable attributes of salt could be liabilities. Some of those are: mineral resources often associated with salt could lead to human intrusion; water can dissolve salt; salt moves when substantially heated; and the self-sealing capability of salt would also make retrievability difficult and expensive. Additionally, there are differences between bedded and domed salt. Bedded salt occurs in relatively flat formations that extend over large areas. Domed salt is purer, but the formations cover smaller areas and are surrounded by other rock types. Thus, because it covers larger areas and is more abundant, bedded salt offers more possible repository locations than domed salt, but the purity of domed salt lessens the likelihood of the occurrence of dangerous brine or gas pockets. Therefore, each type of salt presents unique problems which must be studied on a case-by-case basis. Nevertheless, DOE's program currently has only salt alternatives to the military reservation sites.

Utah bedded salt sites. Davis and Lavender Canyons in the Gibson Dome area in the southeastern corner of the state are being considered. A Geological Characterization Report (ONWI-290) and the Paradox Area Characterization Summary and Location Recommendation Report (ONWI-291) are DOE's primary technical justifications for the site. DOE still needs to do further hydrologic testing, particularly to determine the time it takes groundwater to flow into the Colorado River.

Major concerns about this location are its proximity to Canyonlands National Park, since industrialization of an area two miles from the park would certainly degrade it and the nearby wilderness. Transportation would be very expensive because totally new railroad and highway systems would be required. The direction of groundwater flow from the site is unknown but could be toward the Colorado River, which is within 12 miles of the site. Furthermore, interbeds between the salt beds in the Paradox Basin have yielded natural gas, oil, brine, and toxic hydrogen sulfide gas, which could imply mineral resource conflicts as well as operating hazards. Forecast times of possible uplift and erosion in the Canyonlands area are also controversial.

Texas bedded salt sites. Areas in Deaf Smith and Swisher counties are being considered. No well-defined "sites" have yet been selected because of strong criticisms of the draft Geological Characterization (DOE/CH/10140-1) and the Location Recommendation Report (DOE/CH/10140-2). State officials and citizen organizations charge that the data are technically inadequate and that geotechnical issues in the Panhandle are left unresolved. As in the other states, DOE is trying to negotiate an agreement to allow further field work.

Major concerns here relate to groundwater flow characteristics and the possible contamination of the aquifer that serves more people and cropland than any other in the nation, the Ogallala. Land in the area is used primarily for agriculture, and 10 percent of the nation's farm revenues come from the Texas Panhandle. Thus any contamination from the repository or from transportation accidents in the area could have repercussions far beyond the immediate vicinity. Salt dissolution and thin salt layers (less than 75 feet thick) are further concerns, and potential oil and gas resources could lead to human intrusion. Additionally, the direction and speed of deep groundwater flow and discharge are unknown, and inadequate information exists regarding possible earthquake faults.

Gulf Coast salt domes. The three sites under consideration are the Richton and Cypress Creek domes in Mississippi and the Vacherie Dome in northern Louisiana. Geological Characterization Reports (ONWI-117,118,119,120) and a Location Recommendation Report (ONWI-109) have been issued for these areas. Many Louisiana state officials believe there is little chance their state will be chosen to host a waste repository. Some years ago, a veto over a repository was granted to the state by President Carter -- it has since been reaffirmed by President Reagan -- in exchange for accepting the Strategic Petroleum Reserve. That means, according to many, that the Vacherie Dome site cannot be selected as the repository. As a result no strong, organized governmental and citizen opposition has emerged there.

Concerns about salt domes include their small area, the complex geology and hydrology of surrounding deformed rocks, and their past and future attractiveness for petroleum exploration and salt mining, which is likely to result in human intrusion. The domes are also in relatively densely settled areas. In the case of the Richton Dome, DOE's favored dome site, the town of Richton and its 1,000 people would have to be relocated.

HOW CAN CITIZENS BECOME EFFECTIVELY INVOLVED?

While effective individual involvement is not impossible, the formality of the process and the long-term commitment needed to participate in a 15-year program recommend group involvement. Various citizen organizations already exist in all of the first six target states, as well as in several eastern states containing crystalline rocks (see "Citizen Organizations" list). Some national environmental organizations were involved in lobbying on NWPA, and some are now involved in examining the current program, at least in some states. Thus, channels for information and action already exist.

Information about the DOE program is essential for effective action. Interested citizens and organizations should have all basic documents (see bibliography) and should be on DOE's mailing lists. Major background publications listed in the bibliography are also essential. Of course, new documents will be developed throughout the process by DOE, NRC, and the states, as well as by citizen groups.

DOE places many of its documents and reports in public library reading rooms in areas near proposed sites, as well as in its regional office libraries. DOE's regional offices also are in charge of program management for sites in their area and are important information sources. (See list of DOE offices.)

In some places DOE has public information offices and/or disseminates information through public meetings. Many citizen groups, however, have criticized such methods as being less than objective, often totally excluding or downplaying information from and concerns of non-DOE, non-nuclear-industry sources.

A major source of information for citizens will be the states. Types of organizational structure will vary greatly from state to state, as will their technical review processes, but citizens should definitely keep in touch and attend legislative hearings, technical briefings, and other meetings. (See list of government officials.)

Also, the Freedom of Information Act (FOIA) allows individuals or organizations to obtain otherwise unavailable draft reports, contracts, memoranda, correspondence, and other documents that can be extremely useful. Because the costs of searching out and copying such documents can be quite large unless fees for those services are waived, and because citizen organizations with active public information and education mechanisms can best distribute the information received, organizational requests are usually much more successful than those from individuals. A sample successful FOIA letter is provided as a model.

DOE OFFICES

Office of Civilian Nuclear Waste Management
U.S. Department of Energy
1000 Independence Ave., S.W.
Washington, DC 20585
(202) 252-6842
Responsible for NWPA implementation.

Nevada Operations Office
P.O. Box 14100
Las Vegas, NV 89114
(702) 734-3662
Responsible for Nevada Test Site.

NWTS Program Office
505 King Avenue
Columbus, OH 43201
(614) 424-5916
Responsible for salt site programs.

ONWI Library
505 King Avenue
Columbus, OH 43201
(614) 424-7697
Source for ONWI and salt program documents.

Richland Operations Office
P.O. Box 550
Richland, WA 99352
(509) 376-7334
Responsible for Hanford site.

SAMPLE FOIA LETTER

February 17, 1983

Freedom of Information Officer
U.S. Department of Energy
1000 Independence Ave., S.W.
Washington, DC 20585

FREEDOM OF INFORMATION ACT REQUEST
Certified Mail No. P 210 215 649

Dear Freedom of Information Officer:

This is a request under the Freedom of Information Act, 5 U.S.C. 552 et seq., as amended, 10 C.F.R. 1004.1 et seq., 43 C.F.R. 2.1 et seq., and 40 C.F.R. 1515 et seq. for release of various reports, studies, correspondence, memoranda, minutes, contracts, agreements or other documents or records (hereinafter collectively referred to as "records") relating to the Department's work in the Texas Panhandle (Palo Duro and Dalhart Basins) as part of the National Waste Terminal Storage (NWTS) program.

Specific records requested are:

1. Reports, memoranda and other documents related to the Principal Borehole Recommendation Report and the decision to not do a principal borehole in Texas.

2. Reports, memoranda and other documents related to the decision to choose the Study Locations in Deaf Smith and Swisher counties.

3. Reports, memoranda and other documents related to studies of the Ogallala and Dockum aquifers in west Texas.

4. Contracts with Stone & Webster and NUS Corporation for work in Texas Panhandle....

6. Reports, memoranda and other documents comparing the site characteristics of the Texas Panhandle with one or more other potential salt sites for geologic disposal of commercial wastes....

Should any questions arise as to the scope of this request, please contact the undersigned attorney at [insert telephone number, including area code].

Requestor Serious Texans Against Nuclear Dumping (STAND) is a citizens group composed of persons residing in Swisher County, Texas, which is involved in representing citizen interests and providing information to the general public regarding the nuclear waste disposal activities underway in the Texas Panhandle. The organization holds regular public meetings and continuously provides information to the public. Therefore, we would request that any fees required under 43 C.F.R 2.19(a) be waived, because furnishing this information will primarily benefit the public interest. 43 C.F.R. 2.19(c).

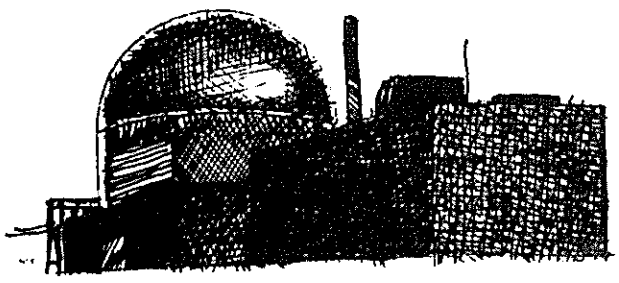
However, in the event it is determined that fees are to be assessed, requestor authorizes the incurring of up to $25 in authorized expenses. This does not constitute a waiver of any rights requestor may have to a waiver of fees, nor does it authorize the incurring of fees for information which has not been specifically requested.

If it is determined that the request for any documents is denied, either in whole or in part, please provide a list of all documents included in the request, and a specific indication of what materials are being withheld and for what reason. 43 C.F.R. 2.I5, see *Vaughn* v. *Rosen* 484 F.2d 820 (D.C. Cir. 1973); *cert. den.* 415 U.S. 977 (1974). The explanation of the reasons should reflect the Agency's burden to justify nondisclosure. *Vaughn v. Rosen, supra.* In either case and as required by law, we expect an answer to this request within 10 working days. If any portion of this request is denied, please inform us of our immediate avenue of appeal.

Sincerely,

Attorney for STAND

Most of DOE's work is done by a few major outside contractors, who are the primary economic beneficiaries of the program. For the WIPP Project, Bechtel Corporation is the architect-engineer and has been paid more than $70 million since 1978. Westinghouse, the technical support contractor, has been paid more than $55 million since 1978 and will presumably be awarded the operating contract (estimated to be worth at least $500 million over 25 years) when the facility is built.



For the commercial program, the prime contractors are Rockwell at Hanford, Battelle Memorial Laboratory of Columbus, Ohio, for the salt program,

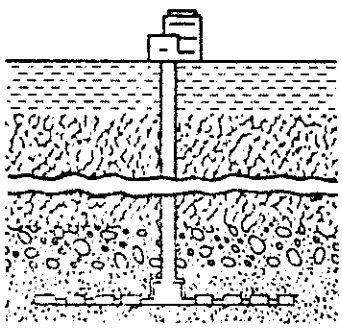
and a consortium, including government agencies and laboratories, Westinghouse, and Science Applications, Inc., in Nevada. Battelle was also awarded the five-year, $175-$200 million contract to conduct the crystalline rock investigations. Major subcontractors include Stone & Webster in Texas, Woodward-Clyde in Utah, Bechtel in Utah and for the salt domes, and Law Engineering Testing Company on the salt domes. DOE has tried to prevent public release of contractors' draft reports and actual work contracts. After nine months of court battling, however, the Federal District Court in New Mexico has ruled that all draft reports, contracts, subcontracts, and related documents on WIPP should be routinely made available. That ruling may be cited as precedent, even in the absence of any legal action.

Local media are also extremely important in providing information to the general public. Close contact should be maintained with newspaper management as well as with reporters and editorial writers.

OTHER IMPORTANT ISSUES

The most critical issues are the geologic and hydrologic concerns related to the various sites and the determination whether the sites meet the requirements of the DOE guidelines. These concerns are site specific (they have been briefly mentioned above in the sections describing the sites being considered for the first repository) and they must be addressed in progressively more rigorous fashion at each succeeding stage -- nomination, characterization, and repository selection.

The NWPA assumes that a program of multiple barriers -- geologic and engineering -- will increase confidence in the long-term safety of a site. While mining technology applicable to some aspects of repository construction is well established, there are significant areas in which engineers must seek to develop and test new techniques to meet unprecedented engineering problems. Some examples of the tasks: determining the optimal depth at which the repository should be located; ascertaining the strength of the rock at the repository horizon; assuring that groundwater will be prevented from



TRANSPORTATION RESOURCES

Primary Federal Laws & Regulations

Hazardous Materials Transportation Act (49 U.S.C. 1801 et seq.)

HM-164 (Department of Transportation regulations), 49 CFR Parts 171, 172, 173, 177 (46 *Federal Register* 5298).

Nuclear Regulatory Commission Transportation Regulations, 10 CFR Parts 71 and 73. NRC is required by law to notify governors concerning transportation of spent fuel and certain other wastes through their states. The list of state contacts is published annually in the *Federal Register*; the current listing appears in the issue of June 30, 1983, p. 30221.

Information Sources

Environmental Policy Center

Fred Millar
317 Pennsylvania, S.E.
Washington, DC 20003
(202) 544-2600

Particularly involved in reviewing federal regulations and assisting local communities interested in developing ordinances.

Sierra Club Radioactive Waste Campaign

78 Elmwood Avenue
Buffalo, NY 14201
(716) 884-1000

Has various publications, including *The Waste Paper*, and information about risks of transportation.

Transportation Technology Center

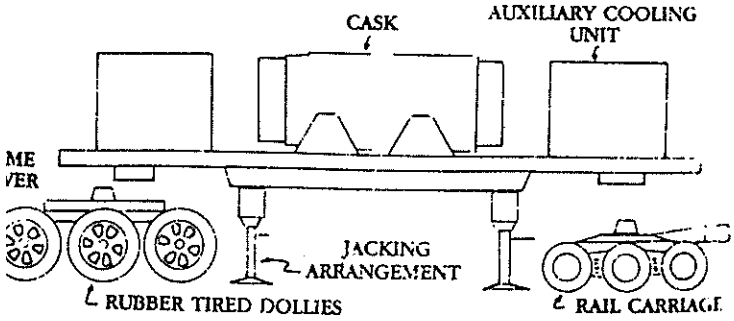
Sandia Laboratories
P.O. Box 5800
Albuquerque, NM 87185
(505) 844-8753

Has data collection on accidents and container design and testing research done for DOE, NRC, and DOT. Also publishes newsletter, *TTC Update.*

Publications

Final Environmental Statement on the Transportation of Radioactive Material by Air and Other Modes, NUREG-0170, U.S. Nuclear Regulatory Commission, December 1977.

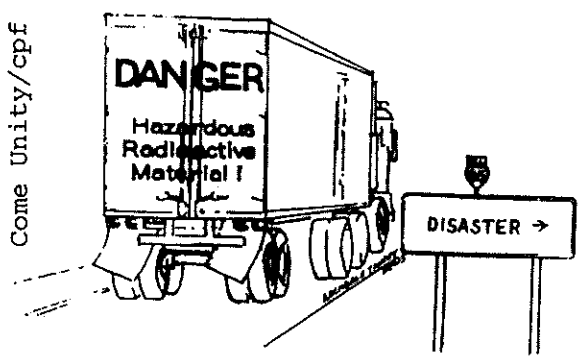
The Next Nuclear Gamble. Marvin Resnikoff. New York: Council on Economic Priorities, 1983. Available from CEP, 84 Fifth Avenue, New York, NY 10011, $17.95.



flowing through shafts; developing adequate seals for shafts; designing waste containers that will be impenetrable for at least 1,000 years; and avoiding potential hazards such as gas or brine pockets.

Nongeologic concerns, such as socioeconomic impacts, are important, and furthermore are potentially disqualifying factors under the Act. The first sites provide several concrete examples of such potential problems -- land use issues related to agricultural development in the Texas Panhandle, possible impacts on a national park in Utah, and relocation of a town at the Richton Dome in Mississippi. While DOE will often try to "sell" a repository as a completely positive economic benefit to an area, substantial local inflation, increased unemployment as people migrate to the area for jobs, and increased social service costs must be examined. Further, outside contractors will draw much of their labor supply from outside the area. Proximity to populated areas will also become a more prominent concern with the proposed second repository, since it will likely be located in the more populous east.

Transportation impacts are specifically mentioned in the Act. Since most reactors are located east of the Mississippi, people from the western states where the first repository will apparently be located often believe transportation concerns have not been adequately addressed. However, transportation could well affect people in many states. Indeed, numerous states and local governments have already passed ordinances to regulate or ban transportation of nuclear wastes, and various lawsuits involving such transportation are in the courts.



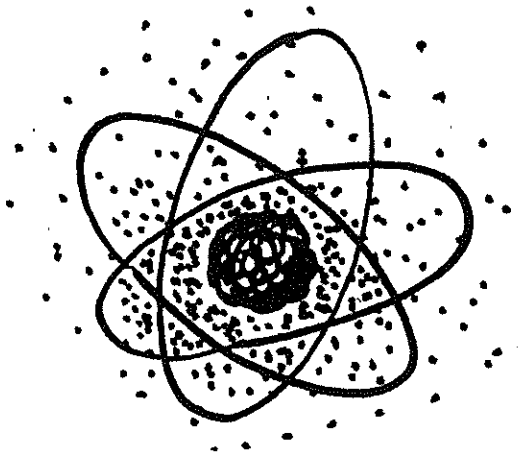
LEGAL ACTIONS

The Act specifically tries to limit litigation to the adequacy of the EAs and the FEIS. Those documents are clearly subject to judicial review, though suit must be brought in a circuit court of appeals, meaning that the case will have to be based on the record already developed, rather than on new testimony. That fact increases the importance of competent expert involvement in commenting on the documents.

However, a variety of other legal actions is also possible. Regarding the Act's provisions, litigation could possibly arise from contention over the acceptability of the guidelines, over DOE's not complying with the dates set in the Act, and over regulations or procedures of the EPA and NRC.

Additionally, litigation or administrative actions are possible at the state level, particularly where state laws and regulations are applicable. NWPA does not preempt any applicable state laws. For example, Texas requires a permit to sink the exploratory shaft. Passed in 1983, that law, Senate Bill 1018, requires an evidentiary hearing and provides for citizen suits. Mississippi state laws passed in 1982 require permitting of nuclear waste transportation into or through the state and require a detailed DOE application to conduct site characterization studies.

Citizen initiatives are also possible in some states. In Wisconsin in 1983, a statewide ballot measure opposing siting of a repository garnered 90 percent of the vote. While not binding on the federal government, such actions can be used to educate the public and to clearly establish where the public stands on the repository issue. Such initiatives conducted after site characterization could influence both the decision about the exercise of a state veto and congressional reaction to such a veto. However, it should be remembered that Congress could override any state veto, regardless of its basis in negative public opinion.



WHAT EFFECTIVE CITIZEN ACTION HAS ACCOMPLISHED

Various citizen groups in the states targeted to become the nation's first nuclear waste repository site have waged effective campaigns to educate the general public, to pressure government officials, and to change or block the Department of Energy (DOE) waste management program. Groups in Mississippi and Texas afford particularly good examples of effective citizen involvement in nuclear waste management issues.

In Mississippi, Mississippians Against Disposal (MAD) and Citizens Against Nuclear Disposal (CAND) formed in the late 1970s in response to DOE's exploration work at salt domes in the southern part of the state. The groups have two principal objectives -- to educate the Mississippi public on the radioactive waste issue and to consolidate efforts to prevent the use of any Mississippi salt dome as a site for any test or for permanent installation of a high-level nuclear waste repository.

The groups believe the "responsibility of the federal government is to find the safest possible means of disposing of these wastes, regardless of industry pressure and/or political considerations." Therefore, "our duty as responsible citizens is to prevent the federal government from yielding to a selection process based on other than technical, socioeconomic, and environmental factors."

An important result of CAND's work was the Mississippi Waste Forum held in 1981 in Biloxi, which more than 5,000 people attended. While strong efforts were made to involve DOE, its contractors, and pronuclear spokespersons in the forum, none consented to participate. The result of the forum was that thousands of people were educated about nuclear waste issues, and the credibility of the DOE, with its professed interest in informing the public, was badly undermined.

In 1982, in response to growing citizen pressure, the Mississippi legislature established an Energy Transportation Board, a Nuclear Waste Policy Council, and a Nuclear Waste Siting Review and Technical Advisory Committee. These agencies are intended to regulate DOE's site characterization activities and any transportation of nuclear waste in Mississippi.

Hundreds of citizens attended DOE's hearings in Mississippi in April and May 1983 to oppose DOE nomination of any site in the state as a potential repository.

In Texas, Serious Texans Against Nuclear Dumping (STAND) was formed in November 1981 by people in Swisher County who were concerned about DOE field work in the area. STAND's public education efforts have included speaking to a wide variety of citizen groups, preparing informational materials, and providing press releases to local media. Its advisory committee of 20 local leaders includes the president of the state wheat growers association, the county attorney, a bank vice president, the president of the Chamber of Commerce, and the editor-publisher of the local newspaper, as well as farmers and homemakers. STAND's members have refused DOE contractors access to their lands to conduct seismic testing and exploratory drilling.

In early 1983, STAND hired technical consultants and a lawyer to comment on DOE's repository guidelines and technical documents, to prepare for legal action if necessary, and to increase pressure on government officials to oppose DOE's activities.

In the spring of 1983 in response to a DOE contractor's recommendation that Deaf Smith County be one of the five sites nominated, area residents formed People Opposed to Waste Energy Repository (POWER). POWER immediately conducted an extensive series of educational forums, inviting DOE officials, DOE contractors, and speakers from other parts of the country to address them on important concerns. The group also conducted an informational fair.

At the DOE hearings in May 1983 on the possible nomination of a Texas Panhandle site, more than 1,000 people from Swisher and Deaf Smith counties attended to oppose any such nomination. In May the state legislature passed a resolution opposing DOE's activities and enacted legislation requiring a state permit for any site characterization shaft.

These efforts in Mississippi and Texas have produced great public awareness about DOE's program and about nuclear waste management issues. They have also influenced state officials to pass important legislation and have resulted in DOE's becoming aware of, and having to respond to, the concerns of local residents.

WHAT IS THE FUTURE FOR NWPA?

While the Act establishes clear schedule deadlines, several states and numerous scientists and involved citizens believe many deadlines are entirely unattainable, even if the 1998 deadline might be possible. The schedule set forth in NWPA is clearly optimistic. In 1980, DOE itself told the NRC in its waste confidence proceeding that the time frame for beginning operation of the first repository was 1997 to 2006,[17] and that was prior to the new requirements of NWPA. Site characterization activities will take three to five years; shaft sinking in salt and perhaps in tuff may be done in about a year's time, but at Hanford just sinking the shaft will take two years or more. Tunneling and conducting experiments at the proposed repository depth will take more than three years, and preferably five to ten years in the case of the experiments, so that the results are reliable and meaningful. The NRC construction authorization of three to four years will require DOE to submit an excellent license application and encounter no major problems during the proceeding. Four to six years will be necessary for actual construction of the repository.

Therefore, it seems clear that a March 1987 date for recommendation of the first site cannot be met, and even the allowable one-year delay in that decision may well not provide adequate time. Further delays could certainly result from state vetoes and legal actions if DOE does not implement a sound scientific program, which is more important to most state governments and the public than meeting the overly optimistic schedule of the Act.

There will be three major options if such delays in fact occur. One possibility is to delay or abandon the geologic repository program and to proceed with the alternative authorized by Section 141 of NWPA -- Monitored Retrievable Storage. Such mausoleum facilities would accommodate spent fuel for as long as necessary in a readily retrievable form to facilitate reprocessing. Sites would be chosen from at least three alternative sites and would be subject to NRC licensing and the same state and tribal veto provisions as repositories.

While such surface facilities could presumably be more easily and quickly constructed than repositories, many people have opposed the entire concept of surface storage, believing that it postpones finding permanent solutions and leaves the problem to future generations, and that it might not provide long-term safety.

A second option would be for Congress to amend the NWPA and speed up the geologic program to meet the federal government's contractual obligation to assume control of the wastes by January 31, 1998. Such a program could certainly create a new test of our system of government, should it find itself faced, as it almost certainly would, with the strong opposition of one or more states, many scientists, and the vast majority of the public, who would perceive that such a program could jeopardize public health and safety.

The third option would be to delay the repository program to ensure the choice of sites that are safe and scientifically and publicly acceptable. Delaying the final selection of sites for some two to eight years would be necessary, and short-term alternative arrangements, including continuing storage of spent fuel at the reactors, would be required.

CONCLUSION

Safe management and disposal of nuclear waste is a major technical and political challenge to the United States. A successful effort will require excellence from the federal government and its contractors, the scientific community, the states and their political leaders, and the general public. While the challenges are great, safe management and disposal of nuclear waste should be possible, and ensuring the health and safety of present and future generations deserves our best effort.

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Published *Radioactive Waste: A Handbook for Minnesotans*

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FOOTNOTES

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Excellent nontechnical introduction to nuclear waste management.

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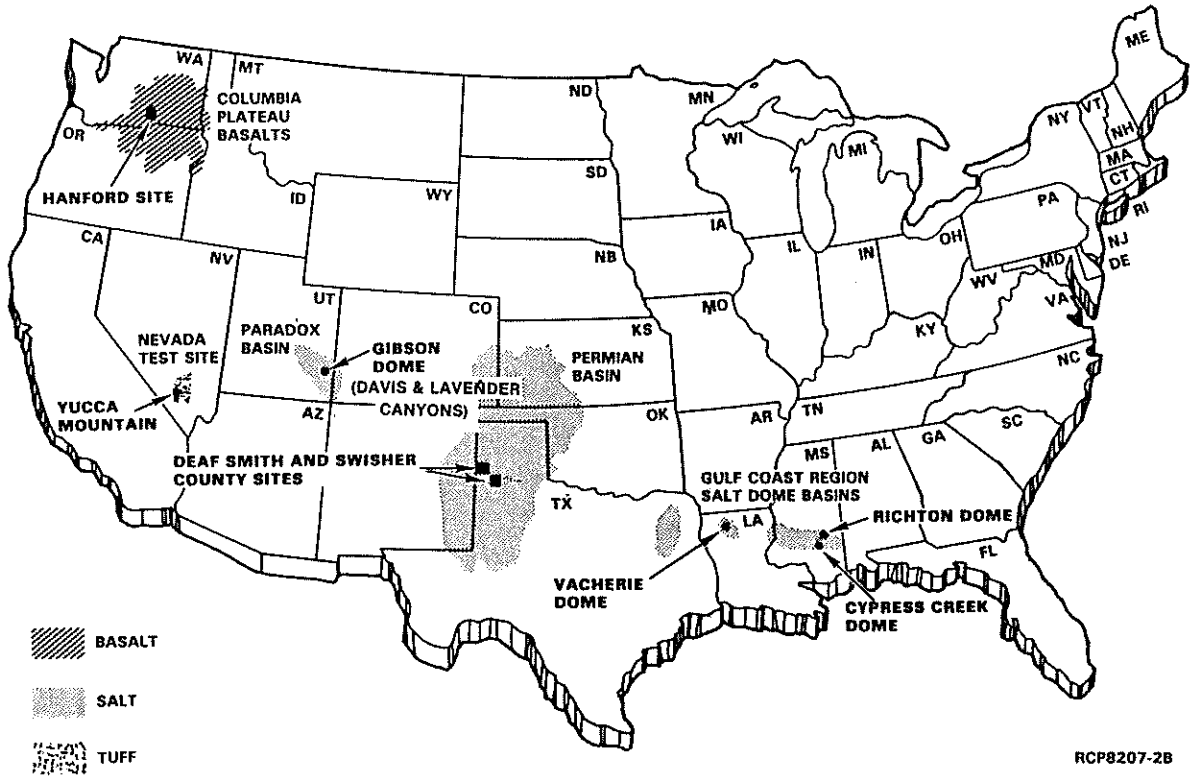
PERIODICALS

In addition to the publications of the citizen organizations listed (see box), there are various expensive ($237 to $815 per year) commercial publications dealing with current nuclear waste issues. While these are too costly for most individuals and citizens groups, they are often available at government or technical libraries.

McGraw-Hill (1221 Avenue of the Americas, New York, NY 10020, (800) 223-6180) publishes weekly or biweekly: *Inside DOE; Inside EPA; Inside NRC; Nuclear Fuel;* and *Nucleonics Week.*

Nuclear Waste News, 951 Pershing Drive, Silver Spring, MD 20910; (301) 587-6300.



Specific Geologic Sites Under Active Consideration for the Disposal of Radioactive Waste

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