

## DOCUMENT RESUME

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**Nuclear Energy's Dilemma: Disposing of Hazardous Radioactive Waste Safely.** September 12, 1977. 15 pp.

**Testimony before the House Committee on Government Operations: Environment, Energy, and Natural Resources Subcommittee** by Monte Canfield, Jr., Director, Energy and Minerals Div.

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There is general agreement among nuclear power critics, the public, business leaders, and Government officials that a solution to the nuclear waste disposal problem is critical to the continued growth of nuclear energy. The Congress should amend the Energy Reorganization Act of 1974 to provide for independent assessments of the Energy Research and Development Administration's (ERDA's) facilities--including research and development facilities--intended for the temporary storage and/or long-term storage or disposal of commercial and ERDA produced transuranic contaminated waste, the temporary storage of ERDA high level waste, and the temporary storage and/or long-term storage or disposal of commercial spent fuel. To provide such an independent assessment, the Congress should adopt one of three alternatives: (1) give the Nuclear Regulatory Commission (NRC) the authority and responsibility for establishing policies, standards, and requirements in cooperation with ERDA for carrying out these assessments; (2) retain this responsibility and authority within ERDA, subject to certain statutory provisions, to insulate the oversight activities; (3) or authorize NRC to assess periodically ERDA's facilities and annually report the results to the agency and the Congress. (SC)

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STATEMENT OF  
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BEFORE THE  
SUBCOMMITTEE ON ENVIRONMENT, ENERGY AND NATURAL RESOURCES  
HOUSE COMMITTEE ON GOVERNMENT OPERATIONS  
ON  
NUCLEAR ENERGY'S DILEMMA: DISPOSING OF  
HAZARDOUS RADIOACTIVE WASTE SAFELY

Mr. Chairman and Members of the Subcommittee:

We welcome the opportunity to be here today to discuss with you our report on the issues of safely disposing of hazardous radioactive waste. Our report discusses the Energy Research and Development Administration's (ERDA's) program to demonstrate by the mid-1980s the feasibility and safety of placing high level<sup>1/</sup> and transuranic<sup>2/</sup> contaminated wastes in deep geological formations. Furthermore, the report also discusses the progress and problems facing ERDA in managing its high level waste and how it and the Nuclear Regulatory Commission (NRC) are addressing the

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<sup>1/</sup>High level waste has extremely high radioactivity concentrations, is characterized by high levels of penetrating radiation, high heat generation rates, and a long toxic life. High level waste is created when reactor spent fuel elements are dissolved in acid to recover unused uranium and plutonium for reuse as nuclear fuel. It is the acid solution remaining that is referred to as high level waste.

<sup>2/</sup>Transuranic contaminated waste contains much lower concentrations of radioactivity than high level waste. It is generated by plutonium fuel fabrication and fuel reprocessing facilities and laboratories using transuranic elements. This waste generally consists of absorbent tissues, clothing, gloves, plastic bags, equipment, filters from effluent treatment systems, and fuel hulls which remain after fuel reprocessing.

problem of large amounts of spent fuel (a potential high level waste) now accumulating at nuclear powerplants.

There is general agreement among nuclear power critics, the public, business leaders, and Government officials that a solution to the nuclear waste disposal problem is critical to the continued growth of nuclear energy. Radioactive wastes are highly toxic to human life. They can damage or destroy living cells, causing cancer and death. Some wastes will remain potentially hazardous for hundreds of thousands of years. Decisions on what we do with our radioactive wastes in our lifetime will affect the lives of countless generations to come.

The issues surrounding the management and safe disposal of nuclear waste are both important and complex. Their satisfactory resolution involves analysis of complex technical, social, political, and institutional questions. The results of our work contained in the report we are releasing today deal with these issues and we hope it will be useful to this Subcommittee and others in the Congress in deliberations on this important matter.

Our report highlights

- Public and political opposition to nuclear waste disposal locations.
- Gaps in existing Federal laws and regulations governing the storage and disposal of nuclear waste.
- Significant geological uncertainties and natural resources trade-offs encountered when selecting "permanent" disposal locations.
- Lack of NRC regulatory criteria for orderly waste management operations, such as solidification of waste, designing proper waste containers, and transportation of nuclear waste.

--Overly optimistic time frames for demonstrating the safety of ERDA's proposed waste disposal locations and waste management practices.

--Lack of a demonstrated technology for the safe disposal of existing commercial and military high level waste.

Now that the President has indefinitely deferred commercial reprocessing of spent fuel, finding solutions to problems in storing and/or disposing of the spent fuel accumulating at nuclear powerplants is a top priority matter.

#### RADIOACTIVE WASTE VOLUMES

Today there are great amounts of nuclear waste already in existence. Even if all activities which generate radioactive waste were stopped today, we would still be faced with a major radioactive waste disposal problem. Radioactive waste has been accumulating for decades from ERDA's military and research and development efforts, fuel reprocessing activities, and commercial nuclear powerplant operations.

Today about 74 million gallons of high level waste, nearly all produced by ERDA operations as a result of reprocessing, are stored in three locations in the United States. This great volume of waste is being stored "temporarily" while a permanent solution to its ultimate disposal is found.

It is estimated that ERDA will generate about 41 million gallons of high level waste from its reprocessing operations through the year 2000. If commercial reprocessing is allowed, it is estimated that about 152 million additional gallons of high level waste will be generated by the year 2000.

Even without commercial reprocessing, our waste problem is growing.

Commercial reactor spent fuel is accumulating at nuclear powerplants because there are no commercial reprocessors operating or sufficient off-site storage facilities available in the United States. Currently there are about 3,000 metric tons of spent fuel being stored, with a projection of an additional 17,000 metric tons over the next 10 years.

Resumption of commercial reprocessing in the near future does not seem probable since the President has indefinitely deferred commercial reprocessing of spent fuel. If it is finally decided that there will be no further commercial reprocessing, spent fuel elements from existing and future civilian power reactors will have to be managed as high level radioactive waste. Meanwhile, nuclear powerplants have had to store their spent fuel in storage pools at the reactor sites. As a result, a backlog of spent fuel is accumulating at the powerplants.

The nuclear industry estimates that by 1985 it could be faced with a severe shortage of storage capacity. ERDA estimates that 1985 is the earliest possible date a geological waste disposal facility or other storage facility to receive spent fuel could be ready.

#### NRC LACKS AUTHORITY OVER ALL WASTE STORAGE AND DISPOSAL FACILITIES

NRC currently does not have regulatory authority over all waste storage and disposal facilities. As a result, nearly all of the high level waste in storage today is NOT under the regulatory authority of NRC.

NRC was established by the Energy Reorganization Act of 1974 to provide an independent review of nuclear activities, including waste disposal.

It has specific responsibility for licensing and regulating all ERDA facilities used for storage of commercial high level waste. It has similar authority for retrievable surface storage facilities and other long term storage facilities for ERDA high level waste. This does not include authority over ERDA's facilities which are used for or are part of research and development activities.

The act does not specifically give NRC licensing authority over ERDA's (1) research and development facilities for the temporary storage and/or long term storage or disposal of commercial and its own transuranic contaminated waste; (2) facilities for the temporary storage of ERDA high level waste; or (3) research and development facilities or full-scale facilities for temporary storage and/or long term storage or disposal of commercial spent fuel.

We believe that when dealing with hazardous nuclear materials, the public should have adequate assurance that their health and safety are being protected to the maximum degree possible. No matter how competent or conscientious the managers of a project or facility may be, there can be advantages from an efficient, timely review of their operations by an outside independent review.

Because of the potential dangers of nuclear waste storage and disposal, GAO believes the Congress should either give NRC authority over those ERDA facilities--including research and development facilities--intended for the storage and disposal of ERDA's high level waste, or provide for other independent oversight and assessment of these facilities. The Congress should also either give NRC authority over the storage and disposal of transuranic contaminated waste and spent fuel at ERDA

facilities, or provide for an alternate means of independent oversight and review.

Regardless of how it is achieved, we strongly believe that all of ERDA's nuclear waste facilities should receive independent oversight. At the conclusion of my statement I present three alternative means by which independent assessment can be achieved and identify the one which GAO prefers.

We also believe that uncertainties in regulating authority over ERDA facilities for storage and/or disposal of these materials need to be clarified so that there exists no "gray areas" concerning who should be responsible. We believe the American public deserves this protection.

DISPOSAL OF MILITARY- AND  
RESEARCH-RELATED WASTE

After several decades of work, the Atomic Energy Commission (AEC) did not, and its successor--ERDA--has not yet demonstrated acceptable solutions for long term storage and/or disposal of defense- and research-related high level waste, or satisfied the scientific community that present storage sites are geologically suited for long term storage or disposal.

ERDA is investigating several alternatives for managing its military and research waste, including

- immobilization and entombment in place,
- solidification and geological disposal at Hanford and Savannah River, and
- solidification and shipment to a Federal geological repository.

Before this high level waste could be moved to a repository, however, major questions involving retrievability from its temporary storage tanks at Hanford and Savannah River must be resolved.

ERDA does not now have the technological capability to extract all of this waste from the storage tanks. The waste stored at Hanford and Savannah River make up 94 percent of the total volume of waste. This waste has been converted into a chemical form that may be unsuitable for long term storage or conversion to an acceptable long term storage form with current technologies.

ERDA is testing methods which it believes will enable it to extract up to 99 percent of the high level waste from most storage tanks. However, these methods may not work with some older tanks because of their poor condition. The remaining 1 percent of the waste would contain long-lived toxic radionuclides such as plutonium and strontium-90. The costs of extracting and preparing all of the waste for geological disposal are uncertain. Estimates range from \$2 billion to \$20 billion.

ERDA is exploring alternatives for long term storage or disposal of the waste at Hanford and Savannah River. Alternatives include entombment in the existing tanks if the waste cannot be removed and removal of the waste and burial at the site, either in near-surface facilities or in deep geological formations. These alternatives present still other questions, such as the suitability of these sites for geological disposal. Any facility for long term storage or disposal of the waste at these sites will require licensing by NRC.



## MANAGEMENT OF COMMERCIAL SPENT FUEL

A tremendous backlog of spent fuel--which is a potential high level waste--exists at nuclear powerplants because no commercial reprocessors are currently operating in the United States. As of January 1977, utilities operating 36 of the 63 present nuclear reactors have notified the Commission of their interest to increase storage capacities at their reactor pools by reducing the amount of space between stored fuel elements. This is known in the jargon as "compaction."

The safety of such action has been questioned by the Natural Resources Defense Council. In response, the Commission has undertaken a generic environmental impact statement on the storage of fuel elements. While the statement has not been completed, the Commission has allowed compaction on a case-by-case basis. According to the Commission, before allowing compaction the safety concerns raised by the Natural Resources Defense Council are addressed in each request for increased storage capacity.

According to the Commission staff there are no significant environmental or safety impacts associated with these individual actions. As of January 1977, compaction has been approved for 14 of the 36 reactors.

The Commission has, in part, justified allowing compaction for utilities which have shown an immediate need for additional storage capacity in order to maintain electrical generating capability. However, some utilities were allowed compaction without demonstrating such an immediate need.

GAO believes that until the Commission completes its generic environmental impact statement, it should limit through license restrictions, the amount of spent fuel that can be put in storage pools to no more than the

amounts for which the storage pools were designed and authorized under the initial operating license. Compaction should only be allowed if the utility can prove to the Commission's satisfaction that (1) it would be forced to shut down operations if increased storage at that site was not allowed, and (2) such action would not increase the safety risk to the public or environment.

GAO believes that NRC's interim licensing for increased storage capacity may raise public suspicions and concern, because the overall environmental effects--including safety--of such actions have not yet been fully determined. As a result it is extremely important that NRC complete and issue the generic environmental impact statement as soon as possible so that unanswered questions can be resolved concerning increased fuel storage at reactor pools.

#### OBSTACLES TO GEOLOGICAL WASTE DISPOSAL

ERDA has begun an ambitious program to demonstrate the feasibility of safely placing commercial and military waste in deep geological formations. It is seeking seven sites for facilities in widely separated areas across the country.

ERDA has set 1985 as the target year for completing two geological disposal facilities for commercial high level and transuranic contaminated wastes and spent fuel (if and when it is defined as a waste). It also plans to complete four more geological disposal facilities for commercial waste between 1987 and 1991. Furthermore, ERDA plans to build a separate disposal facility by 1983 for its own transuranic contaminated waste, generated by military and research activities. At this facility, it

intends to have the experimental capability to determine site suitability for high level waste disposal.

One of the potential geological disposal sites which may be used for the 1983 facility is being developed in New Mexico by an ERDA contractor. According to ERDA's Assistant Administrator for nuclear energy, this facility might eventually be used for routine high level waste storage; however, ERDA has not established a date for storing such waste.

ERDA's position has been that the New Mexico location is for its transuranic contaminated waste and to provide experimental capability to determine the suitability of the site for high level waste disposal.

GAO believes that since public and official sentiment in New Mexico appears favorable to a waste disposal facility and the project is further advanced than the commercial waste repository program--which may not have a site ready to receive waste by 1985--this site may need to also serve the needs of the commercial nuclear industry by becoming the first commercial waste repository.

Because of the President's deferral of commercial reprocessing of nuclear spent fuel, ERDA has decided to initiate a project to store spent fuel in a proposed Surface Unreprocessed Fuel Facility. In the event the President and the Congress ultimately decide against commercial reprocessing, spent fuel--if defined as waste--might have to be disposed of in the geologic repositories. This will affect the six commercial waste repositories currently being planned by ERDA.

ERDA proposed that six repositories be built in order to (1) spread nuclear waste regionally throughout the Nation, and (2) minimize program setback should a potential site(s) prove unacceptable. Storage and/or

disposal of spent fuel in geological formations requires more acreage than is needed for storage and/or disposal of high level waste. While the precise number of repositories which will be needed is not known, NRC and ERDA officials indicate that three repositories, of the size currently being planned, may be all that will be needed. GAO has not taken a position as to how many repositories should be built, but in view of the \$200 million cost per repository, plus questions of excess capacity, public opposition to nuclear waste disposal locations, and security needs, GAO believes ERDA should evaluate the number of repositories currently planned and justify on a cost-benefit basis, the number they finally believe will be necessary.

#### The obstacles

When it publicly announced its waste repository program objectives and goals, ERDA may have promised more than it can deliver. There are, we believe, formidable social, geological, and regulatory problems which must be solved. Foremost among them is opposition of public and some political leaders. ERDA may not be successful in gaining their acceptance unless it can convince people that it has a sound waste management program and that geological disposal risks to man's environment are acceptably low.

ERDA has twice been unsuccessful in developing potential waste disposal sites because of insufficient attention to the factor of public acceptance--in Kansas and in Michigan.

Other obstacles in ERDA's geological waste disposal program which must be addressed and overcome by ERDA are

- geologic uncertainties and natural resource tradeoffs,
- questionable demonstration time period estimates,

- undemonstrated technology for preparing radioactive waste, and
- lacking NRC criteria for orderly waste management operation.

Let me discuss each of these briefly.

Certain geological formations which now seem promising may not be suitable for long term disposal. Preliminary geological information on the three most promising salt formations--the Salina formation and the Gulf Coast salt domes for commercial waste, and the Permian Salado salt formation for ERDA's transuranic contaminated waste--indicates that there are uncertainties such as the natural instability of salt dome formations. Some potential salt formations are too deep, some are too shallow, and some may be vulnerable to ground water as a result of exploration for natural resources. Others are subject to conflicting uses, such as man's search for natural resources--salt, oil, gas and potash. Furthermore, geologic formations may become unstable after placing high level waste in them. These uncertainties must be resolved and/or avoided before a repository can ever be established.

The 5 to 10 year demonstration period ERDA plans may not be sufficient to prove that the repository can totally isolate radioactive waste from the environment for hundreds of thousands of years. The experimental data gathered over this period may not be sufficient to establish the degree of confidence needed to make valid extrapolations of long term risks associated with radioactivity escaping to man's environment. United States Geological Survey officials told us that the 5 to 10 year period of retrievability may not be adequate to assess all of the effects on the geologic medium from the emplacement of hot wastes.

Existing high level waste cannot be disposed of in its present form because no technology has thus far been demonstrated to completely remove neutralized high level waste from temporary storage tanks and convert it into a suitable solid state.

Performance criteria regulating the form and process of solidifying waste, the waste canisters, and the shipping casks have not yet been written. Developing these criteria--to be completed by April 1978--is a time-consuming process which may result in further delays. Furthermore, draft waste performance criteria NRC is now developing do not address the storage or disposal of spent fuel.

Another aspect of ERDA's waste repository program which is not, in our opinion, based on realistic appraisals is the goal of building six waste repositories in the stated time period. This goal appears overly optimistic in estimating the time required to identify, study, design, construct and confirm the feasibility of the repositories. Such an unrealistic schedule could further decrease the public's confidence in ERDA's waste management program.

#### RECOMMENDATIONS

To better insure public health and safety, our report recommends that the Congress should amend the Energy Reorganization Act of 1974 to provide for independent assessments of ERDA's facilities--including research and development facilities--intended for (1) the temporary storage and/or long term storage or disposal of commercial and ERDA produced transuranic contaminated waste; (2) the temporary storage of ERDA high level waste; and (3) the temporary storage and/or long term

disposal of commercial spent fuel. To provide such an independent assessment the Congress should adopt one of three alternatives:

- Give NRC the authority and responsibility for establishing policies, standards, and requirements in cooperation with ERDA for carrying out these assessments.
- Retain this responsibility and authority within EFDA, subject to certain statutory provisions, to insulate the oversight activities.
- Authorize NRC to assess periodically ERDA's facilities and annually report the results to the agency and the Congress.

In testimony before congressional committees, GAO has stated a preference for the first alternative.

We also recommend that the Congress closely scrutinize, through the annual authorization and appropriation process, the progress of ERDA's program for long term waste management.

In addition to the recommendations to the Congress, the report recommends that a number of regulatory and program management changes be made by ERDA and NRC.

In all, our report discusses and makes recommendations which we believe will provide Congress, the Administration, and other interested persons, with a comprehensive, independent assessment of the status of nuclear waste management in this country. While our report does not paint a rosey picture of where we stand today, it does point out that much work is currently in progress. While much still needs to be done if the public is to be assured that nuclear power can be a safe source of energy in the future, we hope that our report issued today will bring to the center stage the issues and problems which must be faced. Hopefully, our work will contribute toward

more quickly resolving the nuclear energy dilemma of how can we dispose of hazardous radioactive waste SAFELY.

Mr. Chairman, this concludes my prepared statement. We will be glad to respond to your questions.