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COMMENTS ON PROPOSED RULEMAKING ON THE
STORAGE AND DISPOSAL OF NUCLEAR WASTE
(Waste Confidence Rulemaking)

U.S. Nuclear Regulatory Commission

by

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SUMMARY

The status, and history, of the U.S. management programs for radioactive wastes has been reviewed and summarized. It is demonstrated that:

- There can be no confidence that spent reactor fuel can and will be disposed of safely
- Without criteria, and demonstration that these criteria will be satisfied, there can be no assurance that radioactive waste can be disposed of safely
- The historic record of the U.S. nuclear waste program does not provide a basis for confidence that the spent nuclear fuel will be managed safely
- The failure to adequately address institutional and social issues has been a major factor in explaining why there is no waste disposal means currently available. The apparent inability of the Department of Energy to recognize these issues will prevent there being such means in the foreseeable future
- There can be no assurance that spent fuel can be safely stored on reactor sites past the expiration of existing licenses.

The basis for each of these findings is set forth in subsequent sections of this comment.

THERE CAN BE NO CONFIDENCE THAT SPENT REACTOR FUEL CAN AND WILL BE
DISPOSED OF SAFELY

The first question at issue in this proceeding is whether or not there is confidence that the wastes produced by commercial nuclear power reactors can and will be disposed of safely.

Since 1977 U.S. policy has been to defer indefinitely the reprocessing of spent reactor fuel. Therefore, the spent reactor fuel is the high-level radioactive waste which must be disposed of safely.

In April 1980 both the U.S. DOE and the U.S. G.S. prepared submissions for this "confidence" proceeding. The U.S. DOE purported to demonstrate, via the contents of a 700+ page statement of position, that:

"Spent nuclear fuel from licensed facilities can be disposed of in a safe and environmentally acceptable manner." 1/

The U.S.G.S., considering only earth science processes, advanced the opinion that:

"The USGS is confident that solid radioactive wastes produced by nuclear facilities can be disposed of with very low risk to the environment." 2/

Both USGS and DOE claim only that these wastes "can" be disposed of safely. However, this is not now, and has not been, at issue. To our knowledge, no informed commentator, either an institution or an individual, has claimed that the isolation or containment of

high-level wastes would require that a physical law be violated.

One of the major conclusions contained in the DOE program statement is:

"The analyses performed to date give no indication that a mined geologic disposal system, designed and constructed according to the requirements described in this Statement, cannot isolate radioactive waste safely." 3/

This claim is virtually meaningless as : (1) one would not expect a showing that the wastes cannot be isolated from a scientific standpoint, and (2) the demand on DOE is not to show that isolation cannot be achieved, but it is to show that isolation can and will be achieved.

The USGS is more cautious, claiming that the wastes "can" be isolated but refusing to speculate on when the wastes will be isolated citing serious unsolved social, insitutional, and technical issues.

As forcefully presented by the Chairman of the President's Council on Environmental Quality in an April 1980 letter regarding this "confidence" proceeding:

"In his Congressional Message, the President stressed the importance of having the NRC 'provide the Nation with its judgment on whether or not it has confidence that radioactive wastes produced by nuclear power reactors can and will be disposed of safely,' and he urged that the NRC's review of this question 'provide a full opportunity for public, technical and govern-

mental agency participation.' As this request reflects, it is important that the NRC reassess and decide the question of whether safe, ultimate disposal of nuclear wastes both can and will be provided. The NRC should not limit its inquiry to the much less important question of whether safe temporary (on or off-site) storage can be provided. Nor should the NRC focus simply on the question of whether it is technically possible to provide safe, ultimate disposal; it is important for the public, the Congress, and the Executive Branch to have the NRC's assessment of whether safe ultimate disposal will be provided as well as its assessment of whether it can be provided." 4/

As is shown in the following pages, there is no basis for confidence that the spent nuclear fuel can and will be disposed of safely.

References

- 1 / DOE, Statement of Position, 15 April 1980, p. VII-1
- 2 / USGS, "Preliminary Statement" (Confidence Proceeding), 15 April 1980, p. 1
- 3 / DOE, op cit, p. II-242
- 4 / Letter, Gus Speth to John F. Ahearne, 15 April 1980.

WITHOUT CRITERIA, AND DEMONSTRATION THAT THESE CRITERIA WILL BE SATISFIED, THERE CAN BE NO ASSURANCE THAT RADIOACTIVE WASTE CAN BE SAFELY DISPOSED OF

At least three sets of criteria are necessary to evaluate the question of assurance that radioactive waste can be safely disposed of. They are: (1) environmental criteria, (2) site selection criteria, and (3) performance criteria for the repository and disposal facility.

The EPA is required to issue appropriate environmental criteria. While EPA has published general criteria for comment 1/ they have not yet published even proposed criteria for the disposal of high-level radioactive wastes. These criteria have been under development for some time, but will not be published for comment for at least several months 2/. Without these criteria there is no way to judge adequacy of any proposed waste management scheme, for there is no standard of acceptability.

The NRC has not yet developed criteria for assessing the suitability of sites and disposal facilities 3/. At present the NRC has only said:

"Criteria by which the acceptability of the site/facility combination can be assessed are needed for this [likelihood that a given site would be suitable] determination"

NRC admits, moreover, that it may not even be possible to determine such criteria:

"Specifically, this second aspect relates to questions of whether or not, given the present state-of-the-art in the earth sciences, it is possible to identify on a generic basis site characteristics the presence of which at an otherwise suitable site would render the site/facility combination unacceptable for HLW disposal. The question of general site acceptability criteria is an open one in the sense that the staff has not identified to date such criteria. Should general site acceptability criteria not be developed, it would be necessary to determine the site acceptability question on a case-by-case basis."

This raises a fundamental question. The NRC appears to be saying that there is insufficient earth science knowledge to set forth general site acceptability criteria and therefore it may be necessary to determine suitability on an ad hoc basis for each tentative site. The DOE in its program plan sets forth vague and ill-defined program "objectives" to be met in the context of a "step by step" evaluation and development program. There are substantial political and institutional pressures to do something soon. The risk is that which is found will be deemed "reasonable" whether or not it meets rigorous standards for waste isolation.

It would, of course, be possible to continue without established criteria and simply to proceed in a stepwise manner doing at each stage what seems adequate. Then later on, when there is a better idea of what is "reasonably achievable" 4/ the achievements can be framed as measurable performance standards. To do it this way would guarantee

that the criteria would be met, for it would be exactly as though in a shooting competition one first shot at a blank wall, then later went to the wall and drew the target around the places where the shots hit. The "generic performance objectives" of DOE suggest this approach.

This would be a far cry from the standard set forth by the U.S. National Academy of Science as early as 1957:

"Unlike the disposal of any other type of waste, the hazard related to radioactive waste is so great that no element of doubt should be allowed to exist regarding safety." 5/

The Academy later stressed the same point, making even more explicit the degree of assurance which the management of high-level radioactive waste requires:

"We believe there should be no phenomenon involved in any of the waste disposal schemes that is not completely understood." 6/

The NRC has, however, set forth provisional technical performance criteria, including:

- " ° The waste must be retrievable for 50 years post emplacement
- ° There will be containment by the waste package for all radionuclides for the first 1,000 years
- ° For periods beyond 1,000 years there must not be releases of more than one part in 100,000 of the activity present in the HLW per year

- ° The radionuclide travel times to the accessible environment must be at least 1,000 years
- ° The suitable block of rock must extend beyond the repository for 2 km horizontally and 1 km vertically
- ° Areas potentially attractive to human intrusion must be avoided
- ° The various seals must provide at least as good barriers as does the undisturbed rock." 7/

The DOE, in its program plan submitted as a part of this proceeding, does not even assert, say nothing of demonstrate, that any one of these NRC requirements has yet been satisfied. Their program does not provide assurance that the requirements can be met, but instead is geared to vague and flexible "objectives". As examples, the first two of the NRC requirements noted above are examined in more detail.

Retrievability

The NRC draft performance criteria include:

"The Department of Energy shall design the geologic repository operations area so that the radioactive waste stored there can be retrieved for a period of 50 years after termination of waste emplacement operations." 8/

The 1978 EPA review panel considered the state of knowledge regarding retrievability. They concluded:

"Retrieval may only be feasible so long as an active crew is kept at the repository site, perhaps then for only a relatively short number of years, 5 to 10, while the repository is being filled." 9/

"Retrievability of HLW in other rock types [other than salt where there would also be migration of the canisters] is not so much a question of locating the canisters because they have bodily moved elsewhere, but being able to collect all of the waste because corrosion and leaching might so disintegrate the canisters that much of it is dispersed.

. . . ." 10/

On the question of maintaining the integrity of the waste package the EPA panel observed:

"It is unlikely, however, that the integrities of the canister, its contents, and its immediate surroundings will last very long, whether or not reprocessing is carried out. We have seen no evidence of survivals longer than a decade." 11/

In its program plan, the DOE discusses retrievability in only the most general way, emphasizing that it is very unlikely that it would be necessary anyway -- and so by implication is not a significant issue:

"Both limited and total retrieval are unlikely events, the latter being least likely." 12/

DOE does not claim that the ability to retrieve the waste

has been demonstrated, nor does their program plan provide convincing evidence that they take seriously the potential need for retrieval nor that their program will provide proof of retrievability in the foreseeable future.

Containment of all fission products

The NRC draft criteria specify:

"Containment of all radionuclides for the first 1,000 years after decommissioning of the geologic repository operations . . ." 13/

In this example, not only has the DOE not claimed that such containment has either been proved possible or that their program will demonstrate such containment, but the DOE "program objectives" are fundamentally at variance with the proposed NRC requirements.

DOE suggests that exposures of tens or more millirem per year would be permissible:

"Radiological consequences should be maintained within the level of variations in natural background radiation associated with geographic location and domestic activities." 14/

and then later

"Background radiation variations due to geographic location differences range from approximately 100 to 250 mrem/yr within presently populated areas in the United States." 15/

DOE further imposes an economic standard to govern the operation of a repository:

"The environmental impacts associated with waste disposal systems should be mitigated to the extent reasonably achievable. To the extent reasonably achievable means that which is shown to be reasonable considering the costs and benefits associated with potential mitigative measures. . . ." 16/

Where NRC speaks of "containment of all radionuclides during the first 1,000 years", the DOE objectives call only for "containment to be virtually complete during the period when radiation and thermal output are dominated by fission product decay", and further that this will be done "to the extent reasonably achievable."

In this example not only has the ability to meet NRC criteria not been shown, but even were DOE successful in its described program, failure would be assured simply because the DOE "objectives" would not satisfy NRC requirements.

The philosophy behind the NRC and the DOE objectives have been illustrated by other statements regarding radioactive waste management as well. For example, the Chairman of the ^{President's} Council on Environmental Quality presented the issue as:

"The overriding imperative, given the toxicity and long half-lives of these deadly by-products, is the protection of future generations from their release into the biosphere. President Carter's mandate to those of us directed by him to review the nation's nuclear waste program was unequivocal:

: 'the waste generated by nuclear power must be managed so as to protect current and future generations'." 17/

The U.S. Geological Survey, in their 1978 summary of geological disposal of high-level wastes, stressed a somewhat different perspective:

"An effective solution to the problem of long-term storage of radioactive waste is essential to the expanded use of nuclear power." 18/

Which shall it be -- a hasty decision to protect the corporate health of those institutions with vested interests in "expanded use of nuclear power", or, a program of whatever length necessary to demonstrate unequivocally that the health of current and future generations will be protected?

Conclusion

At least three sets of criteria need to be developed and given final approval. The environmental criteria, to be done by the EPA are not yet available even in preliminary form. The site selection criteria, to be done by the NRC, are not yet available. The repository technical performance criteria have been published in preliminary form by the NRC. The DOE program will not satisfy the NRC performance criteria.

Without approved criteria, and a demonstration that these criteria will be satisfied, there can be no assurance that radioactive waste in the form of spent reactor fuel can be safely disposed of.

References

- 1/ Fed. Reg., Vol 43, No 221, 15 Nov. 1978, pp. 53262 ff.
- 2/ Personal communication, D. Eagen, EPA, 24 June 1980
- 3/ Fed. Reg, Vol 45, No 94, 13 May 1980, pp. 31393 ff
- 4/ DOE/NE-0007, 15 April 1980, p. II-14, see objectives 4 & 6
- 5/ National Academy of Science, Nuclear Waste Report, 1957, p. 3
- 6/ National Academy of Science, Nuclear Waste Report, 1966, p. 20
- 7/ NRC op cit
- 8/ NRC, op cit
- 9/ EPA/520/4-78-004, p. 3
- 10/ EPA, op cit, p 43
- 11/ EPA, op cit, p 44
- 12/ DOE, op cit, p II-283
- 13/ NRC, op cit
- 14/ DOE, op cit, p II-6
- 15/ DOE, op cit, p II-14
- 16/ DOE, op cit, p II-16
- 17/ Speth, G., "Mandate from the future: Nuclear Wastes and the Public Trust, 5 January 1979, AAAS, Houston, TX, p. 4
- 18/ Geological Survey Circular 799, 1978, p. 1.
- 19/ Interagency Review Group, Final Report, 1979, page 42

THE HISTORIC RECORD OF THE U.S. NUCLEAR WASTE PROGRAM DOES NOT PROVIDE
A BASIS FOR CONFIDENCE THAT THE SPENT REACTOR FUEL WILL BE MANAGED SAFELY

This proceeding deals only with the question of whether or not there is confidence that high-level radioactive waste, in the form of spent reactor fuel, will be disposed of in a way which provides safety. In examining the historic record of the U.S. nuclear waste management program it is necessary to consider other radioactive wastes than spent reactor fuel. The nuclear fuel cycle produces radioactive wastes from many different sources and processes. With only minor exception the responsibility for the safe management of these radioactive wastes has been lodged with the NRC, the DOE and their predecessor agencies, AEC and ERDA.

It is only within the past few years that there has even been given passing consideration to the management of spent reactor fuel as radioactive waste. Until 1977, and in some quarters yet today 1/, it was simply assumed that all spent fuel would be reprocessed and as a consequence the disposal of spent fuel was not considered 2/. One must ask therefore, whether or not the record of management of other radioactive waste forms provides confidence that spent fuel can be safely stored or disposed of.

The history of the U.S. radioactive waste program has been fully documented by several authors. For example, a general historical summary has been provided by the AEC's, and now DOE's Chief Historian. He summarized:

"In the three decades following World War II, two federal agencies -- the Atomic Energy Commission and the Energy Research and Development Administration -- tried unsuccessfully to develop a satisfactory plan for managing high level wastes. The history of their efforts, beginning with debates in the Atomic Energy Commission in 1949, reveals one fact of paramount importance: despite changes in terminology and situations, the policy issues related to nuclear waste disposal which the Department of Energy faces today are strikingly similar to those tackled by the Atomic Energy Commission in 1956 and inherited by ERDA in 1975." 3/

Not only has the record of high-level waste management been "unsatisfactory", but so has that for the management of uranium mill tailings 4/, low-level radioactive wastes 5/, and every other form of radioactive wastes 6/.

The very existence of this proceeding stands as moot testimony to the unsatisfactory status of the management -- storage and eventual disposal -- of spent reactor fuel.

Some of the recent milestones in the history of planning for the disposal of high level radioactive wastes are:

" (Nov. 1970) At the request of the Atomic Energy Commission, the Committee on Radioactive Waste Management of the National Academy of Sciences-National Research Council has examined the technical feasibility of burial of solid radioactive wastes in bedded salt deposits . . . [and has concluded that]

1. The use of bedded salt for disposal of radioactive wastes is satisfactory. In addition, it is the safest choice now available . . .
2. The site near Lyons Kansas, selected by the AEC is satisfactory. . . " 7/

* * *

"(April 1971) "Plans by the AEC to set up its first graveyard for radioactive wastes in the middle of Kansas have . . . raised a good deal of controversy in the state, fueled by reports from the Kansas State Geological Survey, which doesn't want the AEC to purchase the 1000 acre site and the 1700 acres of underground rights until further studies prove that all risks have been eliminated . . ." 8/

* * *

"(August 1973) AEC SAYS SITUATION WELL IN HAND: COMMERCIAL WASTE MANAGEMENT STATUS The AEC's multi-pronged program for storage and disposal of commercially-generated radioactive waste . . . include[s] a near-term program adequate for safekeeping of high-level wastes 'for as long as the human race wants to,' and intermediate and longer-range programs that would improve the economics by lessening surveillance and maintenance burdens. The near-term program calls for retrievable surface storage, and AEC is planning construction of such a storage facility to be ready to accept the first commercial wastes. Development is continuing meanwhile on a possible successor concept: placement in a deep salt bed . . . Despite

the fiasco at Lyons, Kan., which was partly technical and partly political, AEC still feels bedded salt has the best potential. . . . An area in southeastern New Mexico appears, from surface exploration and information supplied by the U.S. Geological Survey, to be satisfactory. AEC plans call for drilling into the salt bed in New Mexico for further exploration" 9/

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1975) ERDA SHELVES A NUCLEAR WASTE STORAGE PLAN
E. . . . ruptly shelved its controversial plan -- inherited from the extinct AEC -- to build a \$55 million surface storage facility for the nation's nuclear wastes. ERDA apparently will proceed with its long-range plan of developing a permanent burial site for nuclear waste in southern New Mexico. . . . Critics said the AEC seemed to have its priorities upside down in that it was emphasizing a temporary fix to the problem of work on a long-range solution. . . ." 10/

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"(October 1975) RADIOACTIVE WASTE SITE SEARCH GETS INTO DEEP WATER The search for a permanent disposal site for radioactive wastes. . . . hit another snag recently. Sandia Laboratories, of Albuquerque, New Mexico, which is managing the search for an underground repository in the remote areas of southeastern New Mexico, reports that the latest test hole has discovered unexpected geologic conditions that may render the immediate area under investigation unsuitable" 11/

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"(July 1978) NUCLEAR REPORT CASTS DOUBT ON . . . DISPOSAL Even deep salt beds, a leading contender as a permanent storing place for atomic wastes, got a poor evaluation in the report prepared by the President's Office of Science and Technology Policy . . . Deutch, head of the panel, told a House Interior subcommittee that a solution to the problem of waste disposal was still years away. . ." 12/

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"(March 1979) CARTER TO CONSIDER DELAYING EARLY DEMO OF COMMERCIAL NUCLEAR WASTE DISPOSAL President Carter will be urged to forego DOE's plan for early demonstration of spent nuclear fuel disposal and to launch instead a wide-ranging search for alternative geologic sites, according to White House officials working on a draft presidential review memorandum on the nuclear waste issue. These sources said a Carter decision on the option to search for alternatives could push the target date for the nation's first permanent waste repository beyond 1993." 13/

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"(November 1979) NRC CRITERIA MAY RULE OUT BUILDING A NUCLEAR WASTE REPOSITORY IN SALT The Nuclear Regulatory Commission may rule out building a high-level nuclear waste repository in salt with criteria which it is developing for the licensing of high-level waste repositories NRC sources said last week. 'We have not taken the position that salt is unsuitable at this time,' said one NRC source, 'but my best guess is that the bottom line will exclude salt.'" 14/

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"(May 1980) CARTER'S TIMETABLE FOR HIGH-LEVEL NUCLEAR WASTE SITES BEGINS TO SLIP Just three months after President Carter enunciated the national nuclear waste management policy, sources within his Administration have begun to acknowledge that the timetable for a high-level nuclear waste repository will probably not be met. The President had recommended that four to five sites were to be evaluated and found potentially suitable by 1985, and the repository was to be operational by the mid-1990s. In recent weeks DOE officials had quietly begun using a 1997 target date for the operating repository (a two-year delay from the 1995 deadline DOE had previously used). What's more, the President's goal of having four to five suitable sites by 1985 appears to be "highly unlikely," according to a source at the U.S. Geological Survey, which will be cooperating with DOE on the waste repository site selection." 15/

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The DOE's chief historian, in evaluating the history of waste disposal concluded, in part, that:

". . . federal officials throughout the period of this study failed to understand that they were dealing with problems that are not solely or even primarily technical in nature. . . . Lip service was given to the importance of such nontechnical factors as public understanding and acceptance, economic incentives or disincentives, and federal-state relationships, but almost nothing was

invested in the analysis or evaluation of these factors. There is no evidence at all that attention was given to such matters as social, cultural, or psychological phenomena that might serve as constraints in implementing technological solutions." 16/

A 1980 scholarly summary of radioactive waste policy concluded, in part:

"In the past, the technologies necessary for safe management of these wastes were implemented poorly or not at all. The institutions responsible for waste management were generally at fault, proving unequal to the requirements of the task. Institutional actions often tended to exacerbate rather than resolve problems. In the excitement of the developing Atomic Age, there was little interest in the mundane problem of radioactive waste. The results were carelessness, mistakes, inflated claims, and unfulfilled promises on the part of the agencies in charge of the waste management program as well as repeated leaks of radioactivity into the environment." 17/

The situation was aptly summarized by the Chairman of the President's Council on Environmental Quality in early 1979 and his words are particularly germane to the instant proceeding:

"Let's turn now to the question of what to do with the nuclear wastes to which we're already committed. My first observation is that we have inherited a badly

flawed federal program that provides a poor basis for getting to the right answer quickly and no basis at all for public confidence. The history of waste management in the U.S. provides ample warning of the risks of having policy formulation colored by past programs and nuclear promotional concerns. It is a history of unbroken failure to produce an acceptable method of waste disposal." [emphasis added] 18/

Conclusion

The past decades of the U.S. nuclear waste management program is an unbroken record of failure.

The failure is due in part to failure to develop adequate technology and failure to implement those technologies which did exist.

The failure is due in large part to an utter failure of the responsible agency to recognize, and consider, institutional and social issues inexorably associated with nuclear waste management.

The historic record provides no confidence that high-level wastes will be safely disposed of or stored until disposal is available.

References

- 1/ Nucleonics Week, 19 June 1980, p. 3
- 2/ Nuclear Energy Policy Study Group, Nuclear Power Issues and Choices, Cambridge, Mass.: Ballinger Pub., 1977
- 3/ Hewlett, R.G., "Federal Policy for the Disposal of Highly Radioactive Wastes from Commercial Nuclear Power Plants: A Historical Analysis", USDOE, 9 March 1978 (mimeo), p. 1
- 4/ See, e.g., Draft Generic Environmental Impact Statement on Uranium Milling, April 1979, U.S. Nuclear Regulatory Commission.
- 5/ See, e.g., U.S. House of Representatives, Hearings before a Subcommittee of the Committee on Government Operations, Low Level Radioactive Waste Disposal, 94th Cong., 2nd sess, Feb. 23, March 12 and April 6, 1976, USGPO, Washington, D.C.
- 6/ Lipschutz, R.D., Radioactive Waste: Politics, Technology and Risk, Cambridge, Mass., Ballinger Pub., 1980
- 7/ Committee on Radioactive Waste Management, National Academy of Sciences, "Disposal of Solid Radioactive Wastes in Bedded Salt Deposits," U.S. GPO, Washington, D.C., November 1970
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- 9/ Nuclear Industry, August 1973, p. 20
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- 12/ The New York Times, 12 July 1978, p. 13
- 13/ Inside D.O.E., 12 March 1979

- 14/ Inside D.O.E., 9 November 1979, p. 4
- 15/ Nucleonics Week, 8 May 1980, p. 1
- 16/ Hewlett, R.G., op cit, pp. 3-4
- 17/ Lipschutz, R.D., op cit, p. 113
- 18/ Speth, G., "Mandate from the future: Nuclear wastes and the public trust", 5 January 1979, AAAS, Houston, Texas, p. 7

THE FAILURE TO ADEQUATELY ADDRESS INSTITUTIONAL AND SOCIAL ISSUES HAS BEEN A MAJOR FACTOR IN EXPLAINING WHY THERE IS NO WASTE DISPOSAL MEANS CURRENTLY AVAILABLE. THE APPARENT INABILITY OF THE DOE TO RECOGNIZE THESE ISSUES WILL PREVENT THERE BEING SUCH MEANS IN THE FORSEEABLE FUTURE.

As is discussed elsewhere in this submission, the past years of the U.S. radioactive waste management program is a "history of unbroken failure". A large part of that record was written in Lyons, Kansas, in Michigan, in New Mexico, and other places where radioactive wastes were either placed or where sites for radioactive waste storage or disposal facilities were being investigated.

In recent years there have been several reviews and analyses of the U.S. radioactive waste management programs. These reviews are consistent in stressing the importance of social and institutional factors in any viable waste management program. Some examples follow:

AEC/DOE Historian Hewlett, 1978

" . . . federal officials . . . [have] failed to understand that they are dealing with problems that [are] not solely or even primarily technical in nature." 1/

An NRC Task Force, 1978

". . . past failures of proposed radioactive waste management systems have stemmed in large part from neglect of non-technological necessities in [the] implementation of systems." 2/

Chairman, President's Council on Environmental Quality, 1979

"So far we have been discussing primarily the technical issues in deciding how best to manage nuclear wastes. But there are in addition a long series of issues called 'institutional', and they may prove the most difficult. Institutional problems are those we will encounter in trying to implement the preferred technical waste disposal option in the real world. They run the gamut from putting together a team capable of thoroughly investigating possible sites and picking the best one, to accurately assessing site characteristics in light of the technical criteria, to carrying out accurate analyses of the risks, to getting the facility approved politically and licensed, to providing careful construction and operation of the repository, to providing long-term monitoring and guardianship. The level of difficulty of all these problems increases with the size of the nuclear waste inventory and its rate of growth: Institutions that can cope on a small scale may fail as the demands placed on them multiply.

We are just beginning to address these institutional issues, and one cannot help but be troubled by the realization that we have periodically flubbed less technically demanding tasks." 3/

The Interagency Review Group, 1979

" . . . the resolution of institutional issues is equally as important as the resolution of outstanding technical issues and problems [and such resolution] may well be more difficult than finding solutions to remaining technical problems." 4/

An independent reviewer, 1980

"Until the Atomic Energy Commission was abolished, there was not, properly speaking, a coherent, comprehensive program for managing radioactive wastes. If the AEC had a policy with regard to waste disposal, it was one of deferring a solution to the indefinite future. As a result, waste management effected through a series of short-term 'technical fixes,' many of which proved inadequate virtually upon implementation. In addition, these inappropriate fixes were always put into practice with little or no thought given to critical nontechnical, or 'institutional', problems that might develop such as human error, political resistance, or bureaucratic bungling. This omission inevitably exacerbated the impacts of specific failures, for not only were the AECs waste managers made out to be hopeless technical incompetents, but they were also seen as politically arrogant and insensitive. In this way, the AEC created a climate of distrust and contempt that persists to this day.

Unfortunately, the current waste management program of the Department of Energy is subject to some of the same weaknesses that plagued waste management under the AEC, for the department strongly believes that proper waste management is primarily a technical problem with a very small nontechnical component." 5/

* * *

There can be no doubt that these nontechnical factors are of extreme importance to the success of a radioactive waste management program. There can be no confidence that a program will be successful in the implementation of a safe disposal or storage program unless

there is convincing evidence that these issues are recognized and being subjected to at least as complete analysis as are the technical issues.

The Department of Energy, as part of this proceeding, has submitted a program plan consisting of over 700 pages of text and figures. It is clear that this program is intended to display not only DOE's technical program but also its program for resolving nontechnical issues:

"To demonstrate the Department of Energy's ability to understand and address the social, political, and institutional aspects of waste management, the Department's program plans and management structures are presented." 6/

But, the DOE program plan is virtually silent on these nontechnical issues. Less than a dozen pages of DOE's report deal with state, local, or social issues -- the very issues which were heavily involved in the failure of previous attempts to establish waste repositories. When DOE does address the issues, they are exceedingly general and unsophisticated, e.g.:

"In addition to participation in hearings, other activities (such as environmental and engineering studies at specific sites) will be discussed with appropriate State officials. Cooperation with State officials will involve providing detailed technical information to them and giving careful consideration to advice from them." 7/

DOE does not attempt to demonstrate that past failures have been a result of insufficient "detailed technical information" being provided to the "appropriate State officials".

"Social concerns" are covered by DOE in less than one page of the over 700. That section, in full, reads:

"Because social concerns are less easily predicted, less confidence can be placed in assessment of their impacts on the repository program. Nonetheless, there is growing public recognition that nuclear waste management is a national problem and that solution of the problem should not be postponed for future generations. For example, the attention focused upon the need for additional low-level waste burial grounds, raised by the actions of authorities in the States of South Carolina, Washington, and Nevada, has resulted in active efforts by other States to address such problems. This developing national awareness also is reflected in the recent statement by the President which was based on the recommendations in the IRG report. The President confirmed the lead responsibility of the Department [of Energy] for coordinating waste management activities within the Federal structure. The result is a rapidly evolving nuclear waste program with a broad scientific base. Included in the program are measures to allow for open interaction with the concerned public.

The continuing implementation of the Department's policy of consultation and concurrence and implementation of the Department's NEPA guidelines build confidence that the schedules provide for adequately addressing social concerns." 8/

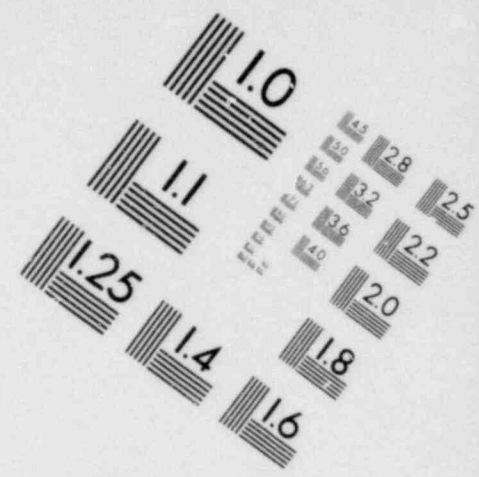
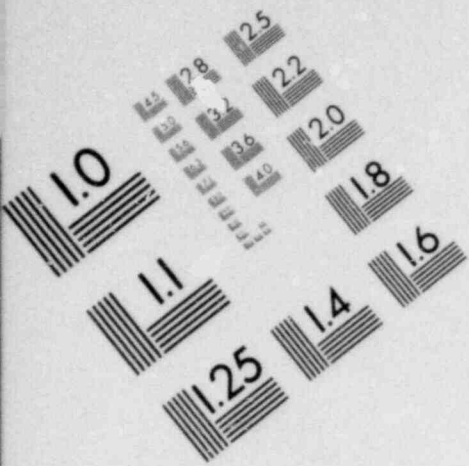
A June 1980 notice from the U.S. National Academy of Sciences sheds some light on the virtual absence of a DOE program to confront these crucial non-technical issues:

"At the request of the U.S. Department of Energy, a National Research Council panel will attempt to identify social and economic issues to be considered in selection of repository sites... The panel hopes to recommend ways in which to take various social and economic impacts into account in site-selection and to spot needs for additional research." [emphasis added] 9/

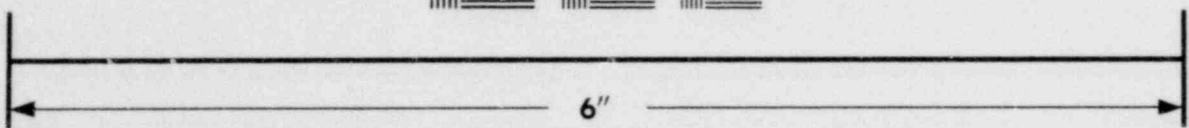
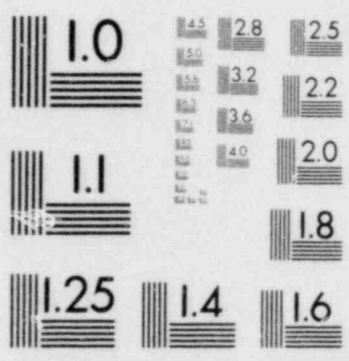
Apparently DOE has no program because it has not yet even identified the issues.

There is another factor to be considered in attempting to assess confidence that there will actually be an operational program for the disposal of spent reactor fuel. The long-term viability of the nuclear option demands the deployment of breeder reactors and the reprocessing of spent reactor fuel. Reprocessing would be precluded were spent reactor fuel "disposed of" by placing it in an irretrievable form in geologic repositories.

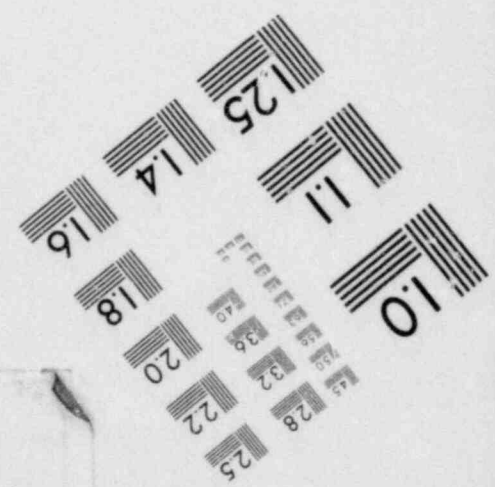
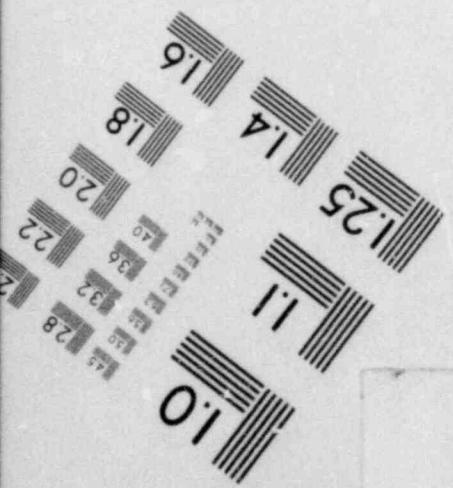
The DOE in its statement of position pointed out, without enthusiasm, that the President on 7 April 1977 announced the decision to defer indefinitely all civilian reprocessing of spent fuel. The reprocessing options, together with a summary of their waste management implications, are, however, described in more detail in the DOE program plan than, for example, are the social and other non-technical aspects of spent fuel management.



**IMAGE EVALUATION
TEST TARGET (MT-3)**



MICROCOPY RESOLUTION TEST CHART



In order for there to be confidence that spent fuel can be safely disposed of, there must be confidence that those responsible for the program intend or want there to be disposal of spent fuel. DOE has failed, either in its program plan submitted as part of this proceeding, or in other communications, to show its intent to dispose of spent fuel.

DOE is, moreover, not the only actor involved. In addition to state and local governments, and the public at large, the programs of the nuclear industry and of the U.S. Congress are crucial to the success of a spent fuel disposal program. Recent congressional activity would, should it prevail, not only fail to assure success of the DOE/NRC spent fuel disposal program, but it would assure failure

"HOUSE APPROPRIATIONS COMMITTEE SETS NEW PRIORITIES FOR NRC AND DOE

NRC's FY-81 budget has been slashed and substantially re-arranged by the House Appropriations Committee, which reported the bill containing NRC and DOE funding to the floor on Monday (June 16). . . . The committee . . . took action to redirect DOE's commercial nuclear waste program. Specifically, it prohibited DOE from spending funds to investigate spent-fuel disposal, 'considering the potential value of this fuel in meeting future energy needs. It also told DOE to concentrate on existing federally-owned sites for waste storage and disposal, rather than carrying out 'costly and unnecessary extensive multiple site investigation and geological evaluation." 10/

Conclusions

Resolution of complex non-technical issues are crucial to success of any program to safely store or dispose of high-level radioactive waste, including spent reactor fuel.

Reports and recommendations during the past few years have stressed the importance of these issues, their difficulty, and the impossibility of achieving success in waste management without their resolution.

The DOE program plan virtually ignores these issues, and provides no confidence whatsoever that they are either understood or taken seriously.

Recent actions in the U.S. Congress would/assure that there seem to be is confidence that there will not be a viable program for the disposal of spent fuel or an adequate investigation of sites for disposal of high-level wastes in general.

References

- 1 / Hewlett, R.G., "Federal Policy for the Disposal of Highly Radioactive Wastes from Commercial Nuclear Power Plants: A Historical Analysis", U.S. DOE, 9 March 1978 (mimeo) p. 3
- 2 / Bishop, W.P., et al, NUREG-0412, Washington, D.C., 1978, p. 57
- 3 / Soeth, G., "Mandate from the future: Nuclear wastes and the public trust", 5 January 1979, AAAS, Houston, Texas, pp. 11-12
- 4 / Interagency Review Group on Nuclear Waste Management, Report to the President, RID-29442, U.S. DOE, 1979, p. 87
- 5 / Lipschutz, R.D., Radioactive Waste: Politics, Technology and Risk, Cambridge, Mass., Ballinger Pub., 1980, p. 139
- 6 / U.S. DOE, Statement of Position of the United States Department of Energy (Waste Confidence Rulemaking), DOE/NE-0007, 15 April 1980, p. I-9.
- 7 / U.S. DOE, op cit, p, V-19
- 8 / U.S. DOE, op cit, p. III-87
- 9 / National Academy of Sciences, News Report, June 1980, p. 1
- 10 / Nucleonics Week, 19 June 1980, pp 2-3

THERE IS NO ASSURANCE THAT RADIOACTIVE WASTE CAN BE SAFELY STORED
ON-SITE PAST THE EXPIRATION OF EXISTING LICENSES

The Court of Appeals, in the Vermont Yankee/Prairie Island case asked for:

" . . . reasonable assurance that an off-site/^{storage}solution will be available by the years 2007-2009, the expiration of the plants' operating licenses, and if not, whether there is reasonable assurance that the fuel can be stored safely at the sites beyond those dates." 1/

It has been demonstrated elsewhere in this comment that there is no confidence whatsoever that an "off-site storage solution will be available by the years 2007-2009." It remains, therefore, to consider whether there is reasonable assurance that the spent fuel can be stored safely at the reactor sites beyond the expiration of the reactor licenses.

There appears to be general agreement that on-site storage is not a permanent solution to the high-level radioactive waste problem. 2/ For as long as the highly-radioactive spent fuel remains in temporary storage it is subject to disruption caused by mismanagement, e.g., operator error or a consequence of a disruptive reactor accident, to malicious mischief, e.g., a terrorist attack or other similar disruption, or to the effects of serious loss of social fabric whether due to war, loss of a stable government, or events with similar consequences.

The DOE asserts that there should be plans for storage of spent reactor fuel, either at the reactor or at an away-from-reactor facility, for periods in excess of 40 years. 3/ There is, however,

not a shred of scientific evidence that spent fuel can be safely stored for these periods. The longest storage time cited by the DOE in their program plan is the 16 years storage in a water pool for the zircaloy-clad spent fuel from the NPD Canadian test reactor. 4/ There does not appear to be experience for even this limited period for the high-burnup spent fuel characteristic of U.S. commercial reactors.

The matter of long-term storage of spent fuel was considered at length in the Windscale Inquiry in the U.K. during 1977-78. The final report from the Hon. Mr. Justice Parker characterized the issue:

"8.11 Crucial to the argument for extended storage is the question whether storage for extended periods is or would be satisfactory." 5/

In responding to this question for the spent fuels which would be typical of those resulting from the operation of U.S. power reactors, Mr. Parker summarized:

"8.14 As to zircaloy fuel, storage for longer periods up to about 15 years has taken place without observation of any difficulties. None of this information advanced matters appreciably and I therefore sought further information both from BNFL [British Nuclear Fuels Limited] and UKAEA [United Kingdom Atomic Energy Agency]. As a result Mr B F Warner of BNFL reviewed the available evidence and reached the conclusion that: --

- a. It is probable that zircaloy fuel may be stored for up to 20 years, and remain suitable for handling and reprocessing.

- b. It would be imprudent to store substantial quantities of stainless steel clad fuel in ponds for more than a decade.
- c. Further evidence was required before present plans for early reprocessing could prudently be modified." 6/

Whether the anticipated long storage time is ultimately to reprocess, or to place the spent fuel in permanent storage, the issue is the same: whether or not it has been demonstrated that spent fuel storage for several decades has been demonstrated. The answer is clearly no, there has been no such demonstration.

As to the question of will there be facilities for long-term storage when and if it is shown that such long-term storage can be done, the DOE program is virtually silent. There are schedules set forth, but no basis for these schedules, no assurance that there is a program to overcome the institutional issues which have been evidenced in all nuclear waste programs, no assurance that sufficient funding will be provided.

Conclusion

There is no scientific basis for asserting that spent fuel can be safely stored for 40 years or more.

There is no assurance that even were it shown that such storage could be done safely, that it would be done.

References

- 1/ United States Court of Appeals for the District of Columbia Circuit, Decision in State of Mn v. U.S. NRC, 23 May 1979, p. 14
- 2/ See, for example, several such comments in the DOE Program Plan, DOE/NE-0007, 15 April 1980.
- 3/ DOE, op cit, p. IV-4
- 4/ DOE, op cit, p. IV-10
- 5/ The Windscale Inquiry, Report by the Hon. Mr. Justice Parker, 26 January 1978, HMSO, London, p. 28
- 6/ Parker, op cit, p. 29

PROFESSOR DEAN E. ABRAHAMSON

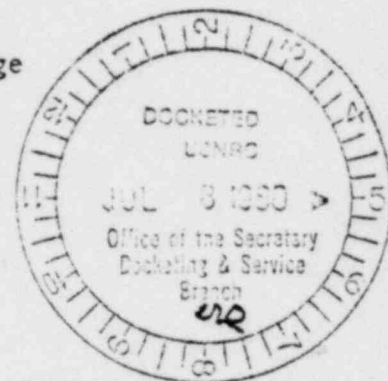
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Date and Place of Birth: December 21, 1934, Minnesota

Degrees Awarded:

Bachelor of Arts	1955	Gustavus Adolphus College
Master of Arts	1958	University of Nebraska
Doctor of Medicine	1967	University of Minnesota
Doctor of Philosophy	1967	University of Minnesota



Recent Academic Experience:

1970-72	Associate Professor, Departments of Anatomy and Laboratory Medicine, University of Minnesota
1970-73	Director, Center for Studies of the Physical Environment, Institute of Technology, and Associate Professor, Department of Physics, University of Minnesota
1977-78	Visiting Professor, Institute of Theoretical Physics, Chalmers Institute of Technology, and University of Gothenburg, Sweden
1971 - Present	Chairman, All-University Council on Environmental Quality, Center for Urban and Regional Affairs, University of Minnesota
1974- Present	Professor, Hubert H. Humphrey Institute of Public Affairs, University of Minnesota
1976- Present	Member of Graduate Faculties in Public Affairs, Geology, and Biophysics, University of Minnesota

Other Experience: (selected)

1958-59	Nuclear Physicist, Reactor Physics Division, Babcock and Wilcox Co., Lynchburg, Virginia
1959-63	Senior Research Scientist, Honeywell, Inc., Minneapolis
1970-72	Member, Executive Committee of Technical Group on Environmental Sciences, American Nuclear Society
1970-72	Member, Advisory Panel to Committee on Environmental Law and Technology, Atomic Industrial Forum

Other Experience: (selected)

- 1970-72 Chairman, Power Task Force of the Committee on Environmental Alterations, American Association for the Advancement of Science
- 1971 Member, Power Plant Siting Task Force, National Academy of Engineering
- 1971-72 Member, Board of Directors, Minnesota Academy of Sciences
- 1972 Represented Consumers' Union of the United States on the Executive Advisory Committee to the Federal Power Commission's National Power Survey
- 1972-73 Member, Citizens Advisory Committee to the Environmental Quality Council, State of Minnesota
- 1972-73 Chairman, State Task Force on Power Plant Siting, State of Minnesota
- 1972-74 Member, Board of Advisors, Ford Foundation Energy Policy Project
- 1973-74 Member, Consumer Advisory Committee, Federal Energy Office
- 1973-75 Chairman, Editorial Advisory Committee, Environment Magazine
- 1973-75 Member, Minnesota Emergency Energy Committee, State of Minnesota
- 1974 Member, Liquid Metal Fast Breeder Reactor Advisory Committee, U.S. Congress, General Accounting Office
- 1975 Member, Review Panel for ERDA Program, U.S. Congress, Office of Technology Assessment
- 1977-78 Advisor to the Swedish Energy Commission, Stockholm, Sweden (one year sabbatical leave from the University of Minnesota)
- 1978 Consultant to Minister of Energy, Government of Sweden
- 1976-79 Member, Resource Group on Sociopolitical Effects, Committee on Nuclear and Alternative Energy Systems, National Academy of Sciences/National Research Council
- 1978-79 Member, Gorleben International Review Panel, Ministry for Social Affairs, Lower Saxony, West Germany
- 1979-80 Consultant and Peer Reviewer, U.S. Nuclear Regulatory Commission Special Inquiry into Three-Mile Island Accident [the "Rogovin Inquiry"]

Current Activities: (selected)

- 1972- Member, Board of Trustees, Executive Committee of the Board
Present (1973-77), Natural Resources Defense Council
- 1976- Member, Advisory Board of Theory and Methodology, National
Present Council for the Public Assessment of Technology
- 1976- Member, Advisory Committee, Project Environment, Sierra Club
Present
- 1976- Member, Advisory Board, Center for Science in the Public
Present Interest
- 1980 Consultant, State of Minnesota Attorney General, regarding
"Confidence Proceedings" [To establish whether there is
confidence that high-level radioactive wastes can be
safely managed]