UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

CHAIRMAN

March 24, 1981

The Honorable Jennings Randolph
Committee on Environment and Public Works
United States Senate
Washington, D.C. 20510

Dear Senator Randolph:

I am pleased to respond to your letter in which you requested information on the impact S. 2189 as passed by the Senate on July 30, 1980 would have, if it were to become law, on the U.S. Nuclear Regulatory Commission's current radioactive waste management activities. We have delayed providing our comments until the Commission completed action on the Part 60 procedural rule for licensing a high level and radioactive waste disposal facility. Your questions and the Commission responses are presented below:

Question 1: S. 2189 directs the Secretary of Energy within one year after enactment, to submit to Congress a specific proposal for a long-term retrievable storage facility that would be managed and monitored for an indefinite period of time.

Would this provision affect the Commission's development of regulations for waste storage and disposal activities, particularly with respect to requirements for monitoring and management? Please explain.

The Commission has promulgated regulations codified as 10 CFR Part 72 for temporary, away-from-reactor storage of commercial spent fuel. These regulations might require some amendments to be applicable to facilities for long-term retrievable storage, but such amendments probably would not be extensive because Part 72 already requires the renewal of Commission licenses every 20 years and periodic overall assessments of the facility's impact on public health and safety. It appears that the Commission could assure under 10 CFR Part 72 that appropriate monitoring and management measures could be required and enforced at a retrievable long-term storage facility for spent fuel. However, 10 CFR Part 72 does not address the long-term retrievable storage of high-level radioactive reprocessing waste. Thus, additional efforts would probably be required to develop regulations for the receipt and emplacement of commercial high-level radioactive reprocessed waste in a long-term retrievable storage facility. These regulations could be promulgated as amendments to Part 72 by extending its scope to include facilities for the retrievable storage of reprocessed waste. Some modifications to 10 CFR Part 72 (or possibly new regulations) would be required if reprocessed waste were to be licensed in a retrievable facility.

Question 2: In its advanced notice of proposed rulemaking, dated May 5, 1980, the Commission included a requirement of retrievability for a deep geologic disposal facility.

Question 2(A): Please describe and analyze the feasibility of any proposed methods for retrieving radioactive wastes from such a facility. How long does the Commission assume these wastes would be retrievable?

In the advance notice of proposed rulemaking, published in the Federal Register on May 13, 1980, the staff indicated that the selection of a suitable site for a geologic repository for HLW disposal and the design, construction, and operation of a repository is a new human enterprise involving some 40-50 years from the time of design approval to filling the repository to capacity. The care exercised and the use of state-of-the-art techniques should make the need to retrieve emplaced wastes unlikely.

During the time the repository is being filled, operational data would be obtained and an assessment of repository performance made, up to the time the site is to be decommissioned. If operational data indicated a problem during this period, corrective action, including removing some or all of the waste, may be necessary to protect the public health and safety. For this reason, the staff believes that it is prudent to maintain the option to retrieve the wastes for a period of time after the last wastes are emplaced and before the repository is decommissioned.

While we recognize that there will be impacts on repository design and waste emplacement from retrievability requirements, the staff is developing criteria to require that a repository be designed to preserve the option to retrieve wastes for a period of time after the last wastes are emplaced. In its advance notice of proposed rulemaking, the staff suggested that this period be about the same as that in which the waste were emplaced in the repository, or about 50 years after emplacement of all wastes. Consistent with the regulatory approach of establishing performance requirements rather than prescribing design specifications, staff believes that the specific method chosen to achieve the objective should be left to DOE. The staff is presently evaluating the comments received by the Commission on this proposed requirement, and will consider this issue before the proposed 10 CFR Part 60 (Subparts E-I) -- Technical Criteria for Regulating Geologic Disposal High-Level Radioactive Waste -- is published for public comment in early 1981.

Question 2(B): Please forward any comments the Commission has received on the proposed retrievability requirement.

Enclosed are comments the Commission has received from both its Waste Confidence Rulemaking Proceeding and the advance notice of proposed rulemaking (10 CFR Part 60) relating to the proposed retrievability requirement.

Question 2(C): Please compare the feasibility and costs of retrieving wastes from a surface or subsurface storage facility with the feasibility and costs of retrieving radioactive wastes from a deep geologic storage or disposal facility.

The staff has not undertaken any studies in this area. It would appear that waste retrievability could be made equally feasible for either: (1) a deep geologic storage or disposal facility or (2) a surface or a subsurface storage facility if easy retrievability were designed into the project at the outset. However, the costs could be significantly different depending on the specific design concepts used. We know of no conceptual designs which have been developed which could serve as the basis of such a comparison. We would estimate, however, that retrievable deep geologic disposal would be more costly than retrievable surface or near-surface storage.

Question 3(A): How does the Commission interpret its licensing authority under S. 2189?

Section 914(a) of S. 2189 provides:

> Nothing in this Act shall affect the authority of the Nuclear Regulation Commission to license and regulate high-level or transuranic contaminated waste or spent nuclear fuel storage and disposal pursuant to Section 202 of the Energy Reorganization Act of 1974 or byproduct, source of special nuclear material pursuant to Section 201(f) of such Act.

Because S. 2189 is not intended to affect the Commission's licensing or regulatory authority, the Commission believes that S. 2189 preserves the Commission's previous interpretations of NRC authority as described below.

Currently, Section 202 of the Energy Reorganization Act of 1974 provides specific authority for NRC licensing of certain DOE facilities pursuant to Chapters 6, 7, 8 and 10 of the Atomic Energy Act of 1954 as amended. Since Chapter 10 of the AEA applies only to licensing of utilization and production facilities, the DOE facilities described in Section 202(3) would be regulated pursuant to the Commission's materials licensing authority as set out in Chapters 6, 7 and 8 of the AEA. As a technical matter,

therefore, the NRC would be licensing DOE's possession of source, special nuclear and byproduct material rather than the facilities themselves. In order to license those DOE activities effectively, the Commission has determined that it must regulate DOE's construction of a facility for such disposal. These regulations are contained in the recently promulgated rule, 10 CFR Part 60.

The Commission has taken the position that for purposes of Section 202(3), spent fuel from commercial power reactors is a form of high-level waste, whether or not reprocessing is intended, and that DOE interim storage facilities for such spent fuel would be subject to NRC regulatory authority. It is also the Commission's position that DOE storage or disposal of foreign high-level waste resulting from a licensing activity would be licensable. That is, if either the foreign reactor or the fuel used in it were exported under a license issued by NRC (or AEC), the storage of the spent fuel would be subject to Section 202(3) under existing law. Section 310 of S. 2189 would explicitly confirm these interpretations of current NRC authority. A full discussion of the Commission's view of the scope if its authority is contained in its Report to Congress on "Regulation of Federal Radioactive Waste Activities," NUREG-0526, 1979.

Although the Commission's current authority would be preserved by S. 2189, in the case of long-term storage facilities the Commission's discretion would be narrowed by barring the consideration under NEPA or the Atomic Energy Act of any alternative to the design criteria set forth in Sections 402 or 405.

In our opinion, the state-review provisions of S. 2189 (Title IX) would not alter the Commission's authority, because Section 901(c) explicitly provides that any cooperative agreement between DOE and a State "shall not affect the Nuclear Regulatory Commission's authority under law." Incidently, as we interpret Title IX, it applies only to mined repositories (requiring completion of "site characterization" activities to determine the suitability for a "geologic repository" and involving construction of a "main shaft") and not to other repositories.

Although the Commission believes that S. 2189 is intended to preserve current NRC licensing authority, we would like to point out a potential problem with certain terminology which could create uncertainty as to NRC's authority to license DOE repositories for ultimate disposal of high-level waste. Currently, we believe NRC has such authority under Sections 202(3) and 202(4) of the Energy Reorganization Act of 1974. Those sections authorize the NRC to license DOE facilities for the storage of high-level waste; and the legislative history of those sections clearly indicates that the term "storage" was intended to include "disposal."

However, S. 2189 would explicitly define "storage" to mean the retention of nuclear waste with the intent to recover such material (Section 201(7)) and would separately define "disposal" to mean long-term isolation including monitored retrievable storage. Section 310 of S. 2189 would amend Section 202(3) of the ERA to explicitly refer to spent fuel, but would not alter the current language which refers expressly only to storage. Thus, by explicitly defining "storage" to exclude disposal and by retaining the term "storage" in the ERA, S. 2189 could be interpreted as precluding NRC from licensing DOE disposal facilities.

Such an interpretation also appears inconsistent with Section 405(c). That section is clearly intended to provide for NRC licensing of disposal facilities established by DOE pursuant to Title IV of S. 2189. This intention could not be realized if the definition of "storage" in S. 2189 is interpreted as limiting the NRC's authority regarding DOE disposal facilities because Section 405(c) is explicitly based on Section 202(3) of the ERA. Moreover, it would be unreasonable to conclude that Congress intends NRC to license storage facilities but not more hazardous disposal facilities. Therefore, we suggest the following addition:

Amend 310 of the bill to read as follows:

Sec. 310. Section 202(3) of the Energy Reorganization Act of 1974 is amended to read:

"Facilities used primarily for the receipt and storage or disposal of high-level radioactive waste or spent fuel resulting from activities licensed under such Act or spent fuel from foreign reactors transferred under a subsequent arrangement authorized under such Act."

Question 3(B): In particular, what type of facilities and what categories of radioactive waste would the Commission license?

Under existing law, the following DOE facilities contemplated by S. 2189 would fall within NRC jurisdiction:

1. Away-from-reactor facilities for the interim storage of spent fuel from civilian nuclear power plants. Section 306(a).

2. Facilities for the long-term monitored storage of high-level radioactive waste resulting from civilian nuclear activities, as described in Section 402.

3. Mined repositories, as described in Section 406(a).

The categories of waste subject to licensing would be source, special nuclear and byproduct material at any such facility, whether in the form of spent fuel or other high-level waste, as defined in Section 201 or otherwise.

Question 3(C): Would the Commission's licensing authority under S. 2189 differ from its current licensing authority over radioactive waste management?

For the reasons discussed above in response to Question 3(A), the Commission believes that S. 2189, with the addition we propose for Section 310, preserves the NRC's current licensing authority.

S. 2189 would also provide the Commission with the following new authority. Section 310 would amend Section 202(3) of the ERA to extend the Commission's current authority to spent fuel transferred pursuant to a subsequent arrangement under Section 131(a)(2)(E) of the Atomic Energy Act of 1954, as amended, even if neither the foreign reactor nor foreign fuel were of United States origin. Section 311 of S. 2189 would extend the Commission's licensing authority to cover DOE's transportation of spent fuel to federally owned away-from-reactor storage facilities. These are the only extensions of NRC authority provided by S. 2189.

I hope that the above information on the impact of S. 2189 on the Commission's current waste management activities will be of use to you and the Committee.

Finally, I believe that passage of a waste bill is an important step in setting in place the federal procedures that will be necessary to resolve the high-level waste problem.

Sincerely,

Joseph M. Hendrie

Enclosure:
Comments received by the Commission on
the proposed retrievability requirements

cc: Sen. Robert T. Stafford
Sen. Alan K. Simpson
Sen. Gary Hart

PUBLIC COMMENTS ON RETRIEVABILITY REQUIREMENTS PRESENTED IN THE ADVANCE NOTICE OF PROPOSED RULEMAKING 10 CFR PART 60, "TECHNICAL CRITERIA FOR REGULATING GEOLOGIC DISPOSAL IN HIGH-LEVEL RADIOACTIVE WASTE"

ENCLOSURE 1

APPENDIX

PDR No.	Author
1	Lowenstein, Newman, Reis, Axelrad and Toll
2	U.S. Arms Control and Disarmament Agency
3	Hon. Jon Hinson M.C. (comments on proposed 10CFR60 procedural rule)
4	National Aeronautics & Space Administration (NASA)
5	U.S. Department of Energy (comments on proposed 10CFR60 procedural rule)
6	Arvin S. Quist
7	A. E. Wasserbach
8	B. R. McElmurry
9	J. G. McCray (University of Arizona)
10	G. H. Dyer
11	Robert Abrams, Attorney General, State of New York
12	U. S. Geological Survey
13	Bechtel National, Inc.
14	Atomic Industrial Forum
15	Exxon Nuclear Corp.
16	American Institute of Chemical Engineers
17	Lazlo Toth
18	U. S. Department of Energy and enclosed comments by - R. Ellison (D'Appolonia) - I. Remson (Stanford University) - H. Ross (university of Utah Research Institute) - G. Pinder (Princeton University) - F. Parker (Vanderbilt University) - N. Cook (University of California) - J. Bird (Cornell University)
19	Bechtel National, Inc. (duplicate of #13)

20 Westinghouse Electric Corp.

21 R. Tauke & M. Adam

22 Energy Resources Conservation and Development Commission

23 Environmental Protection Agency

24 R. E. Johnson

25 Duke Power Co.

26 Bureau of Land Management (BLM)

27 A. T. Heubner, Department of Environmental Protection, State of Connecticut

28 Lowenstein, Newman, Reis, Axelrad & Toll (28) with enclosed comments by The Analytic Sciences Corporation (TASC)

Questions concerning the scope and content of performance-deteriorating scenarios are now well recognized; the NRC must fund a way to deal effectively with them. With respect to this function, we offer the following observations:

- The repository doesn't know if water intrusion is the result of natural processes, human action, repository-induced phenomena, or combinations of these. The scenarios and the performance assessment results may depend strongly, however, on the characteristics and relative frequency (i.e., probability) of these alternative potential causes of performance deterioration. A high-level of NRC effort on scenario definition and analysis would pay dividends with respect to "... the validity of... licensing finding(s)...".

- Aside from catastrophic external events, physical property changes that can produce safety performance deterioration are rather constrained: nature's proclivity to minimize free energy is pervasive. How much change (performance deterioration) can there really be as a result of realistic scenarios, especially with respect to the margin of safety built into the repository?

D. The above discussion leads to the observation that judgment has two distinct roles relative to use of modeling in NRC's disposal licensing responsibilities: with respect to selection and use of mathematical models, and with respect to selection and use of performance-affecting scenarios. Need for judgment vis-a-vis use of models can be minimized; the need vis-a-vis scenarios can be directed so as to maximize confidence in results.

(6) RETRIEVABILITY

Comment 81: G. H. Dyer (10)

The requirement that radioactive waste "... can be reterieved for a period of 50 years after termination of waste emplacement operations, if the geologic repository operations area has not been decommissioned" and that they be able to be retrieved "... in about the same period of time as that during which they were emplaced" is a good general concept but likely will lead to problems as specifically worded.

(a) It is possible that a decision might be made to retrieve only a portion of the wastes, since over the emplacement period differing materials and tec. iques are likely to evolve.

(b) If the repository is decommissioned immediately after the placement of the first waste package, then there is no retrieval requirement. Further, if it is intended to accomplish such early decommissioning, then the requirement to design and construct a retrievability capability could be construed to not be required. This logic could be further extended all the way out to just short of the 50-year period.

(c) This requirement makes more difficult the backfilling of emplacement tunnels immediately after emplacement -- say, with salt being excavated in other portions of the facility.

(d) I do not have facts, but I suspect removal will be considerably more complicated than placement and will require more time, especially if backfilling is conducted prior to decommissioning.

(e) To what extent must retrievability be achieved? Should there be a specification on residual radioactivity in the event of a waste package failure?

(f) What minimum conditions would lead to a requirement to conduct a retrieval operation, and who decides, etc.?

(g) In summary, while agreeing with the retrievability concept, I believe it important to recognize the dynamic nature of the emplacement operations, and to couple the retrievability requirement to them, rather than have a single simple 50-year rule.

Comment 82: Bechtel National, Inc. (13)

Retrievability - The likelihood of having to retrieve nuclear waste once a license has been granted and the waste has been emplaced in the geologic medium should be extremely small. In fact, it is difficult to foresee any circumstances where this would be required. Paragraphs 60.111(a)(3), 60.132(b)(2), 60.132(c)(3), and 60.135 define design requirements for a retrievability period which extends 50 years beyond termination of waste emplacement operations, and require that the wastes be retrieved in about the same period of time as that during which they were emplaced. These requirements are much too conservative, have no apparent justification, are extremely costly with little or no benefit in terms of risk reduction to the public and, for some geologic media, are probably not obtainable. In the case of a salt repository, where creep allowance would be required, mining of a much larger cavity at greatly increased cost would be required, and maintenance of the mined opening to permit retrievability might be impossible. Furthermore, the additional excavation required would diminish the future isolation integrity of the repository. The 50-year requirement would probably rule out all soft rocks such as salt and shale which otherwise might serve as excellent repository media. As an alternative, a 10-year retrievability period is suggested.

Comment 83: Atomic Industrial Forum (14)

While we are in agreement with the concept of retrievability as a general design criteria, we believe that careful evaluation and trade-offs need to be considered before this concept is quantified or broadened extensively. We suggest that retrievability be required only during the emplacement period and until all or a part of the waste disposal facility is defined as a permanent repository.

Comment 84: American Institute of Chemical Engineers (16)

Although the concept of retrievability for a period of 50 years after filling of the geologic repository seems attractive, we believe that this is illusory. Our view assumes that retrievability is to be achieved by not backfilling the repository rooms and not sealing the shafts into the repository for 50 years

after waste has been emplaced. First of all, _____ specialists are dubious that a deep underground structure with only partial internal support can maintain its integrity for this long a period. Secondly, failure to seal the shafts as soon as possible simply encourages influx of water to the repository, subverting the careful choice of a formation that otherwise does not allow easy influx. Furthermore, with no backfill of the rooms, the heat-flow patterns will be distorted to conduct more heat downward by means of an increased temperature gradient. These conditions are not truly representative of those that the waste will encounter during the remainder of the period during which fission product heating predominates. Finally, the retrievability period will end at about 1050, at which time our grandchildren must summon the capital to finish the job in proper fashion; it seems more prudent for our generation to complete the project.

In constrast, the unavoidable waste emplacement period of 10 to 15 years should provide satisfactory monitoring of the same aspects of repository behavior as would be revealed by the 50-year period. The early emplacements could be monitored during the decade or so of filling. Because technical flaws in systems design usually cause failure early in life, the 10 to 15 year emplacements should reveal the potential for failure nearly as well as would the 50-year period. The design criterion for the package is a 1000-year life, so that all we can detect is early failure. Emplacement could readily be stopped at any time before filling is completed, and the waste retreived.

To summarize: if "retrievability" is to be provided at the expense of early backfilling and shaft sealing, we suggest that it be deleted from these criteria.

Comment 85: U. S. Department of Energy (18)

Paragraphs 60.111(a)(3) and 60.135 require that the repository be designed so that the option remains open to retrieve the waste for up to 50 years after termination of waste emplacement. The basis for this period of time is not presented. In fact, the meaning of the word "retrievability" is not clear. We certainly agree that a specific time period, during which retrievability or recoverability will have to be maintained, should be specified. "Retrievability" implies that canisters can be retrieved as easily as they were emplaced, whereas "recoverability" implies that waste canisters may be recovered intact although requiring removal of backfilled material to do so. The exact period of time during which retrievability or recoverability should be maintained should not be specified now but should be established only after more information is available on the phenomena of concern. It may very well be that the required period of retrievability will depend upon and vary according to the geologic medium and environment in which a repository will be placed.

We are not sure what the present rule intends concerning backfilling of the rooms. We accept the premise that containers should be placed so that the are recoverable intact. However, the rule should not preclude early backfilling of the repository rooms. We believe that sufficient information is not yet available to specify the exact time at which backfilling of repository passages should take place. Backfilling would provide improved conditions for maintaining operational safety. Also, the lesser amount of waste rock during operation would reduce the environmental impact of any spoils pile on the surface. Maintaining the rooms in an open, ventilated condition for long periods would

amount to storage and would, in effect, pass the responsibility for disposal to future generations. Several initial options exist in approaching backfilling. For example, one option would be to backfill a representative number of rooms after loading them with waste. This would allow a productive monitoring program to begin. After the initial monitoring period, backfilling could be done for all of the rooms as they are filled with waste. Therefore we believe that specific time periods for maintaining retrievability or recoverability should not be specified at this time. Rather, the Commission should consider stating that such specific time periods will be established at the time of repository licensing depending upon the conditions at the proposed site.

The Supplementary Information states that "it might be desirable to postpone any irreversible (or not easily reversible) decisions until the maximum amount of reasonably obtainable information about how well the repository is functioning and can be expected to function and contain and isolate the waste for periods of time required is at hand". However, there is no discussion of how this leads to 50 years after termination of waste emplacement nor is there any discussion of negative aspects of postponing this decision.

Comment 86: Westinghouse Electric Corp. (20)

Retrievability - The time period for retrievability of 50 years after decommissioning seems excessively long. When coupled with up to a 40-year repository operational period, it could require that some mined portions of the repository remain fully operational for 90 years. To design and construct the repository openings for this period of time and to maintain them for this period of time could add very considerable expense to the repository. It would seem appropriate and reasonable to require a shorter retrievability period after start of waste emplacement (10 to 15 years) in which the major concerns about long term effects are reasonably answered and confirmed. After this point in time, going back in for retrieval for having to perform those operations is quite small. It would be better to face the small potential of these costly operations than to require the expensive, very long retrieval period be designed into every repository.

Comment 87: Tauke and Adam (21)

Retrievability. Is is possible to pinpoint a safe date for sealing the repository.

Comment 88: Duke Power Co. (25)

In the discussion on retrievability, the implication is made that one reason for retaining retrievability might be the expectation of future, "improved technologies..., better designs..., operational procedures improved." We strongly suggest the regulations specify that retrievability need be maintained for only that period required for performance checkout. In the case of disposal of spent fuel, further retrievability for resource recovery could be maintained based on an assessment of economic viability, but should not be mandated by regulations.

We have long maintained that the waste ultimately disposed of should be high level waste from reprocessing, rather than spent fuel with its enormous energy content, and we continue to take that position. However, from the standpoint

of the Commission's regulation. We hold that repository designs should be required to incorporate retrievability only to the extent and for the period necessary to obtain meaningful data relating to long term safety of the repository.

Comment 89: Department of Environmental Protection, State of Connecticut (27)

I was pleased to see that priority consideration is being given to retrievability.

Comment 90: Lowenstein, Newman, Reis, Axelrad and Toll (28)

Retrievability of emplaced wastes is specified for a period of time that could be as long as 100 years from the start of repository operations. While it is recognized that a repository site would have to be abandoned whenever critically adverse circumstances might [illegible], the likelihood of such circumstances evolving is vanishingly small. Accordingly, the provision for retrievability for such extensive periods is an excessive and unrealistic requirement. As is recognized in the discussion of this subject in the Advance Notice, such a requirement has a significant undesirable impact on repository design, construction and operation, particularly as it relates to potential occupational radiation exposure of workers in the repository. It also is counter to a rational systems approach and quite conceivably could complicate the use of salt, a generally acceptable repository formation, as a host rock, on a very weak and tenuous basis. In our view, the period of retrievability is more logically and realistically related to the amount of time (likely less than 10 years) during which useful in situ repository performance related information can be acquired. In any case, because of the large potential negative impacts and highly questionable benefits of such a long retrievability requirement, a more convincing rationale would have to be provided to justify any such requirement.

(7) HUMAN INTRUSION PROBLEM

Comment 91: A. E. Wasserbach (7)

Section (7) Human Intrusion Problem. "Simply stated, human intrusion cannot be prevented;" If you canNOT keep humans from intruding, HOW can you possibly guarantee the stability of the geologic formation, or the expected behavior of a repository, or the waste/rock interaction? If humans, subject to will and reason, cannot be controlled, how do you expect a human to be able to control an inanimate rock formation?

High level wastes should be kept, as stated above, in retrievable storage facilities, until a genuine disposal method is found, not a "disposal" that is simply one of "Out of sight, and (hopefully) out of mind". A genuine "disposal" method is one that would render the nuclear wastes completely harmless to man and his environment.

Comment 92: Attorney General Abrams, State of New York (11)

The question is raised whether attempts should be made "to protect future generations from the deliberate intruder." P. 31398 col. 2. The answer, of course, is yes. Future generations should not be exposed to deadly radiation produced by our generation, even if one or more members of future generations act deliberately.

DOE/NE-0007, SUPP. 1

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

IN THE MATTER OF	)	
	)	
PROPOSED RULEMAKING ON THE STORAGE AND DISPOSAL OF NUCLEAR WASTE	)	PR-50,51 (44 FR61372)
	)	
(Waste Confidence Rulemaking)	)	

CROSS-STATEMENT OF THE UNITED STATES DEPARTMENT OF ENERGY

5 September 1980

e these characteristics are in progress. The Department, in its Position tement, presented a summary of these data and tests under various tempera- e and fluid conditions. DOE PS at II-148 to II-149.

One Participant contends that locating existing boreholes has to be considered. NRDC at 56. This contention completely ignores the cedure specifically discussed by the Department in its initial statement ch has been successfully employed at the Los Medanos site in southeastern Mexico (50). DOE PS at II-181.

In summary, the suggestions about the inadequacy of technical ta on sealing of repositories are based on improper assumptions that totally pervious seals are essential to the successful performance of a repository stem. Such suggestions ignore the body of data available from current partment of Energy programs and completely discount the results that are ing obtained from current research programs.

.B.5.3 Retrieval

Several Participants suggest that the Department's Position atement has not adequately addressed possible retrieval of waste from a re- sitory. The State of New York asserts, "A methodology for assuring retriev- ility of the wastes has not been developed." NY PS at 96. New York also scusses potential hazards from retrieval to both the workers and the pub- c. NY PS at 62n. The Department has described a general methodology for trieval in its Position Statement. DOE PS at II-281 to II-283. The Depart- nt is committed to maintaining waste retrievability both to fulfill its own quirement to use a conservative stepwise approach; DOE PS at II-16, Objec- ve 5; and to comply with whatever NRC and EPA regulations may eventually be tablished.

The Department is closely monitoring the NRC and EPA regulation velopment efforts, DOE PS at II-5, and is structuring its program to meet ose agencies' regulations once they are adopted into law. DOE PS at II- 2. Repository and waste package development efforts are consistent with the ntent of the draft NRC retrievability requirements, i.e., maintaining the pability to safely retrieve wastes throughout the operational phase and for

an amount of time thereafter appropriate for the NRC to grant the necessary permission for decommissioning the repository. The issue of what constitutes an appropriate amount of time requires resolution, but does not present an obstacle to the conduct of the NWTS Program as described in the Department's Position Statement. See II.A.7, supra (concerning the use of draft criteria in this proceeding). A specific retrieval procedure will be developed prior to emplacing wastes when the detailed design of the engineering features of both the repository structure and waste package is complete. As noted in the Department's Statement, design features will be provided to allow for retrieval of emplaced canisters throughout the operating phase. DOE PS at II-281.

The nature of retrieval operations makes potential risks to the public extremely low. DOE PS at II-283, Item 5. For example, source terms would be limited by individual canister contents and there would be a low driving force for release of radioactive materials. It will be necessary to design the repository, waste package, handling equipment, and retrieval procedures to protect repository personnel from potential exposure to localized contamination and direct exposure. Such design provisions are within the state of the art, requiring technology and methods presently employed in providing in-plant radiation protection for existing nuclear facilities and those used by the Department to recover radioactive materials, including broken packages (55-57). DOE PS, Refs. II-772 and II-773. Efforts are ongoing to define the requirements for safe retrieval for subsequent implementation in repository design.

(4) Two Participants quote an EPA report; NRDC PS, Ref. 25; which questioned the capability to retrieve because of canister corrosion. NRDC PS at 25, 31-32; MN PS, Abrahamson at 8. The Department discusses the currently applicable waste package requirements in its Position Statement and states, "The waste package must preserve the ability to retrieve the waste safely throughout the required repository demonstration period." DOE PS at II-135. In 1978, when the EPA report was prepared, the waste isolation concept on long-term radionuclide retention was based on the natural system. The canister was intended to contain the wastes during handling and emplacement only, and longlived canisters were not factored into conceptual design studies. The EPA report appropriately evaluated the predominant canister design at the

time. Results of the studies made more recently, which were not considered in the EPA studies, would have led to a different conclusion.

Two Participants address retrieval operations after repository closure. The New England Coalition on Nuclear Pollution states, "DOE should evaluate retrieval from a completely filled repository after a sufficient period of time that temperature and exact location would make retrieval and handling of the fuel a more uncertain operation." NECNP PS at 55. The California Department of Conservation states, " . . . the design of backfill material and penetration seals should allow for safe re-entry, maintaining the integrity of the repository." CDC PS at 22-23. Section II.F.3 of the Department's Position Statement considers the need for retrieval during and at the completion of the operational phase. Waste packages will be designed, at a minimum, to contain the wastes throughout the planned retrieval contingency period (approximately two times the planned duration of the operating phase) in order to facilitate retrieval and reduce operator risks. Once the NRC has authorized isolation and the repository has been sealed, retrieval will continue to be possible at an increased degree of difficulty, cost, and perhaps operator risk. It should be noted that such authorization by the NRC would be indicative of its confidence in the safety of the repository thereby making the need for subsequent retrieval, for safety reasons, highly unlikely. Waste packages will retain a high degree of integrity for a considerable period of time beyond repository closure. For example, the Department's proposed Performance Objective 1 would require containment throughout the period dominated by fission-product decay. DOE PS at II-7. See also II.B.1., supra. Therefore, although retrieval after isolation is not anticipated, the waste package and repository design features will allow retrieval after closure at a higher cost and degree of difficulty. It should be noted that if a decision were made to retrieve waste and to abandon the repository, long-term integrity of the host rock would be unimportant. See DOE PS at II-282.

Two participants contend that salt and shale are unacceptable media if retrievability is a design consideration. NRDC PS at 37; NY PS at 85 to 90 and 98. They base this contention on four considerations:

1. The corrosive effects of salt brine.

2. Possible movement of waste by brine migration.

3. Tendency for canisters to migrate downward in dry salt.

4. Room closure rates.

The first two effects can be avoided by proper design and selection of packaging materials, e.g., use of an absorbent to prevent the brine from contacting the canister. The Department's Statement of Position describes the brine migration phenomenon. DOE PS at II-58 to II-61. It notes that, for a typical emplacement configuration, " . . . the total accumulated influx of brine 1,500 years after emplacement is about 6 liters." DOE PS at II-59.

The waste package system is discussed in the Department's Position Statement. DOE PS at II-129 to II-160. This discussion notes that incursion of fluid is one of the principal phenomena of concern to waste package decision. DOE PS at II-131. It also states, "The waste package will consist of various components, each of which can mitigate the inputs of these phenomena on package performance." DOE PS at II-132.

Movement of waste packages in dry salt has been studied over a wide range of conditions. Although the migration of canisters in dry salt is theoretically possible, the rate of movement is extremely low and inconsequential relative to the ability to retrieve over the several decades when retrieval may be required. For example, one study has shown that the total movement over a period of 150 years would be less than 1 millimeter (58).

The room closure rates for salt and shale repositories could require "supports," as suggested by the State of New York, if it were decided to prevent the rooms from closing. NY PS at 98. On the other hand, the rooms may be backfilled and closed by design, and if retrieval were to become necessary, reopened using conventional mining techniques coupled with radiation protection measures. Either option is within the state of the art. The subject of creep is also discussed in II.B.5.1 of this Cross-Statement.

The State of Wisconsin has stated that the Department of Energy:

> . . . should consider a "worst case" scenario. Reliance on a second repository would be impossible if the first repository would entail or suffer engineering problems prior to the second repository's

> completion. Broad contingency plans need to be developed in order that an established procedure can be implemented to deal with potentially hazardous situations. WN PS, Leverance at 1.

The Department's Position Statement notes:

> . . . waste removed from the repository could be transferred to temporary surface storage rather than to another repository. DOE PS at II-283.

Also, as previously noted,

> . . . Retrieval probably will not be based on an immediate threat to the repository, but rather loss of confidence in long-term containment. DOE PS at II-282.

The Department is committed to following a careful step-wise approach in developing, designing, and operating waste disposal systems. Retrievability is a planned contingency provided in implementation of that approach. DOE PS at II-23. Detailed retrievability plans must, of necessity, be addressed on a site-specific, design-specific basis. However, the Department in its Position Statement, DOE PS at II-281, and in this Cross-Statement affirms its commitment to maintain waste retrivability throughout the operating phase. Both the material and technical requirements for a safe retrieval system can be provided using current technology. No Participant has raised a substantative retrievability issue precluding a finding of confidence in this proceeding.

II.B.5.4 Reclamation of Site/Decommissioning

The State of Wisconsin raises concerns regarding the reclamation of a repository site and particularly of surface disturbances. WN PS, Mudrey at 5. Dr. Mudrey questions the fate of a shaft sunk at a site which is later abandoned, and he also expresses concern about the disposition of rock tailings. Id. All sites investigated or utilized by the Department will be restored. This includes backfilling shafts, removing or stabilizing waste rock in a manner which meets applicable Department, EPA, NRC, and NEPA requirements, and restoring vegetative cover, as appropriate. See DOE PS at II-284 to II-285.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter	:	
of	:	PR-50, 51 (44 F.R. 61372)
Proposed Rulemaking on Storage and Disposal of Nuclear Waste, 10 CFR Parts 50 and 51 (Waste Confidence Rulemaking)	:	

STATEMENT OF POSITION OF ROBERT ABRAMS, ATTORNEY GENERAL OF THE STATE OF NEW YORK

ROBERT ABRAMS
Attorney General of the
State of New York
2 World Trade Center
New York, New York 10047
(212) 488-3474
(212) 488-7565

MARCIA J. CLEVELAND
JOHN W. CORWIN
EZRA I. BIALIK
Assistant Attorneys General

The experience with Salt Vault demonstrates that *in situ* testing must continue for many years, including at least the period of waste emplacement and the retrievability period, so that technical problems with the site can be detected. If such problems do materialize, it could be necessary to remove some or all of the wastes already emplaced and move them to other repositories. Therefore, it is necessary to have additional repositories available for such contingencies. (See above, p. 18, footnote). It is consequently necessary that for each repository ultimately needed, several must be selected for *in situ* testing. As a dozen or more repositories will be needed, several dozen candidate sites will have to be tested.*

* Unfortunately, retrieval of the wastes in case a repository proves unsuitable is itself hazardous, to both the workers and the public. For example, as NRC staff has pointed out, canisters may be corroded, damaged or stuck, creating a risk of exposure to retrival workers. Overcoring could result in radioactive dust to which workers would be exposed. In addition, retrieval creates a risk of escape of radionuclides to the biosphere if the integrity of seals separating main airways from storage rooms has not been maintained. (Ref. 7, pp. 3-14, 3-15).

threatening mine stability; salt is adversely affected by heat; salt is vulnerable to fractures; and disposal of mined salt poses an environmental hazard. Salt also carries with it the potential dangers of "focusing" and breccia pipes. Each of these liabilities of salt is briefly described below.

First, salt is highly soluble in water (Ref. 2, p. 7.2.4; Ref. 1, p. 3.1.32). This solubility constitutes a serious defect for several reasons. As DOE has acknowledged, "trapped brine can be released with considerable energy when heated and can fracture the rock." (Ref. 2, p. 7.2.18). "The protective metal canisters and sleeves will certainly degrade quickly in the strong brine environment, and leaching of the wastes will be enhanced." (Ref. 4, p. 5). Interstitial brine is known to reduce the mechanical strength of the salt. (Id.) Also, as DOE recognizes, brine tends to migrate towards heat sources, such as radioactive waste (Statement, pp. II-175, II-252; see also Ref. 8, p. 11); migration in volume "is likely to be deleterious and must be accounted for when considering long-term isolation." (Ref. 11, p. 65). Brine can also be expected to decrease the sorptive properties of the salt (Ref. 15, p. 45); "the capacity of the salt to fix or adsorb the nuclides from the waste in insoluble form is apparently low." (Ref. 4, p. 5).

Solubility affects mine operations and retrievability of the wastes. As USGS has said:

> If relatively small amounts of brine can cause substantial decrease of me-

> chanical strength and possible movement of waste during a relatively short time, special efforts will surely be necessary to insure retrievability from a salt repository for periods as short as 10-25 years. The question of whether the workings of a mine in salt can be predicted to stay dry will have to be faced.

(Ref. 4, p. 12).

Second, as DOE recognizes, salt creeps. Creep is the viscous flow of the medium under constant stress. Creep occurs in three stages. The first stage is short and occurs at the time of initial stress. Then there is a longer "steady state creep," during which there is a gradual increase in stress. Most important is the third stage, which lasts less than a day and leads rapidly to failure. (Ref. 2, p. 7.2.15). Thus, a salt formation can collapse literally overnight

Experiments in the laboratory have yielded empirical equations to describe the creep behavior of salt. However, as DOE has admitted:

> These equations are complex and no agreement has been reached as to which is the best one. The important point, however, is that salt does creep and a repository cannot be rationally designed unless the creep behavior under the appropriate conditions of pressure and temperature is properly understood.

(Id.) (emphasis supplied).

Third, the physical behavior of salt is "drastically affected by temperature." (Ref. 2, p. 7.2.18). The heat emitted by the wastes "may cause complex mechanical and chemical changes. Increased temperatures in salt would further decrease mechanical strength of the salt-brine mixtures... and would increase the creep rate of dry salt." (Ref. 4, p. 6).

Fourth, as NRC staff has observed, while it is often claimed that salt's plastic properties tend to heal any opening, it "may not be realistic to depend on this 'self-healing behavior' to produce an impermeable seal around the repository.... Water under great pressure "could keep [thermally or mechanically induced] fractures open and increase the dimensions of the fractures as a result of the flow." (Ref. 7, p. 3-29).

Fifth, bedded salt may be plagued by the presence of vertical structures known as breccia pipes, which extend vertically through several geologic strata. If such a pipe is permeable, and near a proposed repository site, it "could provide a shortened path to the biosphere... [and] provide a sufficient reason to preclude construction of a repository." (Ref. 11, pp. 66-67).

Sixth, in a dry salt dome the canisters containing the waste "would tend to migrate downward," perhaps complicating future attempts to retrieve. (Ref. 5, p. 20). It is not known whether the sinking would "focus" the canisters -- i.e., draw them closer together. If so, the

result could be further sinking and focusing, producing very high temperatures Id. If this occurred, the thermal loading criteria limiting the density of waste in each repository could be violated. These questions still need to be answered.*

Because of the many problems listed above, a salt formation may become unstable after placement of high-level waste (Ref. 16, p. 17), or the waste containment could be breached (Ref. 1, p. 3.1.32; Ref. 7, p. 3-9). More information is needed to determine whether the potential danger of a salt repository failure can be avoided. The rate and extent of waste dissolution in brine are unknown. (Ref. 11, p. 65). "How ion exchange rate, reaction to radioactivity, and other associated potential chemical reactions of salt deposits and related rock type affect isolation are not adequately understood at present." (Ref. 2, p. 7.2.4). These potential chemical reactions include explosion of unstable species formed by radiolysis; formation of explosive hydrogen-oxygen mixtures near the waste or in an unventilated storage room; and formation of volatile chemical compounds from the combination of fission products and brine (Ref. 9, Vol. 7, p. 2-5). All of these "potentially significant topics" should be investigated more extensively (Id). The "most

* In addition, salt formations are located in areas where oil and gas are frequently found, but hydrogen sulfide, a deadly gas, is often found near oil and gas. This poses problems to waste repository operations. (Ref. 16, p. 17).

crucial aspect of the development of predictive capability is the appropriate selection of a law describing material behavior," yet:

> For materials such as salt which exhibit time-dependent deformation and strength characteristics, no one type of model has been accepted as adequate by all workers in the field of rock mechanics. Depository structural stability is highly dependent upon these time-dependent material characteristics of the material.

(Ref. 9, Vol. 4, p. 4-29; emphasis in original). In particular, a satisfactory method of measuring the stress state around an opening to the mine is unknown at this time. (Id., p. 4-22). Moreover, room closure rates may be high in an unsupported salt repository. The cost of engineered support depends on the room closure rate, which is "an unresolved technical issue." (Ref. 1, p. 3.1.31).

Finally, of course, in situ trial excavations and monitoring are essential prerequisites to final repository design. (Ref. 9, Vol. 7, p. 2-6; See also id., Vol. 4, p. 7-14). The problems raised by in situ testing have been described above at pp. 63-64.

In addition to all the problems with a salt repository per se, significant environmental issues affecting plant life and soil productivity are presented by the more than 30 million tons of mined salt which will be removed and

placed on the surface above a single repository. (Ref. 1, pp. 3.1.41; 3.1.226). "Mitigating procedures would be needed to reduce salt dispersal at least two orders of magnitude to ensure that emission concentrations are well below toxic levels.... The potential also exists for salt deposited as dust on the land to be transported by run-off to nearby surface waters," which could receive "amounts of salt sufficient to damage indigenous aquatic plants and animals". (Ref. 1, p. 3.1.121). Loss of vegetation because of the effects of salt "would reduce cover and food supplies for mammals and birds and result in their displacement or elimination." (Id.).

(b) Shale

Numerous drawbacks to the designation of shale repositories have been identified. Considerable water is to be found in shale deposits. (Ref. 5, p. 9.). As DOE acknowledges, heating and subsequent dewatering in shales can produce fractures. (Statement, p. II-175). Shales are subject to "slaking," which is deterioration and loss in strength due to drying and wetting. (Ref. 1, p. 3.1.30). The mining process itself would be difficult. (Ref. 11, p. 74). Shale is believed to weaken and become more ductile with increased temperature. (Ref. 2, p. 7.2.23). Swelling clays resulting from the presence of water can create pressures great enough to cause buckling of steel supports. (Id.) Shales are susceptible to mineralogical alterations which could weaken the physical structure and promote cracking and disintegration at the pressures anticipated in

4. Non-Destructive Excavation Technology Has Not Been Developed.

The first step in actually building a repository will be to excavate the site. Like in situ testing (see above, p. 63), however, excavation itself will produce fractures which could breach the integrity of the site and render it unsuitable for use as a repository. NRC staff has said that the mining process will fracture the rock and create a series of joints near the excavation point, and is likely to increase hydraulic conductivity of the rock mass. (Ref. 7, pp. 3-23, 3-25). NRC staff has also said that the effect of the excavation process on "the important and complex problem of groundwater mass transport" and, more generally, on long-term repository performance, needs to be addressed (Id., p. 3-25). DOE acknowledges that fracturing "must be considered," and that fracturing, if extensive, "may provide a potential pathway for groundwater." (Statement, p. II-161). A symposium of DOE's National Waste Terminal Storage Program observed that the permeability of fractures and of the overall rock mass is "extremely important," yet techniques for minimizing damage to the host rock during excavation are "poorly developed". (Ref. 15, p. 109).

5. A Methodology For Assuring Retrievability Of The Wastes Has Not Been Developed.

DOE has identified many important reasons requiring that wastes be placed in the repositories in a way which assures

their retrievability: (1) to provide a period for observing waste-rock interactions and repository operations (Ref. 2, p. 1.5.5); (2) to allow examination of the entire host rock formation before the wastes become irretrievable (id.); (3) to allow removal of wastes "if tests and acquired data show that a sufficient degree of confidence could not be provided" (Statement, p. II-281); (4) to correct defective waste packages which have already been emplaced (id.); and (5) to allow relocation of wastes if a portion of a repository were found to be unsuitable (id.).

DOE states that retrievability is needed throughout the operating phase of a repository. (Statement, p. II-281). Because selection and construction of repositories constitute "a new human enterprise," says NRC staff, it is "reasonable to expect that, whatever the care exercised and however advanced the techniques, mistakes will occur..." 45 Fed. Reg. 31398 (May 13, 1980). Accordingly, proposed NRC regulations would require DOE to design each repository "so that the radioactive waste stored there can be retrieved for a period of 50 years after termination of waste emplacement operations, if the geologic repository operations area has not been decommissioned." (Id at 31400; see also Ref. 9, Vol. 4, p. C-3).

No final decision has been made as to how many years' retrievability is necessary, and thus the extent of the capability which must be developed is unknown. Yet, serious problems have been identified, at least for salt and shale. NRC staff believes that maintaining retrievability in salt is "questionable", even for five years:

> There is significant evidence that salt rock behavior under thermal and mechanical stress is such that rapid closure rates can be expected. It may be impossible to maintain integrity of seals under such closure rates.

(Ref. 7, pp. 3-9, 3-15). And a repository in shale would entail "massive support requirements" to keep all corridors and storage rooms open and maintain retrievability. (Id., p. 3-15). Another unresolved technical problem with retrievability is that as long as the rooms and passages of the repository remain open, flooding is possible. (Ref. 12 , p. 83).

The IRG has found that:

> Further definition of the retrievability concept, the circumstances in which waste would be retrieved, and the technical aspects (including development of waste packaging, containers and handling) is necessary.

(Ref. 10, p. 62). (emphasis in original).

6. Adequate Sealing Methods Have Not Been Developed.

DOE recognizes that "repository seals must retain their integrity for much longer periods of time than those

UNITED STATES OF AMERICA

BEFORE THE NUCLEAR REGULATORY COMMISSION

In the Matter of	
PROPOSED RULEMAKING ON THE STORAGE AND DISPOSAL OF NUCLEAR WASTE	PR-50,51 (44 FR 61372)
(Waste Confidence Rulemaking)	

STATEMENT OF POSITION

OF THE

NEW ENGLAND COALITION ON NUCLEAR POLLUTION

- Inadequate Consideration of Retrieval

The DOE Statement of Position contains a description of waste implacement and retrieval considerations. 31/ Three retrieval cases have been considered. The most difficult retrieval case considers the retrieval of waste and abandonment of the repository that could be required if tests and acquired data show that a sufficient degree of confidence (of long-term acceptability) could not be provided. 32/

Unfortunately, this retrieval case is assumed to occur near the end of the repository operational phase and thus is not the worst case since all of the repository would not have been backfilled and facilities and experienced personnel would still be in place. DOE should evaluate retrieval from a completely filled repository after a sufficient period of time that temperature and exact location would make retrieval and handling of the fuel a more uncertain operation. This would then be followed by surface handling of the fuel, presumably in water-filled storage pools, trans-shipment, etc.

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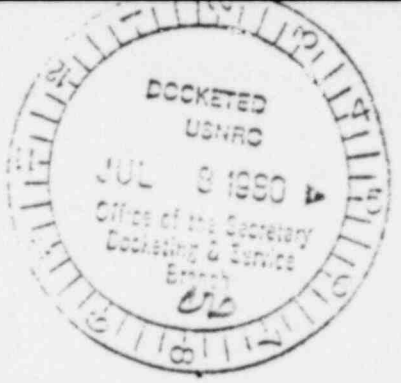

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

IN THE MATTER OF	)	
PROPOSED RULEMAKING ON THE STORAGE AND DISPOSAL OF NUCLEAR WASTE	)	PR-50, 51 (44 F.R. 61372)
(Waste Confidence Rulemaking)	)	

STATEMENT OF POSITION
OF THE
STATE OF MINNESOTA

I. INTRODUCTION

The State of Minnesota by its Minnesota Pollution Control Agency ("MPCA") and its Attorney General hereby files its Statement of Position in the above-captioned proceeding. This Statement of Position is filed pursuant to the Order issued by the Presiding Officer on May 29, 1980, in which July 7, 1980, was established as the date upon which all participants were required to file their Statements of Position.

II. IDENTITY AND INTEREST

The MPCA is an agency of the State of Minnesota. It is comprised of a nine-member citizen board appointed by the Governor. Its staff of 320 persons is headed by an Executive Director. It is charged with regulatory responsibilities in the environmental areas of air quality, water quality, solid and hazardous waste, and noise pollution. As such, the two nuclear power plants located in Minnesota, Northern States Power Company's Monticello and Prairie Island nuclear generating plants, are subject to MPCA regulation for all non-radioactive discharges and for all radioactive air emissions.

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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

Dean Abrahamson, M.D., Ph.D.
Professor of Public Affairs
Humphrey Institute of Public Affairs
University of Minnesota
Minneapolis, MN 55455

2 July 1980

"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 is 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 forseeable 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 reposity 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:

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

IN THE MATTER OF	)	
	)	
PROPOSED RULEMAKING ON	)	
THE STORAGE OF DISPOSAL	)	PR-50,51
OF NUCLEAR WASTE	)	(44FR61372)
	)	
	)	
(Waste Confidence Rulemaking)	)	

STATEMENT OF POSITION
OF THE
NATURAL RESOURCES DEFENSE COUNCIL

7 July 1980

Finally, in March 1979, a federal interagency review group prepared a comprehensive report for submission to the President, reviewing the nuclear waste disposal program and recommending changes to improve it. The final report, entitled Report to the President by the Interagency Review Group on Nuclear Waste Management,[17] stated:

> [T]he management of radioactive wastes for the past three decades can be characterized by inadequate integration of waste management R&D [research and development] efforts. . .caused in part by inadequate perceptions of the additional technological and scientific capabilities needed to develop an acceptable disposal program . . ..

The federal government has now begun again the search for a geological formation that might serve as a permanent waste repository. In addition to the unresolved technical problems, serious political and social resistance to the siting of a disposal facility continues to mount throughout the country. Against the backdrop of past mistakes, abandoned programs and growing political opposition, there is substantial question whether the federal government ever will develop and implement a safe method for the permanent disposal of radioactive wastes.

Confidence in DOE's program must be judged in light of its past efforts, for they illustrate the agency's commitment to the task, its organizational ability and its perception of the obstacles to implementation. DOE has made little real progress towards its goal of a safe, readily implemented waste disposal method. The issues facing the agency today are

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17/ TID-29442 (March 1978).

them can or will be met at the same site. Instead the DOE program is geared to vague and flexible "objectives." As examples, the NRC requirements for retrievability, containment of fission products, and prevention of human intrusion are examined in detail.

a. Retrievability - The NRC draft repository performance criteria include the requirement that

> The Department of Energy . . . 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.

There is no evidence in the DOE program that 50 year retrievability can be accomplished. The 1978 ad hoc EPA review panel concluded that:

> 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. 24/

> 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. . .25/

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

24/ EPA/520/4-78-004, op cit., p. 3.

25/ Id., p. 43.

> It is unlikely . . . 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. 26/

Even if there were evidence from which to conclude that 50 year retrievability was possible, i.e., could be accomplished, there is nothing to indicate that DOE will provide for it. DOE does not appear to take seriously the NRC requirement on the need for retrievability. Retrievability is discussed in only the most general way in the Statement of Position, and DOE dismisses it by stating:

> Both limited and total retrieval are unlikely events, the latter being least likely. 27/

DOE has presented no evidence that it can and will meet the NRC retrievability criterion. Without confidence in this component of DOE's program, the NRC has insufficient assurance of the achievement of a safe disposal plan.

b. Containment of all fission products - The NRC draft criteria require

> containment of all radionuclides [within the waste package] for the first 1,000 years after decommissioning of the geologic repository operations. . .

There is no evidence that the DOE programs can or will meet this criteria. In fact, DOE's program "objectives" are fundamentally at variance with this proposed requirement. The DOE objectives call only for containment to be "virtually complete during the period when radiation and thermal output

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26/ Id., p. 44.

27/ DOE Statement of Position, p. II-283.

else identified a host rock unit of adequate volume and appropriate depth that also meets NRC draft technical criteria.

1. Salt

Draft NRC waste disposal criteria appear to rule out the use of salt as a host medium for a high-level nuclear waste repository. Salt has been, is, and will continue to be a valuable resource. It is often associated with other valuable resources, e.g., oil, gas, and potash. Mining of salt and exploration of other resources in and near salt deposits has occurred, and will continue to occur, probably at an accelerated rate. Thus salt can be eliminated generically under NRC criteria designed to avoid siting of repositories in areas where human activities could adversely affect the stability of the site, increase the migration of radionuclides from the repository, or provide pathways to the accessible environment.

Salt is plastic and highly corrosive. Consequently, salt also appears to be eliminated generically on the basis of the need to assure retrievability for a period of 50 years after termination of waste emplacement operations. Finally, because of the human intrusion problem, the corrosive nature of brine and its migration, salt appears to be eliminated on the basis of overall performance of the engineered system, that is, the ability to provide for total containment for 1,000 years and an annual release rate of one part in 10^5 of the total activity thereafter.

Clearly, the NRC does not have assurance now, on the basis of what is known about salt, that a repository can be built in