



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

October 25, 1978

OFFICE OF THE
SECRETARY

MEMORANDUM FOR: Chairman Hendrie
Commissioner Gilinsky
Commissioner Kennedy
Commissioner Bradford
Commissioner Ahearne

FROM: Samuel J. Chilk, Secretary

SUBJECT: SECY-78-366B - EDITED POLICY
STATEMENT FROM SECY-78-366
(CONSENT CALENDAR ITEM)

Attached is the revised Federal Register Notice and Enclosure 2 from the subject paper, which will be presented for affirmation on Thursday, October 26.

Attachment:
As stated

CC:
Acting General Counsel
Director, Policy Evaluation

LICENSING PROCEDURES FOR GEOLOGIC REPOSITORIES
FOR HIGH-LEVEL RADIOACTIVE WASTES

Proposed General Statement of Policy

AGENCY: U.S. Nuclear Regulatory Commission

ACTION: Proposed General Statement of Policy

SUMMARY: The U.S. Nuclear Regulatory Commission (NRC) has under consideration the following proposed policy statement regarding establishment of procedures for licensing geologic high-level waste repositories to be constructed and operated by the U.S. Department of Energy (DOE). This NRC policy statement is intended to inform DOE, interested States and members of the public of the procedures with which DOE will be required to comply to receive a license to construct and operate a repository. The policy, as finally adopted, may be codified as part of the Commission's regulations.

DATE: Comments are due on or before (insert date 60 days after publication in the Federal Register).

ADDRESSES: Send comments and suggestions to: Secretary of the Commission, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, Attention: Docketing and Service Branch. Copies of comments may be examined in the: U.S. Nuclear Regulatory Commission Public Document Room, 1717 H Street, N.W., Washington, D.C.

FOR FURTHER INFORMATION CONTACT: James C. Malaro, Chief, High-Level and Transuranic Waste Branch, Division of Fuel Cycle and Material Safety, U. S. Nuclear Regulatory Commission, Washington, D. C. 20555.

SUPPLEMENTAL INFORMATION:

The Commission is considering the procedures to be used in the licensing of high-level waste repositories, and believes that it would be useful to solicit the views of interested persons prior to making any final decision. Accordingly, the Commission is publishing for comment the Proposed General Statement of Policy on high-level radioactive waste repository licensing procedures set forth below. The Proposed General Statement of Policy could also be used by DOE for interim planning purposes pending a final Commission decision on repository licensing procedures.

Under present statute, it is not clear whether NRC would have licensing authority over DOE's planned Waste Isolation Pilot Plant (WIPP) proposed to be located at Carlsbad, New Mexico. However, if the WIPP facility is subject to NRC licensing, NRC expects to apply these procedures in the licensing review.

NRC licensing authority over DOE waste management activities is derived from Section 202(3) and 202(4) of the Energy Reorganization Act of 1974. These sections confine NRC licensing authority over DOE waste management activities to certain DOE facilities for receipt and storage of high level radioactive waste. If WIPP is to be used exclusively for disposal of transuranic wastes from the defense program and 1,000 commercial spent fuel rod assemblies, then WIPP might not be licenseable. While the 1,000 commercial

spent fuel rod assemblies would be "high level radioactive waste,"* the transuranic wastes would not be, and the facility would not be "primarily" for receipt and storage of "high level radioactive wastes" (Section 202(3) of the Energy Reorganization Act). If WIPP is to be used for disposal of defense program high level wastes, then it would be licenseable under Section 202(4) of the Act provided it was not "used for, or...part of, research and development activities." It is possible that, depending upon the exact program proposed by DOE, WIPP could be regarded as a research and development facility exempt from licensing.

* Even though spent fuel which is to be disposed of in a geologic repository may have some resource value, it contains radioactive waste. Thus, it is clearly a "high level" radioactive waste because it contains all the toxic and long-lived radionuclides contained in the liquid wastes from reprocessing that have traditionally been regarded as a form of high level radioactive waste.

Proposed General Statement of Policy--
Licensing Procedures for Geologic Repositories
For High-Level Radioactive Waste

Introduction

The U.S. Nuclear Regulatory Commission ("NRC" or "Commission") is vested with licensing authority over certain DOE high-level radioactive waste repositories by Sections 202(3) and 202(4) of the Energy Reorganization Act of 1974. These sections refer to:

- (3) Facilities used primarily for the receipt and storage of high-level radioactive wastes resulting from activities licensed under such Act (Atomic Energy Act).
- (4) Retrievable Surface Storage Facilities and other facilities authorized for the express purpose of subsequent long-term storage of high-level radioactive waste generated by the Administration, which are not used for, or are part of, research and development activities.

Under the Energy Reorganization Act of 1974, as amended, and the Atomic Energy Act of 1954, as amended, such repositories would not be licensed as "production" or "utilization" facilities. Rather, they would be licensed under those provisions of the Atomic Energy Act dealing with receipt and possession of "byproduct" and "special nuclear" materials. However, the Commission has authority under the Atomic Energy Act to fashion procedures for licensing of byproduct and special nuclear materials that are tailored to the kinds of activities being authorized and the

potential hazards involved. For example, although a license for possession and use of plutonium in a sealed calibration source and a license for possession and use of plutonium for purposes of processing and fuel fabrication are both special nuclear materials licenses, the former license may be issued after a single review (and indeed may even be generally licensed without the need for filing and review of a specific license application--see 10 CFR §70.19), while the latter license may only be issued after a review process resembling in many respects the two-step licensing review provided in the Atomic Energy Act for production and utilization facilities (see 10 CFR §§70.22[f] and 70.23[b]).

In fashioning the procedures which follow, several unique features of geologic high-level waste repositories were carefully considered. For such a repository, the suitability of the site becomes crucial, for the integrity of the site itself is essential to assure containment of the radioactive materials. Thus, sound policy suggests that the Commission be afforded the opportunity to participate in DOE's site selection process, though--considering the tentative character of the activities involved--only in an informal advisory capacity. Also, for such an application, construction of a repository shaft would constitute the first major penetration of the geologic containment. If improperly constructed or sealed, it could impair the ability of the geologic containment to isolate wastes over long periods of time. At the same time, construction of this shaft is expected to dispell some of the uncertainties in the accuracy of data necessary for design of the underground repository. Thus, while a

safety review prior to sinking of a shaft would be appropriate, the scope of review and the findings required need to take into account the possibility that only limited data may be available. Further, there should be a formal safety review of the main repository design features before substantial commitments are made and alterations become impracticable to implement. Finally, the Commission believes that it should examine the methods of construction and any new information that may have been developed during construction before formally authorizing receipt and storage of radioactive materials at the repository.

If a repository is subject to the NRC licensing authority, the entire repository will be subjected to licensing review, including those activities which by themselves might not be within the scope of NRC responsibility. This comprehensive review will be necessary because loss of integrity in any part of a repository could imperil the integrity of the entire repository.

The Commission believes it should prepare an environmental impact statement pursuant to Section 102(2)(C) of the National Environmental Policy Act of 1969 ("NEPA") prior to authorizing construction of the main repository shaft. This statement could be updated prior to receipt and storage of radioactive materials at the repository should new information warrant.

Early Notification to States and Other Interested Parties

In order to provide opportunity for early input from States and other interested parties, the Commission would, upon receipt of a DOE license application or request for an informal early site review, (1) publish in the Federal Register a notice of such receipt (2) make a copy of the application or request available at the Public Document Room, and (3) transmit copies of such request to the Governor of the State and to the Chief Executive of the municipality in which the repository is tentatively planned to be located and to the Governors of any contiguous States. Also, the staff would offer to meet with State and local officials to provide them with information about the Commission's review and to explore the possibilities of State and local participation in the Commission licensing process.

Licensing Procedures

The proposed repository licensing procedures are divided into four parts: review of DOE site selection, review of repository development, repository licensing, and repository closure.

1. Review of DOE Site Selection

There would be informal NRC staff comments to DOE on site suitability matters after DOE's site selection. Such informal consultation, which might take the form of written NRC staff comments supplemented by one or more open meetings between the two agency staffs, would enable the NRC staff to point out those aspects of a location which in its judgement might require special attention or present special problems,

and would help to define the kinds of information that might be needed for the Commission to make licensing decisions.

As indicated, the interaction between NRC staff and DOE at this early stage would be consultive in nature. That is, NRC staff may provide comments and advice, but the Commission will neither make formal findings nor take other formal action. DOE would remain at liberty to come forward later with any license application that it believed would conform to Commission requirements, and the Commission would be free, as the evidence might warrant, to formally approve or disapprove the application.

2. Review of Repository Development

The formal Commission licensing review process would begin with the filing of an application for a license by DOE prior to commencement of construction of a repository shaft. The application would be docketed for review after a preliminary review for completeness, notice of the application would be published in the Federal Register offering an opportunity for interested persons to intervene and request a hearing, and a public announcement would be issued.

The application would include information on site suitability and repository design features important to safety. An environmental report prepared by DOE addressing the matters set forth in Section 102(2)(C) of NEPA would be submitted with or prior to the application.

It is probable that some information necessary to make a definitive finding of the repository's safety will not then be available. Nevertheless, the Commission* could authorize construction of the repository upon completion of a review of all NEPA, safety, and common defense and security issues, and upon finding (1) after considering reasonable alternatives that the benefits of the proposal exceed the costs under NEPA, and (2) that there is reasonable assurance that the types and amounts of wastes described in the application can be stored in a repository of the design proposed without unreasonable risk to the health and safety of the public or being inimical to the common defense and security. Construction would commence with the sinking of the main repository shaft. In the alternative, where insufficient information is available prior to shaft sinking to permit the Commission to make the complete findings set forth above, on request by DOE or on the Commission's own initiative, the Commission could allow the safety review to be conducted in two phases. Construction of the shaft could commence upon finding (1) after considering reasonable alternatives, that the benefits of the proposal exceed the costs under NEPA, and (2) that there is reasonable assurance that: (a) the site

* For hearings granted on an application, the Commission expects, as in a nuclear power reactor licensing proceeding, to designate an Atomic Safety and Licensing Board to hear and initially decide the contested issues. As in any licensing case, it would be possible for the Board to render partial decisions on several discrete issues, such as NEPA issues.

is suitable for a repository within which high-level wastes of the kinds and quantities described in the application can be stored without unreasonable risk to the health and safety of the public or being inimical to the common defense and security, and (b) the plans for construction of the main shaft and related structures can be implemented in a manner compatible with the use of the site for a repository. The full findings set forth previously would, then, have to be made before the start of construction of surface and underground structures. Safety issues that could not be resolved based upon the available information might be deferred until the repository operating license review provided that:

(1) an adequate program has been developed to resolve the issue prior to that time, and (2) there is reasonable assurance that the issue can be resolved in a favorable manner at the later date. ~~{The Commission requests public comments on this possible course of action}~~

The NEPA environmental review would address, to the extent possible based on available information, environmental impacts and alternatives associated directly or indirectly with siting, construction, and operation of the repository. Any hearing held upon request of an interested person would be conducted in accordance with subpart G of 10 CFR Part 2.

The applicant will be required to report to the NRC, during the course of construction, any site characterization data obtained which are not

within the predicted limits upon which the repository design was based. Also, it would be required to report deficiencies in design and construction which, if uncorrected, could have a significant adverse effect upon the safety of the repository at any future time.

3a. Repository Licensing

Prior to receipt of any radioactive material at the repository, DOE will need to file an updated license application with the Commission. The license authorizing actual receipt and storage of radioactive materials would be issued after the Commission has conducted a final review of health and safety and common defense and security issues in the light of (1) any additional geologic, hydrologic, and other data obtained during construction; (2) conformance of construction of repository structures, systems, and components with the earlier received design; (3) results of research programs carried out to resolve questions identified during prior reviews; (4) plans for start up and routine operations; and (5) plans for identifying and responding to any unanticipated releases of radioactive material from the repository. Issuance of a license will require a definitive finding under the Atomic Energy Act that the receipt, possession, and use of the special nuclear and byproduct materials at the repository will not constitute unreasonable risk to the health and safety of the public or be inimical to the common defense and security. If warranted by new information which the staff judges could materially alter the NEPA cost-benefit balance, the earlier environmental impact

statement will be updated. Also, if requested by a person whose interest may be affected, a hearing in accordance with subpart G of 10 CFR Part 2 would be held prior to license issuance.

3b. License Amendment (As Needed)

If special restrictions such as retrievability or a limit on amounts or types of wastes have been imposed in the license, an amendment will be required prior to committing waste to irretrievable disposal or prior to the receipt of additional waste. It is anticipated that the required review procedures and findings will be similar to those described above for initial licensing, taking into account additional information obtained during the retrievable storage phase or during operation with limited inventory.

DOE will be required to conduct and monitor its operators, to keep records, and to submit routine and special reports, in accordance with Commission regulations and orders. All operations will be subject to such continuing NRC inspection activities as may be found to be appropriate.

4. Review of Repository Closure

After the repository has been developed and filled to maximum capacity but prior to final closure of the underground excavations and shafts and the decommissioning of surface facilities, an NRC review and approval will be required of the licensee's proposed program for compliance with regulations governing sealing of the

underground repository, decommissioning of surface facilities,
storage of permanent records, and long-term monitoring.
Following completion of the review, a change in license status
may be warranted.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Samuel J. Chilk
Secretary of the Commission

Dated at Washington, D. C. this
 day of , 1978

ENCLOSURE 2

NRC ISSUES PROPOSED POLICY STATEMENT
ON PROCEDURES FOR REVIEWING WASTE REPOSITORY APPLICATIONS

The Nuclear Regulatory Commission has issued a proposed policy statement on procedures for reviewing a possible application from the Department of Energy (DOE) for a license for a high-level nuclear waste repository.

The policy statement is being issued in proposed rather than final form so that the Commission can obtain the views of interested parties and the public before making a final decision as to the procedures that will be followed in reviewing the application. The proposed statement may also be used by DOE for interim planning purposes until a final statement is issued.

The proposed repository licensing procedures are divided into four steps:

(1) NRC and DOE staff members would consult informally on site suitability matters after DOE selected a site for the repository. (No application for a license would be before NRC at this point, and NRC would not give any formal approvals.)

(2) When DOE submits an application for a license, NRC staff would conduct a formal safety and environmental review and would prepare an environmental impact statement. Notice of receipt of the application would be published in the Federal Register, and interested persons would be offered an opportunity to intervene and request that a public hearing be held. If the Commission made a satisfactory finding with regard to the effects on the public health and safety and the environment from

constructing and operating the repository, and if it found that the repository would not be inimical to the common defense and security, it would authorize sinking of the main repository shaft and construction of surface and underground structures.

(3) NRC staff would conduct another formal safety review and make any necessary updates to the environmental impact statement before the Commission could authorize DOE to receive waste for storage in the facility. Interested parties would again be given an opportunity to request a hearing before the license was issued.

(4) After the repository had been developed and its capacity filled, but prior to its final closing and decommissioning, NRC staff would conduct a review and, if appropriate, the Commission could approve the closing and appropriately change the status of the license.

Interested persons are invited to submit written comments on the proposed policy statement by _____ to the Secretary of the Commission, U. S. Nuclear Regulatory Commission, Washington, D. C. 20555, Attention: Docketing and Service Section.

After considering the comments received, the Commission expects to either publish the policy statement in final form or issue proposed rules on the waste repository review procedures.

Part 60
Procedure

NUCLEAR REGULATORY COMMISSION

ORIGINAL

COMMISSION MEETING

In the Matter of: DISCUSSION AND VOTE ON SECY-81-48 -
FINAL RULE TO 10 CFR PART 60 -
DISPOSAL OF HIGH-LEVEL RADIOACTIVE
WASTES IN GEOLOGIC REPOSITORIES -
LICENSING PROCEDURES

DATE: January 26, 1981 PAGES: 1 - 82

AT: Washington, D. C.

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

DISCUSSION & VOTE ON SECY-81-48 -
FINAL RULE TO 10 CFR PART 60 -
DISPOSAL OF HIGH-LEVEL RADIOACTIVE WASTES IN GEOLOGIC
REPOSITORIES - LICENSING PROCEDURES

Nuclear Regulatory Commission
Room 1130
1717 H Street, N. W.
Washington, D. C.

Monday, January 26, 1981

The Commission met, pursuant to notice, at

2:05 p.m.

BEFORE:

- JOHN F. AHEARNE, Chairman of the Commission
- JOSEPH HENDRIE, Commissioner
- VICTOR GILINSKY, Commissioner
- PETER A. BRADFORD, Commissioner

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STAFF PRESENT:

- L. BICKWIT
- W. DIRCKS
- S. CHILKS
- D. EISENHUT
- J. DAVIS
- J. MARTIN
- P. CONELLA
- M. KENNEKE
- M. CUNNINGHAM

DISCLAIMER

This is an unofficial transcript of a meeting of the United States Nuclear Regulatory Commission held on January 26, 1981 in the Commission's offices at 1717 E Street, N. W., Washington, D. C. The meeting was open to public attendance and observation. This transcript has not been reviewed, corrected, or edited, and it may contain inaccuracies.

The transcript is intended solely for general informational purposes. As provided by 10 CFR 9.103, it is not part of the formal or informal record of decision of the matters discussed. Expressions of opinion in this transcript do not necessarily reflect final determinations or beliefs. No pleading or other paper may be filed with the Commission in any proceeding as the result of or addressed to any statement or argument contained herein, except as the Commission may authorize.

P R O C E E D I N G S

1
2 CHAIRMAN AHEARNE: The continuing saga of Can We
3 Get out Part 60, and In What form continues.

4 Bill, we have in front of us an advance copy that
5 is listed as 81-48A, and since it arrived so recently, I
6 doubt whether all of us, in fact perhaps any of us have had
7 the chance to understand what it is. So perhaps you might
8 discuss it, and tell us what is in it.

9 COMMISSIONER HENDRIE: I dissociate myself from
10 those who do not understand what is in 48-A.

11 CHAIRMAN AHEARNE: I think Commissioner Hendrie
12 would like to explain it.

13 MR. DIRCKS: What it does, it brings up to date
14 with the objectives of the Executive Order 1204 in meeting
15 the criteria of the new regulations. It is more, I don't
16 want to characterize it as boiler plate, but maybe I would
17 for want of a better term. It is a procedural aspect that
18 we can incorporate into the procedures of this rule.

19 The other items are typographical items, beginning
20 on page 2.

21 CHAIRMAN AHEARNE: As far as the procedures, we
22 are required to make a final determination.

23 MR. DIRCKS: Yes.

24 MR. CUNNINGHAM: The Commission has determined
25 that it will voluntarily comply with the Executive Order,

1 and in that sense you have committed yourselves to make a
2 finding. That commitment was made in the action plan.

3 CHAIRMAN AHEARNE: We have to take some kind of a
4 formal vote.

5 MR. BICKWIT: I have not seen the procedures that
6 the staff has proposed. Are these procedures on record
7 anywhere? What is the nature of the procedures?

8 MR. DIRCKS: The Regulations Coordinating
9 Committee, chartered by ADO, sent to the Commission a paper,
10 which is before you now, outlining in detail the schedule
11 for the accomplishment of the five-year systematic review
12 that the regulations call for by the action plan and the
13 Executive Order.

14 It discussed the required findings. It does not
15 at this point have procedures, those are still in the
16 development by that Regulations Coordinating Committee.
17 This will be the second paper that is before you that
18 contains one of these finding sheet. The proposed Part 51
19 also has a finding sheet of this same format.

20 CHAIRMAN AHEARNE: Interesting, but that does not
21 answer the direct question.

22 MR. BICKWIT: Under those procedures, you would
23 have a formal determination by the Commission with respect
24 to new regulations or new important regulations.

25 MR. DIRCKS: Yes, the Executive Order says that

1 the Commission must make the following eight findings.

2 MR. BICKWIT: Then, it seems to me that if the
3 Commission wants to abide by the Executive Order, and these
4 proposed procedures, you would make a formal determination
5 and vote on it.

6 CHAIRMAN AHEARNE: All right, so that item 1,
7 after we have had a chance to read it to see whether we are
8 willing to take the vote that these have been met.

9 COMMISSIONER GILINSKY: Those eight findings are
10 set anywhere?

11 MR. DIRCKS: Yes, in the fact sheet.

12 COMMISSIONER GILINSKY: I see.

13 CHAIRMAN AHEARNE: I have four, but I guess it
14 should be eight.

15 MR. DIRCKS: There are eight.

16 COMMISSIONER GILINSKY: One says, "The regulation
17 is understandable to those who must comply with it." It
18 should be understandable.

19 CHAIRMAN AHEARNE: That is a tough finding.

20 What is your pleasure, gentlemen?

21 COMMISSIONER BRADFORD: I think that we would have
22 to do that last.

23 CHAIRMAN AHEARNE: Yes.

24 COMMISSIONER GILINSKY: What is the plan for
25 evaluating the regulation after its issuance, and it has

1 been developed?

2 COMMISSIONER HENDRIE: The second cycle of the
3 periodic and systematic review process.

4 COMMISSIONER GILINSKY: Is this a rhetorical
5 question?

6 (Laughter.)

7 COMMISSIONER BRADFORD: Back in 1986.

8 CHAIRMAN AHEARNE: On Pat's birthday.

9 (Laughter.)

10 CHAIRMAN AHEARNE: Peter wants to wait until we
11 are finished. That probably seems to be reasonable, unless
12 when we come to vote on it we can conclude there are other
13 changes.

14 COMMISSIONER HENDRIE: That could be infinite
15 series.

16 CHAIRMAN AHEARNE: Go ahead, Bill, and describe
17 the rest of the paper.

18 MR. DIRCKS: The rest of it is a summary of
19 essentially changes that have been agreed to as minor
20 modifications, and we can go down through them if you want
21 to. If you want to, we could go down through these.

22 COMMISSIONER HENDRIE: Let me make a suggestion.
23 The Commission has not met on the base paper 81-48, which
24 was a rewrite and comparative text, trying to pull together
25 everybody's assorted suggestions. What you have here in the

1 48-A paper are corrections on the base paper.

2 I think we ought to turn to the base paper, and
3 just keep this thing at hand, and when we get to the
4 appropriate pages we can include this in.

5 CHAIRMAN AHEARNE: You are not ready to take the
6 base paper?

7 COMMISSIONER HENDRIE: I have a few nits, and a
8 problem.

9 CHAIRMAN AHEARNE: All right. I see your reason
10 for wanting to go to the base paper.

11 COMMISSIONER HENDRIE: I must say that I don't see
12 much in the 48-A changes --

13 CHAIRMAN AHEARNE: Before we turn to that, are
14 there any major substantive issues outstanding that anybody
15 wants to raise before we turn to the 48 and 48-A that we
16 will not get to as work through the papers.

17 COMMISSIONER BRADFORD: No. I think we will get
18 them all.

19 CHAIRMAN AHEARNE: Okay.

20 All right, if we start with the base paper 48 --
21 This revised paper, by the way, is supposed to capture
22 changes as of when?

23 MS. CAMELLO: Changes as of --

24 CHAIRMAN AHEARNE: In other words, the A that you
25 have.

1 MS. CAMELLO: The A is to capture the minor
2 typographical errors that we have noticed since we submitted
3 48 a few days ago. There were several of those.

4 CHAIRMAN AHEARNE: Does it capture the changes
5 that -- There were a couple of agreements struck between
6 various commissioners that we all agreed to. Did it attempt
7 to capture those?

8 MS. CAMELLO: We tried to capture those.

9 COMMISSIONER HENDRIE: It pretty well gets the
10 ones that I was involved in. I don't think that it
11 necessarily gets all of Peter's.

12 CHAIRMAN AHEARNE: All right.

13 COMMISSIONER HENDRIE: Again, I think the best way
14 to get through it is to page through the document, and just
15 take them as they come.

16 CHAIRMAN AHEARNE: Why don't we start with
17 enclosure A, if anybody has any objection or questions.
18 What is the first page that someone has a question or
19 objection to?

20 MS. CAMELLO: In the body of the paper itself,
21 beginning on page 2, we did try to get some pending changes,
22 so that you would have a guide through the paper, and know
23 exactly what changes were made and why they were made.

24 CHAIRMAN AHEARNE: Page 2 of the staff paper?

25 MR. DIRCKS: Yes.

1 COMMISSIONER HENDRIE: Why don't we charge
2 through, sweep through and pick up everybody's complaints.

3 I have one on the first page.

4 Craig, do you really want your name on this?

5 VOICE: Yes.

6 COMMISSIONER HENDRIE: All right.

7 CHAIRMAN AHEARNE: What is the first page in
8 enclosure A that someone has a problem with?

9 Page 2? Page 3? Page 4? Page 5?

10 COMMISSIONER BRADFORD: Page 5 there is a change
11 there.

12 COMMISSIONER HENDRIE: I don't have a problem with
13 it.

14 CHAIRMAN AHEARNE: There has to be a change
15 because one of the negotiated settlements was to treat -- to
16 say that we would take no more than two sites, one of which
17 must be other than salt.

18 COMMISSIONER HENDRIE: That is in there. I don't
19 have any objection to it.

20 CHAIRMAN AHEARNE: I think you are right.

21 COMMISSIONER HENDRIE: Try page 6.

22 CHAIRMAN AHEARNE: Page 6? Page 7?

23 COMMISSIONER HENDRIE: Tilt, page 6. That is why
24 I said, try six. You were leaving it for seven. That was
25 clever work, John. I can see why you are chairman.

1 (General laughter.)

2 CHAIRMAN AHEARNE: What is your problem, Joe?

3 COMMISSIONER HENDRIE: A minor one of language.

4 Starting at the bottom of page 5, and going through this
5 little bit about whether or not the Atomic Energy Act might
6 allow us to require alternatives to be presented. We say,
7 starting at the bottom of page 6, "The Commission recognizes
8 that under AEA consideration may indeed be appropriate where
9 necessary and desirable to protect health," etc.

10 It seems to me that at that point one ought to say
11 what is in the last sentence of this change. Namely, the
12 Commission cannot say at this point that an examination of
13 alternatives would be essential for this purpose, and then
14 go to say, "We anticipate, however, that the fundamental
15 licensing inquiry," etc.

16 CHAIRMAN AHEARNE: It is okay with me.

17 COMMISSIONER HENDRIE: I would strike "in time,"
18 please.

19 CHAIRMAN AHEARNE: Vic?

20 COMMISSIONER GILINSKY: I am not sure I followed
21 that.

22 COMMISSIONER HENDRIE: The last sentence up there
23 of the first paragraph on, it just dangles out at the end.
24 It says: "Cannot say at this point that an examination of
25 alternatives would be essential for this purpose," and you

1 can't tell whether this purpose means general applicable
2 standards established by so on and so on, the environmental
3 review, or whether it is the AEA. I think we ought to get
4 the last sentence up to the thing that applies.

5 MR. MARTIN: Doesn't the "however" come out in the
6 first full sentence, if you do that?

7 COMMISSIONER HENDRIE: Yes.

8 CHAIRMAN AHEARNE: Your point is that "this
9 purpose" really refers to the health and safety provisions o
10 the Atomic Energy Act.

11 COMMISSIONER HENDRIE: Just so. If I am wrong,
12 why then what I propose may or may not be right, but then
13 you will also have to explain to me what the paragraph
14 means.

15 MR. DIRCKS: You are just moving the sentence.

16 MS. CAMELLO: Moving the sentence would be fine.

17 CHAIRMAN AHEARNE: Would it be consistent? Does
18 "this purpose" refer back there?

19 MS. CAMELLO: Yes.

20 COMMISSIONER GILINSKY: I wonder what Peter has to
21 say.

22 COMMISSIONER BRADFORD: I think it is all right.

23 CHAIRMAN AHEARNE: You think it is all right?

24 COMMISSIONER BRADFORD: Yes.

25 CHAIRMAN AHEARNE: Anything else on page 6?

1 **COMMISSIONER BRADFORD:** Nothing on page 6, John,
2 but I try to shuffle the various papers and fit them in
3 where they belong, it seems to me we charged past a point on
4 page 3 where I had suggested a change, and then you
5 suggested a modification to that. Your modification is fine.
6 This was the first of the attachments in your January 23
7 memo.

8 **CHAIRMAN AHEARNE:** Yes, before comments, right.

9 **COMMISSIONER BRADFORD:** Your changes are fine with
10 me.

11 **CHAIRMAN AHEARNE:** All right.

12 Vic, do you agree?

13 **COMMISSIONER GILINSKY:** Yes.

14 **CHAIRMAN AHEARNE:** Joe?

15 **COMMISSIONER HENDRIE:** I don't have any problem.

16 **CHAIRMAN AHEARNE:** All right, so that would be
17 added before comments.

18 **MR. DIRCKS:** Which one?

19 **COMMISSIONER HENDRIE:** It is a JA change to a PB
20 edition.

21 **CHAIRMAN AHEARNE:** This is Peter's memo of January
22 23rd, to which I responded on Friday.

23 Sam, is there a copy?

24 **MR. CHILKS:** Yes.

25 **CHAIRMAN AHEARNE:** SECY does have the change, and

1 you can get it from them.

2 MR. DIRCKS: We don't have it.

3 COMMISSIONER BRADFORD: You do have the change
4 there.

5 COMMISSIONER HENDRIE: I will give you mine.

6 CHAIRMAN AHEARNE: Let's move back to page 7.

7 COMMISSIONER HENDRIE: On page 8 we begin to pick
8 up this new stuff.

9 COMMISSIONER BRADFORD: Yes.

10 CHAIRMAN AHEARNE: This is a different enclosure.
11 This new stuff is enclosure B, and this is still enclosure
12 A.

13 COMMISSIONER HENDRIE: I am sorry, the page in
14 48-A which has been added to is, in fact, out of 48.

15 COMMISSIONER BRADFORD: That is right, even though
16 it says B.

17 CHAIRMAN AHEARNE: It says C, struck to B, but it
18 is really A.

19 COMMISSIONER HENDRIE: Then stricken to A.

20 CHAIRMAN AHEARNE: Is that correct, Pat?

21 MS. CAMELLO: Yes. It is actually enclosure B of
22 48-A that refers to enclosure A to 48. It is all perfectly
23 clear once you follow the construct.

24 MR. DIRCKS: This is our new policy of writing
25 everything in plain English.

1 (Laughter.)

2 COMMISSIONER HENDRIE: You want to add in there,
3 after saying, "DOE can request an exemption from the testing
4 at depth requirement," "or it may decline to include, in
5 which case we reject, in which case they are entitled to a
6 hearing on the denial, and would at that time have an
7 opportunity to persuade the Commission --

8 COMMISSIONER GILINSKY: Could we change that
9 language a little bit.

10 COMMISSIONER BRADFORD: First of all, would
11 someone tell me why it needs to be in there?

12 MR. CUNNINGHAM: Yes. The requirement for in situ
13 characterization, which was added recently, appears in Part
14 51. It says your environmental report will describe in situ
15 characterization, and that is how the requirement was
16 imposed.

17 Part 51 has the standard exemption language that
18 most of our parts, which says that you can request an
19 exemption as authorized by law. The language which was
20 added to the basic paper here that says that DOE may request
21 an exemption does not specify how they do that.

22 They could come to the Commission before submittal
23 of the environmental reports, and request an exemption from
24 the requirement to include that material. The Commission
25 might say, "Wait, we are at such an early stage here, we are

1 not prepared to grant that exemption. We want the in situ
2 testing described."

3 I think under the way Part 60 is structured,
4 however, the DCE could refuse to do it, and insist upon an
5 adjudication. That is what this additional language is
6 there for.

7 CHAIRMAN AHEARNE: So you are saying that they
8 would have a formal hearing on our requirement for them to
9 do an in situ test for site characterization prior to the
10 license application?

11 MR. CUNNINGHAM: If they decline to provide that
12 information. If they say it is not necessary, they could
13 adjudicate whether it is necessary, and they would entitled
14 to test that in an adjudication, unless it is the
15 Commission's intention to say, "The only way you get an
16 exemption is by requesting one pursuant to Part 51 before
17 you ever submit the report."

18 COMMISSIONER GILINSKY: You are not saying that
19 there would be a formal hearing unless DOE wanted one, are
20 you?

21 MR. CUNNINGHAM: No. There would be a formal
22 hearing only if DOE refused to accept the initial refusal of
23 the Commission to exempt them from that requirement.

24 CHAIRMAN AHEARNE: Would that hearing be separate
25 from the hearing on the --

1 MR. CUNNINGHAM: No, that would be part of the
2 hearing on the construction authorization.

3 CHAIRMAN AHEARNE: I see.

4 MR. CUNNINGHAM: The staff would take the position
5 that the application is inadequate, and the selection should
6 be denied, and they would want a hearing on it.

7 CHAIRMAN AHEARNE: Yes.

8 COMMISSIONER GILINSKY: I don't know, but the
9 language "entitled to a formal hearing" struck me as a bit
10 hard. If DOE comes in and asks for a hearing, I can't
11 imagine that we wouldn't hold a hearing.

12 COMMISSIONER BRADFORD: It seems to me to lay out
13 a singularly undesirable pathway for everyone involved. I
14 would just strike. If DOE requests an exemption, and we
15 deny it, and they think the Commission is behaving
16 unreasonably, they can come back again. The Secretary of
17 Energy, presumably could as to meet with the Commissioners.

18 The Lord only knows what methods are available to
19 them. But it is ridiculous to have the disagreement persist
20 to the point that they would go to the point of filing an
21 application, have us turn it down, and then contest that
22 issue separately in the formal hearing process at that
23 time. It is just not something that I would invite them to
24 do.

25 I think I agree with you that it is a theoretical

1 path that is open to them, but it does not mean that I would
2 sketch out in here as being something that we would
3 contemplate reasonable men doing.

4 CHAIRMAN AHEARNE: Len, do you have a comment?

5 MR. BICKWIT: I did not grasp why you had to have
6 it. It seems to me that you could leave that sentence out,
7 and it would follow automatically from the licensing process
8 and the hearing arrangements associated with it.

9 MR. DIRCKS: That true, I don't disagree. This
10 would tend to spell out the possible procedural ways in
11 which the exemption question could be addressed.

12 CHAIRMAN AHEARNE: I would join anybody who would
13 like to strike that out.

14 COMMISSIONER BRADFORD: I will.

15 COMMISSIONER HENDRIE: If people agree we don't
16 really need it, I think Peter's point is a good one. It may
17 indeed be a path which is open, but it seems peculiar to
18 sketch out one among what may be several possible cumbersome
19 and undesirable paths in the regulations as though there
20 were some underlying reason.

21 COMMISSIONER GILINSKY: You will then have to do
22 something with the previous sentence, too?

23 COMMISSIONER HENDRIE: I think you put a period
24 after "requirement," and then it reads just as it did
25 before. "In such a case, DOE may request a exemption from

1 in situ testing at depth requirements." Then you go on
2 down, "DOE like any applicant --"

3 MR. MARTIN: The decision is just to make no
4 changes to the page 8 in the paper.

5 COMMISSIONER BRADFORD: This is assuming that
6 there are no other changes on that page.

7 COMMISSIONER HENDRIE: I don't think so.

8 CHAIRMAN AHEARNE: Pat, is that the only change?

9 MS. CAMELLO: I believe so.

10 COMMISSIONER HENDRIE: That was the only change,
11 and in fact the subsequent pages 9 through 13 in 48-A are
12 just there because the retyping ran over to the next page.
13 So you can tear out and throw away five or six pages.

14 CHAIRMAN AHEARNE: There are no other changes in
15 pages 9, 10, 11, and 12?

16 COMMISSIONER BRADFORD: Have you gone by page 12?

17 CHAIRMAN AHEARNE: No.

18 COMMISSIONER BRADFORD: Is this only with regard
19 to 48-A?

20 CHAIRMAN AHEARNE: Yes.

21 COMMISSIONER HENDRIE: Now 48-A is clear to page
22 14.

23 CHAIRMAN AHEARNE: Are there any other changes on
24 9? On 10?

25 Page 11, Peter had a proposal, and I had a

1 counter-proposal.

2 COMMISSIONER BRADFORD: I even have a
3 counter-proposal, John.

4 CHAIRMAN AHEARNE: All right.

5 COMMISSIONER BRADFORD: This actually tended to
6 respond to all of the changes that you had made. Item 2 is
7 the one that responds to this one.

8 CHAIRMAN AHEARNE: Peter, that I had made, the
9 point that I felt it was appropriate to go to our policy
10 once they have submitted a license application. I think
11 what you are proposing is once they have submitted the site
12 characterization report.

13 COMMISSIONER BRADFORD: That is right. That is
14 why I said, while I accepted most of your changes, I had not
15 accepted what I thought was the major one.

16 We had talked about this at a previous session,
17 and the staff had had no problem with the formulation of
18 holding open meetings after the site characterization report
19 was submitted for that site.

20 That is, it did not make sense, and no one was
21 suggesting going to open meetings on all sites after a site
22 characterization report were received for the first one.
23 But the proposal that I understood the staff to have not had
24 difficulty with was site-by-site once the characterization
25 report was in. The meetings regarding that site

1 subsequently would be for the most part open meetings.

2 I think the formulation that was standard in the
3 Reactor Licensing Process was that you had to get the office
4 director's approval to have meetings that were not open, and
5 that is perfectly acceptable to me.

6 COMMISSIONER HENDRIE: It was acceptable, or not
7 acceptable?

8 COMMISSIONER BRADFORD: It was acceptable to me.

9 I had thought that formulation was acceptable to
10 the staff, I have forgotten what meeting it was now, but two
11 or three meetings ago.

12 MR. DIRCKS: I would not think that it was exactly
13 what we had in mind. The whole purpose of the site
14 characterization program was to get a process going by which
15 data would start being collected, and the NRC staff would
16 have the opportunity to participate in almost a
17 developmental learning process. We anticipated that we
18 would have a staff assigned to these sites, and looking at
19 shafts as they are being developed, developing positions,
20 looking for research concepts to feed back into the
21 program.

22 We did not anticipate a formal process by which
23 transcripts would be kept, or formal hearings would be
24 held.

25 MR. MARTIN: That is exactly it. It is an

1 informal process. There would probably be hundreds of
2 opportunities to have discussions on the shape of the
3 research program, and how measurements are being made, and
4 how data is being gathered. I certainly did not visualize
5 formalizing all that into transcripts of meetings, and so
6 on.

7 CHAIRMAN AHEARNE: How about after the license
8 application is filed?

9 MR. MARTIN: That is what I had in mind.

10 I thought the thing that Hanrahan and I agreed to
11 up here was more or less in principle what I had in mind.

12 CHAIRMAN AHEARNE: Yes, that is what I had tried
13 to pick up in my comment, it was the last OPE proposal.

14 COMMISSIONER GILINSKY: I wonder if there is not
15 some middle way. It does seem awkward to have a requirement
16 that our man is assigned to some site, and to put a notice
17 in the Federal Register every time he is going to talk to
18 somebody.

19 COMMISSIONER BRADFORD: That is certainly not what
20 I had mind.

21 COMMISSIONER GILINSKY: At the same time, there
22 will be occasions when there are more formal meetings.
23 Because this is a subject on which there are so many
24 concerns, local concerns and suspicions, I think we probably
25 ought to lean over backwards to have those meetings

1 accessible to the public.

2 We ought to distinguish between certain levels of
3 informal data gathering and exchange of views, and perhaps
4 more formal meetings which I am sure will take place.

5 MR. MARTIN: To date, most of the meetings we have
6 had with DOE that lend themselves to structure, like they
7 are going to brief us on what they are doing on cannister
8 development or something like that, most of those have been
9 open.

10 COMMISSIONER GILINSKY: Well, perhaps the
11 statement ought to simply indicate that the Commission
12 encourages the staff to arrange for these meetings to be
13 open, I hate to say, where appropriate.

14 MR. MARTIN: I have no problem with that where it
15 lends itself to it, but if it is a discussion.

16 CHAIRMAN AHEARNE: That I have no problem with.
17 In fact, I think that it is certainly necessary that as the
18 process continues that there be periodic discussion meetings
19 between the staff and DOE in an open forum. But during this
20 development stage, between the site characterization report
21 and the license application, there does have to be a lot of
22 interaction just making sure everybody understands what kind
23 of information is around. That just not lend itself to any
24 kind of a formal structure.

25 COMMISSIONER GILINSKY: Nevertheless, there are

1 bound to be meetings of a dozen people around a table, and
2 papers have been prepared..

3 CHAIRMAN AHEARNE: That is right, and those would
4 be appropriate.

5 COMMISSIONER GILINSKY: How would you phrase
6 that? We can simply say that we are encouraging.

7 MR. MARTIN: Periodic progress reports, or status
8 reports.

9 COMMISSIONER GILINSKY: In an open public
10 meeting?

11 MR. DIECKS: The day-to-day work on the site, our
12 engineers and technical people will be in pretty close
13 day-to-day working relationships, and this procedure would
14 not hold up. It would be too cumbersome.

15 CHAIRMAN AHEARNE: Periodic status reports held in
16 public meetings?

17 MR. MARTIN: Yes, and briefings.

18 COMMISSIONER BRADFORD: The distinction I had in
19 mind, when we talked about it before, was that obviously the
20 day-to-day meetings on the site between the NRC people and
21 the DCE people cannot be public. There is just no way that
22 they could be.

23 The meeting whose primary focus was on issues that
24 were expected to arise in the course of the licensing
25 process, what should be in the application, meetings that

1 were focused primarily on the license from the time of the
2 site characterization report on ought to come under the open
3 meeting policy.

4 It does not mean that you can't get an exemption
5 from the Office Director, but the thrust from that point in
6 time on for those meetings should be toward public
7 meetings.

8 MR. MARTIN: One is these periodic status reports
9 that we can develop into a public meeting forum. I think we
10 can talk about when we get to a point where we are going to
11 formalize a set of requirements that must go into a license
12 application. I think that might be appropriate.

13 COMMISSIONER GILINSKY: What if we said, "The
14 Commission encourages holding open meetings," and we leave
15 it to the discretion --

16 MR. MARTIN: Such as periodic status report.

17 COMMISSIONER GILINSKY: Yes, leave it to the
18 discretion of the Director.

19 CHAIRMAN AHEARNE: Fine.

20 Joe?

21 COMMISSIONER BRADFORD: I guess I would be happier
22 with something stronger than "encourages." I would say
23 something like "The Commission intends that, following the
24 issuance of the site characterization report, meetings whose
25 primary focus is the forthcoming license application should

1 be public."

2 CHAIRMAN AHEARNE: All the meetings?

3 COMMISSIONER GILINSKY: It seems to me that if you
4 say "The Commission encourages," the burden is on those who
5 want the meeting not to be open.

6 CHAIRMAN AHEARNE: I think Vic's thought is about
7 the best that we can get.

8 COMMISSIONER HENDRIE: This would go at the end of
9 the proposed language in 48. The proposed language says:
10 "In addition, the provision of NRC's open meeting policies
11 set forth at 43, the Federal Register," so forth and so on,
12 "will be applied to the licensing to the extent
13 practicable." Then it says, "Under this policy, generally
14 all meetings conducted," etc., etc., "and the review of the
15 license will be open to attendants."

16 Then what you would say is, "The Commission
17 encourages the director to --

18 COMMISSIONER GILINSKY: We could say "strongly
19 encourages."

20 COMMISSIONER HENDRIE: "Encourages the director to
21 provide for open meeting forums prior to the license
22 application to the extent reasonable or practical," or
23 something like that.

24 MR. MARTIN: For example, periodic status
25 reports.

1 COMMISSIONER HENDRIE: "For example, period status
2 reports," would be a good way to characterize it.

3 CHAIRMAN AHEARNE: I would strongly encourage.

4 COMMISSIONER GILINSKY: If we say, "strongly
5 encourage," we get closer to Peter's intent.

6 CHAIRMAN AHEARNE: Pat, do you have that?

7 MS. CAMELLO: I don't quite have it. I will have
8 to go to the transcript.

9 CHAIRMAN AHEARNE: All right, Peter, do you have
10 any rebuttal?

11 COMMISSIONER BRADFORD: I will save it for later.

12 COMMISSIONER HENDRIE: He can draft up his own
13 language.

14 CHAIRMAN AHEARNE: Anything else on page 11?
15 Page 12? Page 13? Page 14.

16 COMMISSIONER HENDRIE: Now we have got problems.
17 I don't see anything wrong with the 48-A corrections on page
18 14, since they seem to be of an editorial nature. This is
19 simply correcting the text. There are other pieces at page
20 14, however.

21 CHAIRMAN AHEARNE: Speak up.

22 COMMISSIONER HENDRIE: Starting at the bottom,
23 "and then reflected in the rule," this is a place where we
24 simply refer to the immediate effectiveness proposition. The
25 first is the place in the supplementary information that

1 refers to it.

2 My problem is going to come really over on page
3 32, when we get to the rule itself, and the amendments to
4 2.764.

5 CHAIRMAN AHEARNE: So is mine.

6 COMMISSIONER HENDRIE: Where we have the LWA sort
7 of proposition in place, and I had thought we were looking
8 for something such as an adapted version of Appendix B that
9 is like the reactor case.

10 What I suggest is, why don't we wait until we get
11 to page 32 and get to the guts of the matter, and then
12 whatever we decide to do there, we can come back and make
13 page 14 consistent.

14 CHAIRMAN AHEARNE: Any other comments on page 14?

15 COMMISSIONER GILINSKY: What does it say, "It is
16 further provided that even if no hearing has been held"? Is
17 this dealing with the theoretical possibility that there
18 might not be a hearing?

19 MR. MARTIN: That is right.

20 COMMISSIONER HENDRIE: At the operation stage. It
21 is mandatory at the construction authorization, but it is
22 optional at the loading stage.

23 CHAIRMAN AHEARNE: You say that it is mandatory at
24 the construction?

25 COMMISSIONER HENDRIE: Yes.

1 CHAIRMAN AHEARNE: Then why does it say, "If no
2 hearing has been held, MSS will not issue a construction
3 authorization"?

4 COMMISSIONER HENDRIE: I don't know. I didn't
5 pick that up, I must say.

6 Am I correct in assuming that construction
7 authorization is mandatory?

8 MR. CUNNINGHAM: No, it does not refer to a
9 construction authorization on page 14.

10 CHAIRMAN AHEARNE: Page 15? Page 16?

11 I assume, Pat, on the 48-A 15 and 16, are these
12 additional changes, or just retyped to take account of some
13 shifts of space?

14 MS. CAMELLO: Yes, just retyping.

15 CHAIRMAN AHEARNE: Page 17? Page 18? Page 19?
16 Page 20? Page 21? Page 22?

17 COMMISSIONER BRADFORD: On page 20, maybe the best
18 way to handle this is the same way we are the other one. We
19 do still have a difficulty on the physical security.

20 CHAIRMAN AHEARNE: The last time when we were
21 here, you and Victor reserved. Have you reached a
22 conclusion.

23 COMMISSIONER BRADFORD: I am perfectly comfortable
24 with the language that OGC has proposed with regard to it.

25 CHAIRMAN AHEARNE: That is what Joe and I came out

1 in agreement with.

2 COMMISSIONER BRADFORD: Okay. It is not the
3 language that I think is in this paper?

4 CHAIRMAN AHEARNE: No, because it was still held
5 in abeyance.

6 COMMISSIONER BRADFORD: All right.

7 CHAIRMAN AHEARNE: You agree with the OGC
8 language, which Joe and I had agreed to on January 6.

9 COMMISSIONER BRADFORD: Yes.

10 COMMISSIONER HENDRIE: Do you have any objection?

11 MR. CUNNINGHAM: Staff told you at that meeting
12 that we could live with that.

13 CHAIRMAN AHEARNE: Vic, do you agree with that?

14 COMMISSIONER GILINSKY: Yes.

15 CHAIRMAN AHEARNE: Peter?

16 COMMISSIONER BRADFORD: All right.

17 CHAIRMAN AHEARNE: So that you can pick that up.

18 Back to page 22. Page 23?

19 MR. BECKWIT: On page 22, I think that is what you
20 mean, but I just want to raise the issue. The reference
21 here is that certain things can't be changed without an
22 amendment to the construction authorization. In the past
23 you have been the phrase "without approval of the
24 Commission."

25 COMMISSIONER HENDRIE: That is a good point.

1 MR. BICKWIT: If you mean the amendment process.

2 COMMISSIONER HENDRIE: We mean approval of the
3 Commission, and if we find one that has been submitted for
4 approval that we think is of a magnitude to require amending
5 the construction authorization, we can then make that
6 determination. But the essential thing is the approval of
7 the Commission.

8 MR. BICKWIT: I guess my question is, does the
9 permit read that certain provisions cannot be changed
10 without the approval of the Commission, thereby allowing the
11 Commission to give its approval and not change the terms of
12 the authorization. Or, does the permit read as an absolute
13 requirement, which as a result could not be changed without
14 an actual amendment?

15 CHAIRMAN AHEARNE: How could you go through the
16 first hearing process, Len? How could you go through the
17 hearing process, and embed in it, here are a set of
18 requirements which are of sufficient significance that they
19 can't change without approval.

20 MR. BICKWIT: You make that a provision in the
21 permit.

22 CHAIRMAN AHEARNE: Once having established those
23 through a hearing process, you could change those outside of
24 the hearing process?

25 MR. BICKWIT: I think so.

1 **COMMISSIONER GILINSKY:** What is the difference
2 between having Commission approval without an amendment, and
3 with an amendment?

4 **MR. BICKWIT:** About a year's difference.

5 **COMMISSIONER HENDRIE:** Minimum.

6 **COMMISSIONER GILINSKY:** Because of whether you
7 have hearings or not?

8 **MR. BICKWIT:** Yes. In one case, you are going to
9 have an opportunity for a formal adjudicatory hearing, and
10 in the other case you will not.

11 **COMMISSIONER GILINSKY:** You talk about a year, but
12 the fact is that you can change the format of these hearings
13 if you wanted to do so, it would not be a year, and it could
14 be a day.

15 **MR. BICKWIT:** Under our rules, it will come out to
16 about a year now, if you want to fiddle with them. That is
17 another story.

18 **COMMISSIONER HENDRIE:** If there is a way to make
19 it come in a day, why haven't we done something about it in
20 the assorted proceedings now underway.

21 **MR. BICKWIT:** I don't think you could have a
22 normal construction permit in which you set all of the major
23 features changed by the approval of the Commission. What
24 you have got here is not a normal construction permit. What
25 you have got is an authorization that we are using to decide

1 whether ultimately a materials license will be granted.

2 It is possible that the requirements of the Act
3 with respect to amendments do apply here, but it is not
4 entirely clear that they do. I think they do if you regard
5 this as a partial initial decision under the Act, therefore,
6 as a part of a materials license.

7 If you treat this as something less than that,
8 then it is not clear to me that you need to go through the
9 amendment process when you are changing terms of the
10 construction authorization.

11 COMMISSIONER GILINSKY: Doesn't that depend on the
12 level of detail of these requirements?

13 In other words, if you are talking about some
14 pretty fundamental features of the repository, then it seems
15 to me you do have to have amendments if you are going to
16 change those. If you are talking about other more detailed
17 requirements, then amendments may not be called for.

18 MR. BICKWIT: If you are treating this as not a
19 part of the license under the Act, but rather as simply the
20 Commission's devised mechanism for ultimately reaching a
21 decision on the materials license, then the statute does not
22 apply to this in the way that it applies to construction
23 permit amendments.

24 If that is your concept, the statute leaves the
25 Commission free to determine what kind of procedures it

1 wants to use to change the terms of that authorization.
2 That is not to say that from a policy perspective, you might
3 not want to decide that where it is a basic change that you
4 want the full adjudication, and when it isn't that you
5 don't.

6 I am just saying that it is not legally required.

7 COMMISSIONER GILINSKY: If it comes out that the
8 construction permit says that the waste will be deposited
9 between 600 and 800 feet below ground, or whatever, and the
10 change is to go to 1200 or 200 feet, it seems to me that you
11 have got to have an amendment.

12 MR. BICKWIT: If you put in the permit that you
13 can go, however you can go to 1200 feet, you get the
14 approval of the Commission, then legally you don't have to
15 have an amendment. You may want an amendment, and you may
16 want to go through the normal procedure, but you don't have
17 to have one.

18 MR. CUNNINGHAM: Let me point out that as written
19 the rule currently contemplates amendments to the
20 construction authorization. In 2.105 it calls for noticing
21 of such amendments if they involve or may significantly
22 affect the health and safety of the public.

23 MR. BICKWIT: That is right.

24 MR. CUNNINGHAM: There is a clear contemplation
25 that significant changes will be pre-noticed, and the

1 adjudicatory process will be offered.

2 MR. BICKWIT: That is right, but what was agreed
3 to last time was changes in these basic conditions that are
4 going to be part of the authorization will be subject to
5 Commission approval, and we never really got to the
6 Commission's sentiment as to what Commission approval
7 meant.

8 CHAIRMAN AHEARNE: There are two categories, and I
9 think you and Victor talked about two different things.
10 Although you addressed the same items, it seems to me Vic
11 was saying, what if they come in with a proposal to change a
12 feature which they had not really discussed at length in the
13 hearing process, such as going to a significantly different
14 depth, for example. So the hearing process really did not
15 review the adequacy of that, and now they come in and say,
16 "We want to change it." Versus what I think you were
17 discussing, a case where the hearing process has covered
18 this range, the decision is in a narrow band of it, but it
19 is saying if they do end up wanting to go outside of that
20 band, to come out for Commission approval.

21 MR. BICKWIT: I guess I am saying that you can
22 phrase the concepts any way you want to in the
23 authorization.

24 CHAIRMAN AHEARNE: You point, though, is quite
25 well taken. There are two significantly different

1 approaches.

2 COMMISSIONER GILINSKY: I guess I don't understand
3 how you get around these changes having to be amendments,
4 even if they are major changes. You seem to be saying, no
5 matter how big the change.

6 MR. BICKWIT: I am saying that you can put into
7 the authorization the requirements that these are to be the
8 provisions unless changed by the Commission, subject to
9 whatever process you want to put in there. Therefore, you
10 are not changing the terms of the authorization when that
11 change is made. You are simply implementing the language of
12 the permit as written.

13 COMMISSIONER GILINSKY: But the word "amendment"
14 triggers a requirement of the law, isn't that right?

15 MR. BICKWIT: If you actually amend it, my feeling
16 is it doesn't in this case, because it is not --

17 COMMISSIONER GILINSKY: Even if you use the word
18 amendment?

19 MR. BICKWIT: Yes.

20 COMMISSIONER GILINSKY: Even if you describe the
21 change as an amendment to the license?

22 MR. BICKWIT: Yes.

23 COMMISSIONER BRADFORD: Are you saying that we
24 could grant the construction authorization without a hearing
25 altogether?

1 MR. BICKWIT: Yes.

2 COMMISSIONER BRADFORD: I suppose when one accepts
3 that conclusion, then you can do almost anything you want.

4 COMMISSIONER GILINSKY: What is the reason for
5 that?

6 MR. BICKWIT: Because this isn't a license. The
7 statutory requirement for the granting of a materials
8 license is for the granting of a license to receive wastes.
9 You can treat this as part of a license --

10 COMMISSIONER GILINSKY: You are distinguishing
11 between the construction of the facility and receiving the
12 wastes?

13 MR. BICKWIT: I am distinguishing between those
14 two. It is clear that you must have a license for the
15 latter.

16 COMMISSIONER GILINSKY: I thought we were saying
17 just the opposite a moment when we were talking about the
18 operating stage not having a mandatory hearing provision.

19 MR. BICKWIT: You put it in the rule that there
20 had to be a mandatory hearing, and I am saying that you did
21 not have to. The Commission's view was that there would be
22 a hearing. I am saying that it was not required.

23 COMMISSIONER GILINSKY: Leaving aside whether a
24 hearing is required or not, it seems to me a major change is
25 made in the license. If a hearing is not required, it is

1 not required.

2 MR. BICKWIT: Certainly any change in the terms of
3 the license is an amendment to the license, or an amendment
4 to the authorization, I am saying, it is not the kind of
5 amendment which is referenced in the statute, and therefore
6 you can apply your own procedures to it.

7 COMMISSIONER GILINSKY: Okay.

8 MR. DIRCKS: That is what you have done in 63.

9 MR. BICKWIT: You have just made determinations
10 which seem to me are reasonable determinations, but they are
11 not the only reasonable determinations.

12 COMMISSIONER GILINSKY: What does does 63 say?

13 MR. DIRCKS: The underlined portion.

14 CHAIRMAN AHEARNE: Now, 63 talks about prior
15 approval from the Commission.

16 MR. MARTIN: That is right.

17 COMMISSIONER BRADFORD: I must say that it had not
18 occurred to me that that would be anything different from an
19 amendment to the construction authorization.

20 MR. BICKWIT: My feeling is that this is what the
21 Commission had in mind, but I didn't know that. I felt that
22 it had to be tested.

23 COMMISSIONER GILINSKY: Since we are talking here
24 about features which are essential to the protection of the
25 public health and safety -- These are pretty fundamental.

1 MR. CUNNINGHAM: I think the staff was thinking in
2 terms of amendments.

3 MR. BICKWIT: That is what I thought the
4 Commission meant, but the Commission does not have to mean
5 that, and they ought to decide what they mean.

6 COMMISSIONER BRADFORD: I meant that.

7 CHAIRMAN AHEARNE: I guess I would have to admit I
8 did not think through reopening and holding another lengthy
9 hearing.

10 COMMISSIONER GILINSKY: I am not sure I understood
11 all this. Len seems to be saying, these are amendments, but
12 not necessarily ones that require hearings.

13 COMMISSIONER HENDRIE: Under the statute.

14 COMMISSIONER GILINSKY: Under the statute.

15 CHAIRMAN AHEARNE: If that is true, then we are
16 arguing about how the words look, and not what they mean.

17 MR. BICKWIT: It seems to me that if you use the
18 word "amendment" in here, you are going to indicate the
19 normal amendment process.

20 CHAIRMAN AHEARNE: Yes.

21 COMMISSIONER HENDRIE: I think we mean "without
22 approval of the Commission" here.

23 CHAIRMAN AHEARNE: You mean, without necessarily a
24 hearing. Peter means, I gather, with a hearing.

25 COMMISSIONER BRADFORD: If you look at it in terms

1 of the way Victor phrased his example, that is, the permit
2 is issued, you might have a condition that is stated that it
3 was the view of the Commission that you had to be between
4 600 and 800 feet. That was one of those conditions that was
5 felt to be so essential that you had to have approval of the
6 Commission to change it. You can write that much
7 flexibility in at that point, or you can make it between 500
8 and 900 feet, if you felt that you had to do it that way.

9 But what you are saying is that if you are going
10 to go outside of whatever envelope we draw up for you at the
11 time we issue the construction authorization, then that is
12 significantly enough different, and will be based on
13 evidence difference from what the public had a crack at, and
14 what all the interested parties had a crack at on the first
15 go-round. You do have to subject that to a hearing test
16 again.

17 CHAIRMAN AHEARNE: Yes.

18 The problem that I am having, Peter, and let me
19 see if I can phrase it. Without us saying this, I think
20 there would have had to have been such a process that you
21 described. If after having laid out, here is what is
22 authorized in the construction, and they want to do
23 something different, then they would have had to come back
24 just as you have described.

25 But I thought what we were trying to do was imbed

1 the concept that there may be some features that we want to
2 narrow even more, and if they want to modify within this
3 broader construction, they still have to come back and get
4 approval.

5 COMMISSIONER BRADFORD: My concern in raising this
6 question originally was that in reactor construction permits
7 there has been this difficulty that no one has ever had to
8 come back no matter how great the change.

9 CHAIRMAN AHEARNE: Yes.

10 COMMISSIONER BRADFORD: What I was trying to do
11 was to state clearly here that there would be some
12 conditions based on which you would have to come back. It
13 was precisely because the perfectly logical assumption that
14 one would have to come back that you were making did not
15 seem to me to hold, based on past agency practice, that I
16 suggested we have a category of conditions that would
17 require coming back.

18 CHAIRMAN AHEARNE: Yes.

19 COMMISSIONER GILINSKY: Isn't the reason because
20 these conditions tend not to get written in the construction
21 permit?

22 COMMISSIONER BRADFORD: That is right.

23 COMMISSIONER GILINSKY: What you are really doing
24 here is saying that, yes, we will lay out those conditions
25 that will flow from the hearing.

1 CHAIRMAN AHEARNE: Once you do that, there is no
2 need, is there, to talk about not coming back for approval --

3 MR. DIRCKS: Those are the conditions in the
4 license.

5 CHAIRMAN AHEARNE: They are the conditions in the
6 license.

7 COMMISSIONER GILINSKY: I understood Peter to be
8 saying that there will be conditions in this license, and
9 not a further narrowing of the conditions of the license.

10 CHAIRMAN AHEARNE: I think I am going to have to
11 think about the right way to phrase this to make sure that
12 we do what is necessary, and not do what is not wise.

13 COMMISSIONER GILINSKY: In writing the license,
14 one has to think, what are the conditions under which you
15 would reopen the license, or what are the boundaries that
16 have been covered in the hearing beyond which it is a new
17 ballgame.

18 COMMISSIONER BRADFORD: That is exactly the
19 point.

20 COMMISSIONER GILINSKY: Otherwise, you can run a
21 hearing on A, and do B, and there is nothing that prohibits
22 it. It may never have been considered in the hearing.

23 CHAIRMAN AHEARNE: I think at the stage that it is
24 now written, it may go beyond just saying that the license
25 will have specific conditions in it.

1 COMMISSIONER GILINSKY: That is what I took to be
2 the intent.

3 CHAIRMAN AHEARNE: Joe, do you have any comments
4 on this?

5 COMMISSIONER HENDRIE: Yes. In principle, at
6 least, it should be possible to distill from the hearing and
7 the decision of the board some general propositions which
8 you would regard as fundamental in the determination that
9 had been made, assuming that it was a positive
10 determination.

11 You would say, "We are going to write these down
12 in the license, and any change in these things will require
13 reopening the hearing," and so on. Certainly you can do
14 that in principle. I am suggesting that you allow more
15 flexibility than that by using the phrase "with approval of
16 the Commission."

17 What I have in mind is the following: If the
18 things you write into the license are going to be such that
19 you have to stay within them, or the hearing reopens, you
20 will drive the drafting of those things in the direction of
21 more general and broader limits than would be the case if
22 you were simply asking DOE to come back and get an approval
23 from NRC for some adjustment.

24 You could, for instance, include a little more
25 detail in you license conditions, be a little more specific

1 with them if you wanted to know about changes in those
2 specific items, but didn't feel you necessarily would have
3 to go to hearing on everyone of them. I don't know whether
4 I can make a good example or not, but let me try.

5 The hearing is probably going to produce the
6 result that there ought to be an overpack, some kind of an
7 overpack cannister, with certain properties. Whatever you
8 are going to say about it in the license, if you are going
9 to reopen the hearing for any adjustment on it, you are
10 going to have to phrase it in terms of what would be an
11 appropriate overpack.

12 If it is with approval of the Commission, you can
13 say that it will be a copper overpack of minimum wall
14 thickness 2.7 inches, and sealed with seven bolts, because
15 that was the standard design. If it turns out that a
16 titanium overpack with three bolts is just as good, and
17 meets the same objectives, if they can come back and show
18 you why that is so, and you can approve that change without
19 having to reopen the whole hearing, you have more
20 flexibility then, and you feel a little more able to be more
21 specific about the things you write in. I think that from
22 our standpoint that that might be desirable.

23 Certainly, under the way I would propose it, a
24 change or some adjustment in those things that are written
25 in the license is proposed by DOE, and indeed a

1 determination would have to be made here as to whether it
2 were of a magnitude that required reopening the hearing,
3 i.e., an amendment to the authorization, or whether it was
4 an adjustment that could simply be approved by staff, and if
5 the Commission wanted to nod over it, it could.

6 COMMISSIONER GILINSKY: Would you add a sentence
7 here saying that the Commission will determine which of
8 these changes are so significant as to require a public
9 hearing?

10 COMMISSIONER HENDRIE: Yes. It could be that
11 whichever way we go here, that it may require a few more
12 words up here in the supplementary information in order to
13 clarify this point about, is everything in the license
14 inviolate without reopening the hearing; or, could some
15 things be simply approved. I think we may need a little
16 more description in here.

17 Len, you were starting to nod. Do you think so?

18 COMMISSIONER BRADFORD: I can't completely let
19 this sort of description of the license go by, because what
20 we have been talking about up to now I thought were two
21 different types of conditions.

22 Class A conditions, which are the ones references
23 in this section, as being the ones that you can vary without
24 amending the license. Then a second category of conditions
25 that would also be in the license, but would not be stated

1 in that particular section, with regard to which the
2 Commission could say whatever it thought prudent. On some
3 of them, we might want notification of change, but no prior
4 approval. With some, it might just be stated in there as
5 regard to what the Commission expectation was, but not even
6 a notification requirement.

7 COMMISSIONER HENDRIE: All right.

8 COMMISSIONER BRADFORD: It is with regard to the
9 limited class of conditions that this requirement of prior
10 approval was ever intended to apply. That is what was
11 intended to keep us out of the straitjacket that your
12 example suggested in which everything that appeared in the
13 license --

14 COMMISSIONER HENDRIE: You would put down the more
15 specific ones with the notification requirement, and then
16 leave it up to us to say, "Hey, wait a minute. Don't do
17 that unless we check you off on those for which we would
18 like approval rights. "

19 COMMISSIONER BRADFORD: That is right. It is not
20 even inconceivable that you would condition the same
21 requirement two different ways, that is, with regard to
22 Victor's depth example earlier. You might say, "If you are
23 going to go outside of 600 feet or 800 feet, you have to get
24 approval. since we expect you to be at 700 feet, we would
25 like to know it if you are going to go outside of 750 or

1 650."

2 COMMISSIONER HENDRIE: Yes.

3 COMMISSIONER BRADFORD: It was never my
4 expectation that every condition that was stated in the
5 license ought to automatically fall under this requirement
6 for prior Commission approval, i.e., amendment.

7 COMMISSIONER HENDRIE: Yes, I see.

8 If we adopted that configuration, I suspect that
9 it might be useful to have a few lines explaining that in
10 this section.

11 CHAIRMAN AHEARNE: I suggest that it is absolutely
12 necessary, because I doubt as the years go by that there is
13 going to be very much of a memory around this Commission of
14 the subtle differences.

15 COMMISSIONER HENDRIE: Yes, just to nail it down.

16 COMMISSIONER GILINSKY: You and Hendrie can be
17 consultants on the meaning of this document.

18 CHAIRMAN AHEARNE: What a fate.

19 MR. MARTIN: Is it the intent that we have certain
20 kinds of conditions that are so important that there would
21 have to be an amendment, and then others. From my
22 standpoint, I would certainly want to have a category of
23 conditions you can lay on that are subject to change later.

24 I can think of dozens of things that could require
25 change, and certainly we wouldn't want to have the lesser

1 kind of license conditions fall in the cracks here.

2 COMMISSIONER GILINSKY: We are talking here about
3 a small number of essential elements.

4 CHAIRMAN AHEARNE: Pat and Jack, do you think you
5 have followed this discussion so that you can write such a
6 modification?

7 MR. MARTIN: That is why I brought this up. The
8 idea is that you may have two categories, one of which are
9 so essential, and others which may be approved without
10 reopening the hearing.

11 MS. CAMELLO: But you would still want prior
12 notice.

13 CHAIRMAN AHEARNE: Yes, prior approval.

14 MS. CAMELLO: That is what I mean, prior
15 approval.

16 COMMISSIONER HENDRIE: If you go Peter's way, you
17 have a class A kind, and you can't tinker with those without
18 an amendment to the construction authorization, which I
19 think we are inclined to think means reopening the hearing.

20 MR. MARTIN: Correct.

21 COMMISSIONER HENDRIE: Those would presumably tend
22 to be few in number, and perhaps generally phrase, but would
23 set down essential safety features, probably one each for
24 the waste form, the overpack, etc.

25 Then there would be a batch of, what shall we call

1 then, type B specifications, and for those we would want
2 notification from DOE before any change was implemented.
3 The point in phrasing it notification is that we can then
4 decide whether we want to tell them, "Please don't do that
5 until we think about it and agree with you." Or, we simply
6 say, "Okay, you have notified us, that is good enough."

7 MR. MARTIN: I don't like that idea because that
8 results in us never getting around to deciding that we don't
9 like it.

10 For example, there will be a monitoring program
11 that there will have to be some consensus over several
12 decades of time, and I would certainly like to approve
13 changes to that monitoring program to make sure that
14 everybody agrees with the program, so that when
15 decommissioning time comes, we are all agreed on it.

16 I would certainly like to have a number of things
17 like that laid out, where they have to come back and get
18 approval to change them. I guess I have seen too many cases
19 where we get notified of things, at least in the licensing
20 cases I know of, but never get around to really raising the
21 issue.

22 Maybe there could be a third category of things
23 that they should notify us about, and those could be written
24 in the license also.

25 COMMISSIONER GILINSKY: There is no reason why the

1 categories that has been talked about here needs to reopen
2 the license. In other words, you can have those which
3 reopen the license, as we talked about a few moments ago,
4 those that require approval, those for which notification is
5 required. You may not want a third category.

6 MR. MARTIN: In that second category, you can word
7 them any way you want to.

8 CHAIRMAN AHEARNE: Right.

9 COMMISSIONER HENDRIE: Len, can you set it down
10 the way Peter arranged this thing. In the version we talked
11 about here, the notification was just to avoid having things
12 that you put in the license that you said, "Don't change
13 these without approval," to avoid the question, "should they
14 go to hearing or not."

15 CHAIRMAN AHEARNE: I think you can specify that.

16 COMMISSIONER GILINSKY: Another way to say is, the
17 license will state the limits of the validity of the
18 license.

19 CHAIRMAN AHEARNE: I would want us to spell that
20 out a little. You are right, that is what is being
21 discussed, but you want to spell it out.

22 COMMISSIONER GILINSKY: You could add the word
23 "fundamental."

24 CHAIRMAN AHEARNE: I think if you have the two
25 categories, it is adequate.

1 MS. CAMELLO: There wouldn't be a problem in just
2 adding language to the supplementary information to indicate
3 that C describes both categories, and that they would be
4 identified later?

5 COMMISSIONER HENDRIE: I would think that that
6 would be enough, wouldn't it?

7 MR. BICKWIT: The categories being those that
8 require approval by amendment, and those which require -- I
9 am not sure on your second category, is it notification or
10 approval?

11 MR. MARTIN: I prefer approval.

12 COMMISSIONER BRADFORD: Jack prefers approval. I
13 am not sure that you have to distinguish between the second
14 and third categories at this point. In other words, each of
15 these conditions at the time they are imposed in the license
16 will have their specific terms, limits, or what-have-you,
17 written into them then.

18 All I was ever trying to state here was that there
19 would be some features considered so essential that if they
20 were change, it would require reopening of the license.

21 MS. CAMELLO: You have a tending amendment here,
22 even --

23 COMMISSIONER BRADFORD: Even though it said prior
24 approval --

25 COMMISSIONER HENDRIE: But this needs to be

1 amplified to get an indication that we contemplate both
2 kinds, otherwise we will not have not noted our purpose.

3 MR. BICKWIT: Then there is a residual category,
4 as I understand, that would require neither notice nor
5 amendment?

6 CHAIRMAN AHEARNE: You mean neither approval?

7 MR. BICKWIT: I think different people are talking
8 about whether there are two categories and a residual, or
9 three categories and a residual.

10 CHAIRMAN AHEARNE: You mean there are some
11 residual things that would be in the license that they could
12 change and we wouldn't care about it?

13 MR. BICKWIT: Where you would not even notify,
14 yes.

15 CHAIRMAN AHEARNE: Why would they be in the
16 license?

17 MR. BICKWIT: That is what I am trying to
18 understand.

19 MR. MARTIN: There is no residual category.

20 CHAIRMAN AHEARNE: I don't see why there should
21 be.

22 MR. BICKWIT: Okay.

23 COMMISSIONER GILINSKY: That is what a license is,
24 it says what you can do.

25 COMMISSIONER BRADFORD: Except that what Len was

1 describing is a residual category is a residual category
2 that we stricken from the license. I think it is your basic
3 reactor CP.

4 CHAIRMAN AHEARNE: That has been a debatable
5 issue.

6 MR. BICKWIT: There are certain things under our
7 regulations which don't have to get approval or where you
8 don't even have to notify the Commission when you want to
9 change them. If you want to exclude that category, then you
10 are down to, I think, three categories.

11 There will always be notification at the very
12 least. There will be approval of some, and there will be
13 amendment approval of some. If that is the concept, it will
14 be easily drafted.

15 CHAIRMAN AHEARNE: I would think so.

16 MS. CAMELLO: If that is the concept.

17 CHAIRMAN AHEARNE: Page 23? Page 24? Page 25?
18 Do you have a change to page 25, pat?

19 MS. CAMELLO: It is rather difficult to call
20 changing a "shall" to a "may" a typographical error. It
21 certainly was an oversight. It was some debate at one time
22 among the staff as to whether it should have been "may" or
23 "shall." Everyone wanted "may," but for some reason the
24 paper that was used during the debate did not reflect that.
25 So we made the change here.

1 COMMISSIONER BRADFORD: Does anybody have the
2 original? Was this originally the Hendrie/Gilinsky, or the
3 Hendrie/Bradford? In any case, this comes directly from a
4 modification agreed on among the commissioners.

5 COMMISSIONER HENDRIE: Yes, I have that some
6 place. I don't remember what I wrote there.

7 COMMISSIONER GILINSKY: Why would you write
8 "may"? Didn't we agree on "shall"?

9 COMMISSIONER BRADFORD: I think that we agreed on
10 "may" here.

11 COMMISSIONER GILINSKY: It is not consistent with
12 what we did elsewhere.

13 COMMISSIONER HENDRIE: What I wrote down is, "The
14 director may find the environmental report to be not
15 complete," etc.

16 COMMISSIONER GILINSKY: Why would you say "may"?
17 Nevertheless, isn't that inconsistent with the agreement
18 that there has to be --

19 COMMISSIONER HENDRIE: No, it is the way one
20 normally writes regulations.

21 MS. CANELLO: The language that is reflected now
22 on page 25 picks up on the language of Commissioner
23 Hendrie's memo of January 9th, which is the enclosure G of
24 48. It is written in the margins.

25 CHAIRMAN AHEARNE: Yes.

1 **COMMISSIONER HENDRIE:** What I wrote in the margin
2 was dictated to me over the telephone by the staff, who
3 said, "Here is the way we ought to do it." I said, "That
4 sounds pretty good," and I wrote it down.

5 (General laughter.)

6 **COMMISSIONER HENDRIE:** You told me to say "may," I
7 said "may." We agreed to "may." You went back, and you
8 could not type it "may," you typed it "shall."

9 **COMMISSIONER GILINSKY:** I did not look every word
10 because agreed that in situ testing was required. But
11 elsewhere we just went over language saying that if the in
12 situ testing has not been done, the director will deny the
13 license.

14 **MR. MARTIN:** But isn't the issue here that we all
15 agree it ought to be done. I think we agreed once before
16 that it doesn't necessarily have to be all complete by the
17 time you accept the application, but it has to be complete
18 before you act on it. This would make it mandatory that you
19 turn it down.

20 **COMMISSIONER GILINSKY:** So you are saying that it
21 is not inconsistent with the requirement that in situ
22 testing is mandatory.

23 **MR. MARTIN:** Right.

24 **MR. DIRCKS:** This says "may" in regard to the site
25 characterization data. You remember when we talked about

1 four, and if you are talking about three to five, or
2 something like, you don't have to bring all sites across the
3 finish-line at the same time in the same condition before
4 your construction authorization expires. There should be
5 enough in there to allow for a meaningful comparison, but
6 not the full-blown --

7 COMMISSIONER GILINSKY: We said that there had to
8 be three sites and at least two media. Let's just stick to
9 that number. Suppose they come in one at a time?

10 MR. DIRCKS: As they will be.

11 COMMISSIONER GILINSKY: Suppose the first one
12 comes in, does that need to have site characterization
13 data?

14 MR. DIRCKS: The first construction authorization,
15 or the first site characterization?

16 COMMISSIONER GILINSKY: This is a construction
17 permit?

18 MR. DIRCKS: Yes.

19 COMMISSIONER GILINSKY: For a particular site?

20 MR. DIRCKS: For a particular site. We said,
21 "Before you do that on a particular on a particular site,
22 you have got to do site characterization on a couple of
23 sites." But we did not say that you had to complete in
24 every detail the same amount of data on every site.

25 COMMISSIONER GILINSKY: Does he have to have the

1 characterization for the site for which he is applying?

2 MR. DIRCKS: Yes, he would have to have that, but
3 you would not have to say, if you are talking about three or
4 four sites and doing site characterization on three or four
5 sites, you would not have to do all three site
6 characterization studies, or four site characterization
7 studies in the same detail for all four sites. You can say,
8 "We have enough now to allow to allow a construction
9 authorization to go forward. We have enough data in the
10 material collected."

11 CHAIRMAN AHEARNE: This isn't to say that if all
12 the information is not there on all the sites, the director
13 can say, "Here is the date by which you must have it all."

14 COMMISSIONER GILINSKY: I hope this is not going
15 to happen, but suppose you get site characterization on one
16 site. You start the application going. You are not getting
17 the other data. This one looks okay. You get a request for
18 an exemption because this one looks okay, and it would take
19 a lot of time to do the others. What happens then?

20 MR. DIRCKS: You have to institute testing on all
21 the sites, but you don't say that they have to dig the
22 tunnels and shaft to the same degree of completeness as they
23 have on one.

24 MR. MARTIN: You have to do it sufficiently to
25 make some comparison.

1 **CHAIRMAN AHEARNE:** So you would go with the
2 language?

3 **COMMISSIONER GILINSKY:** I guess I agreed to that
4 before.

5 **CHAIRMAN AHEARNE:** Yes.

6 **COMMISSIONER GILINSKY:** I am not sure that it is
7 not inconsistent, at least I hope that it isn't.

8 **COMMISSIONER BRADFORD:** There is one little piece
9 of archeology that needs to be done. The draft that the
10 Commission actually agreed, the word "required" appeared in
11 the third line between "include" and "site
12 characterization." If you turn to the third from the last
13 page of SECY paper I can show you where it has gone.

14 What has happened is that the Xeroxing has chopped
15 it off. It was my insert to Joe's draft, and apparently
16 when it went down to the staff all that got left on the
17 paper was the caret mark and the line, and the words
18 themselves disappeared.

19 It is very clear what happened if you use the
20 81-48 paper, and just look at the third page at the end of
21 it.

22 **CHAIRMAN AHEARNE:** Yes.

23 **COMMISSIONER HENDRIE:** You are right. What are
24 the words?

25 **COMMISSIONER BRADFORD:** "Be required."

1 COMMISSIONER HENDRIE: Pat, do you have that?
2 MS. CAMELLO: Yes.
3 CHAIRMAN AHEARNE: Peter, do you agree to that?
4 COMMISSIONER BRADFORD: Yes.
5 VOICE: There is another change on page 25?
6 CHAIRMAN AHEARNE: What you originally told Joe to
7 put in was environmental report.
8 VOICE: Fine.
9 CHAIRMAN AHEARNE: That is what we had agreed to.
10 Is page 25 all right?
11 Page 26? Page 27? Page 28? Page 29? Page 30?
12 Pat, your modification does what?
13 MS. CAMELLO: Again that is a typographical
14 error.
15 CHAIRMAN AHEARNE: All right. Page 31? Page 32?
16 COMMISSIONER HENDRIE: Tilt.
17 CHAIRMAN AHEARNE: At page 32, we have the initial
18 decision issue.
19 COMMISSIONER HENDRIE: Somehow I thought we were
20 to do an adapted Appendix B here, rather than an LWA.
21 MR. BICKWIT: We had proposed Appendix B itself.
22 There was some resistance to that. My interpretation was
23 that what you wanted something on the order of the LWA.
24 CHAIRMAN AHEARNE: I think that is what the
25 majority of us felt.

1 COMMISSIONER HENDRIE: An LWA is --

2 COMMISSIONER GILINSKY: Where do you see LWA? Are
3 you characterizing it?

4 CHAIRMAN AHEARNE: Joe is characterizing it.

5 COMMISSIONER HENDRIE: This thing isn't quite an
6 LWA either. If you recall, for a reactor under the LWA
7 regime the board could treat the environmental issues and
8 the site related safety issues, and issue a partial initial
9 decision, saying: "We think that it is all right to start
10 building up to some point, while the rest of the proceeding
11 grinds on with the other safety related matters."

12 The applicant was able to start digging up the
13 ground, and doing that construction when that decision
14 became effective 10 days after the board's proposition.

15 What you are proposing here is that the licensing
16 board will make a determination, and the appeal board
17 process will then grind all the way to its final
18 conclusion. Then the Commission review will take up, and
19 either will review or will not review, if we review our
20 review will come to a final conclusion at least with regard
21 to what are called "site suitability," etc., issues, if
22 those are separated out, and lead the thing. If they are
23 not separated out, then it is the whole basket that goes
24 through this process.

25 People keep saying, we don't do very many waste

1 repositories, so it is not something that people will be all
2 practiced running a hearing, so the hearing is likely to be
3 a fairly lengthy one. Then people say, "Well, you know this
4 will be the first one of these the appeal board has ever
5 seen, and they are not going to do anything shoddy and
6 swift. They are going to take a long time."

7 CHAIRMAN AHEARNE: I would like to go on record
8 that even on those that they see quite frequently, they
9 still do not act shoddily.

10 COMMISSIONER HENDRIE: Nor swiftly.

11 It looks to me as though we are looking at a
12 process which simply is going to run on embarrassingly
13 long. It would not surprise me a bit to see the appeals
14 board take a year after an initial decision by a licensing
15 board to work through what will be before it.

16 CHAIRMAN AHEARNE: I thought that it could be more
17 like two.

18 COMMISSIONER HENDRIE: Conceivably it could be
19 two, particularly if they decide to have some oral
20 presentations, and so on. The Commission, I suspect, will
21 want to take review at least to show that its hand has been
22 on this object, and it is not just standing back and ducking
23 while it whizzes overhead. I don't know how fast the
24 Commission will move, but it will be hardly less than a
25 couple of months, I would think, and probably a little

1 longer than that.

2 For a proposition that has already been fought
3 through a lengthy hearing, and produced presumably a
4 positive decision if there is going to be anything built,
5 people are going to be pretty ticked about not being able to
6 make any move for another, I don't know, a year and three
7 months to two years and a half, while the appeal procedure
8 and the Commission work through.

9 That is why I had said, why don't we adopt the
10 appendix B procedure we use for reactors to this process.
11 Let the licensing board grinds its way through the
12 proposition, and come to an initial decision, or a partial
13 initial decision, if we separate lead with the site
14 suitability issues.

15 Then, let's do the same thing we do for reactors,
16 give the appeals board 60 days to scratch its head over any
17 stays to effectiveness of that decision that are proposed,
18 or consider on its own motion whether there should be a
19 stay, and make a recommendation to the Commission. Then let
20 the Commission ponder upon it for something on the order of
21 a month, and then let it go forward, or a part of the
22 construction go forward, if we think that appropriate, while
23 the rest of the appeal process and the Commission final
24 review work themselves out.

25 The reason that I think that ought to be done is,

1 one the one hand I recognize the Commission's feeling of
2 need to have its hand on that decision that allows
3 construction to start, rather than just having it start by
4 automatic operation of the board decision and then the
5 director automatically signing off.

6 On the other hand, stop and think what we are
7 going to have at that time. We are going to have a site,
8 and it is going to have two shafts already dug into it, two
9 because the Bureau of Mines or the mine safety law requires
10 two and not one shaft. At the bottom, down at depth, there
11 is going to be a chamber, and various drifts off from it
12 with various kinds of experimental apparatus in it, and so
13 on. It is not what I would call really a pristine and
14 untouched site at that point.

15 If, indeed, you authorize construction to go
16 ahead, there isn't any great and profound, and irrevocable
17 change that is then going to take place, which you are going
18 to feel bad about if in the course of the appeal process
19 something you had not foreseen subsequently turns up and
20 causes you to further condition the license, or whatever.

21 I would be very much against a process which left
22 us unable to authorize the project to go forward, at least
23 in part, for times much greater than, let us say, 90 days
24 after an initial decision of the board.

25 MR. MARTIN: May I point that there are at least

1 three different versions before the Commission. The one in
2 the main paper here was the version submitted by staff in
3 December, which was briefly discussed at a Commission
4 meeting. The General Counsel proposed an alternative by
5 memo of January 19.

6 COMMISSIONER HENDRIE: Yes.

7 MR. MARTIN: That memo moved, Commissioner
8 Hendrie, in the direction that you are seeking. The General
9 Counsel's version was then subsequently modified in
10 Attachment 3 to Commissioner Bradford's memo of January
11 23rd.

12 MR. BICKWIT: General Counsel initially suggested
13 Appendix B.

14 COMMISSIONER HENDRIE: What you have in the GC
15 memo, I think, is more like the LWA.

16 CHAIRMAN AHEARNE: Yes, we do know those pieces.

17 COMMISSIONER HENDRIE: Let me find Appendix C.

18 COMMISSIONER GILINSKY: You read this
19 two-and-a-half year process, I gather, in the words "Until
20 review by the Commission has been completed."

21 COMMISSIONER HENDRIE: Yes.

22 COMMISSIONER GILINSKY: Suppose it said something
23 like "until Order of the Commission"?

24 COMMISSIONER HENDRIE: Then, so far as the
25 language of this regulation, you would not be constrained in

1 my view to track all the way through the whole appeal in the
2 Commission review process, but in fact it would mean just
3 that. The director can't go anywhere with the board's
4 decision until he gets an okay from the Commission. If the
5 Commission then chose to adopt some procedure like the
6 reactor Appendix B procedure, it could do so.

7 We could either do that, or we could spell out in
8 a little more detail what we contemplate. Ordinarily, I am
9 sort of philosophically not in favor of spelling it out much
10 more than is absolutely necessary in regulations
11 themselves. Since we do have a procedure set down in the
12 reactor case, it is at least worth talking about, whether it
13 would be useful to have a little more indication here of
14 what that Commission approval means.

15 COMMISSIONER GILINSKY: Frankly, I wanted to put
16 the Commission more squarely in the path of the decision
17 than Appendix B puts us in the reactor case, simply because
18 it is one of a kind. I think here the Commission needs to
19 be doing more than having its finger on the choke point.

20 CHAIRMAN AHEARNE: You in the past had proposals
21 on the appeal board. Would you have any comments on Joe's
22 concern to bring in the appeal board in this process?

23 COMMISSIONER GILINSKY: I don't know. I have
24 always favored the two-step adjudication process. I am not
25 sure that this is the right vehicle to redo our appeal

1 process. That is more or less your suggestion.

2 CHAIRMAN AHEARNE: I was just trying to get some
3 mechanism. I think I agree with you on that I don't see the
4 Commission involved in just taking a quick look. I think
5 there has to be more direct involvement. This would mean to
6 me that there are two major reviews, and I did not see a
7 third.

8 COMMISSIONER GILINSKY: In somewhere along the way
9 we decide to go to a two-step adjudication process, it will
10 immediately also apply to this case, since in whatever rule
11 we write we will have an indication of what happens to all
12 the pending cases.

13 I don't think that it doesn't make sense to have
14 an appeal process that just runs on for years while we are
15 building things, and all the important decisions that relate
16 to it. You are really just tidying things up for the court,
17 which is why I would like to see it compressed. I am not
18 sure that to try something for this particular case is the
19 way to go about doing it.

20 I think that by saying "By order of the
21 Commission," you put the Commission squarely in it.

22 CHAIRMAN AHEARNE: Yes, and you leave open the
23 particular set of procedures that would then be followed.

24 COMMISSIONER GILINSKY: Right.

25 CHAIRMAN AHEARNE: Which might not be bad at this

1 stage.

2 COMMISSIONER BRADFORD: I have not heard any rush
3 of acclaim for the proposal I circulated on Friday, unless
4 it sounded somewhat like what Joe was talking about.

5 COMMISSIONER HENDRIE: I will tell me what
6 bothered me about your Attachment 3, Peter, and that was, if
7 the Atomic Safety and Licensing Appeal has completed its
8 review of all issues raised on appeal or its own motion with
9 regard to radiological suitability, environmental
10 suitability of the site, safety, and so on and son.

11 What yours does, it seems to me, the Commission,
12 in fact, can authorize a portion of the construction to go
13 forward, but not until the appeal board has ground all the
14 way through, and we have then ground on their report with
15 regard to these site suitability issues, safety,
16 radiological safety, radiological safety, and
17 environmental. Then, of course, the safety and
18 environmental acceptability of that portion of construction
19 to be undertaken.

20 I am not sure to buy you a whale of a lot, because
21 it seems to me that the hard arguments in this case are the
22 site suitability ones, rather than arguments about whether a
23 copper overpack, or a stainless steel overpack is precisely
24 the right one.

25 COMMISSIONER BRADFORD: It only buys you time,

1 Jie, if you structure the proceeding from the beginning with
2 an eye toward having those issues decided first at each
3 stage.

4 You are quite right that if everything reaches the
5 appeal board at once --

6 COMMISSIONER HENDRIE: But if that turns out to be
7 75 percent of the storm fury and litigative energy in the
8 case, yes, it is a help to have it up front, but not a whale
9 of a lot.

10 COMMISSIONER BRADFORD: On the other hand, how
11 could you start construction in any serious way without
12 having made those three findings for the agency in any
13 case. Is there a more limited set of findings that you
14 would suggest one could make?

15 CHAIRMAN AHEARNE: I think the argument is whether
16 the appeal board has to go through that in complete detail.

17 COMMISSIONER BRADFORD: There would be no point in
18 having the appeal board continue to work on it after the
19 Commission had authorized construction.

20 COMMISSIONER HENDRIE: They do under Appendix B on
21 reactors.

22 COMMISSIONER BRADFORD: That is what we are trying
23 to avoid, I thought. That is on "the risk of the applicant"
24 theory that really just doesn't have much applicability in
25 this context.

1 CHAIRMAN AHEARNE: I was trying to avoid the
2 appeal board from doing that for my purposes.

3 My concern with Peter's proposal is that it would
4 not really lead to a significant removal of that second
5 tier.

6 COMMISSIONER HENDRIE: It is not framed to remove
7 the second tier review. It is aimed like the LWA provision,
8 to try to take the case --

9 CHAIRMAN AHEARNE: I understand what it is aimed
10 that.

11 COMMISSIONER HENDRIE: Let's take some issues in
12 the hearing, and push those up front.

13 CHAIRMAN AHEARNE: I understand that. I just
14 don't believe, whether it is a single administrator or a
15 commission at the time this comes up, but whatever is the
16 agency, I don't see the agency authorizing going ahead with
17 the construction of the first high-level waste repository
18 without a substantial review.

19 I think you are automatically going to have two
20 lengthy reviews. I don't believe that it is appropriate to
21 build in a third.

22 COMMISSIONER BRADFORD: If one could be sure that
23 the Commission would, in fact, go at this the way the appeal
24 board does now, in the sense of taking what would be a
25 20,000-page or so record and reading it, then there would be

1 a lot of merit to what you are saying. But I don't think
2 that we can be confident enough that the Commission will
3 have so little else before it in whatever year this comes up
4 that you would get the kind of review that we normally do
5 get from the appeal board.

6 I think it is clear to all of us that there are
7 two ways, perhaps, to save time here. One is to try and put
8 aside some of the issues before one can start construction,
9 and that is my approach. The other is to put aside the
10 review, and that is your approach.

11 I must say, considering the overall times involved
12 here, I am not sure that the saving of time at the outset
13 makes all that big a difference. That is, one does not want
14 to stretch out time once construction is started, but
15 whether it starts in January of one year versus January of
16 another, at the end of this decade, probably does not make a
17 big difference over the span of time that we are talking
18 about for the waste storage.

19 I am all for starting it as soon as one reasonably
20 can.

21 COMMISSIONER HENDRIE: I think it makes a lot of
22 different to the project people who would hope to build it,
23 and so on. The process we contemplate is one which seems
24 very, very lengthy at best.

25 CHAIRMAN AHEARNE: I don't feel that this would be

1 a year. I feel it would be much more like an antitrust
2 case.

3 COMMISSIONER BRADFORD: It takes time in an
4 antitrust case, or at least what takes a staggering amount
5 of time is the initial decision of the huge trial.

6 CHAIRMAN AHEARNE: The appeal board review have
7 tended to take --

8 COMMISSIONER BRADFORD: I am thinking of antitrust
9 cases in general, and not just this agency.

10 CHAIRMAN AHEARNE: I think in our case we do have
11 to look at agency practice, because it is a function of how
12 familiar is the system with the particular type of case.
13 This would be the one.

14 COMMISSIONER BRADFORD: I should think, though, if
15 the Commission at the time the application comes in says:
16 "We want this case structured in a way that issues relevant
17 to an early construction authorization are decided first,
18 and reviewed expeditiously." We have never laid that kind
19 of a charge on the appeal board with regard to antitrust
20 cases. In fact, I think there is probably some tendency to
21 put the antitrust cases to one side when the press of work
22 gets too heavy. So if the system is charged the other way,
23 I think that those issues could move separate.

24 I don't hold this out as having the potential to
25 save years, it clearly doesn't. But I don't it loses much

1 compared to cutting the appeal board out, and I am reluctant
2 to do that for other reasons.

3 CHAIRMAN AHEARNE: Victor has solution to defer
4 action.

5 COMMISSIONER GILINSKY: Suppose we said, "Until
6 Order of the Commission," and then say that the Commission
7 will find with respect to radiological site suitability, and
8 environmental site suitability, and whatever else it feels
9 sufficiently confident, it agrees that construction may
10 begin. That way you would be at least spelling out what the
11 Commission's Order has to deal with.

12 CHAIRMAN AHEARNE: That would be fine.

13 COMMISSIONER BRADFORD: You are not saying one way
14 or the other about the appeal board at this time.

15 COMMISSIONER GILINSKY: Right.

16 Picking up your points, the Commission Order would
17 have to say more than it is okay.

18 COMMISSIONER BRADFORD: I think in the interest of
19 progress this may be as well as we are going to do.

20 COMMISSIONER HENDRIE: I would like to suggest a
21 procedure. I would like to see that written down before we
22 try to decide one way or the other. I would also like a
23 chance for the collective legal and technical staffs to
24 scratch head over it, and see what they like or don't like
25 about it. I don't want to decide today.

1 CHAIRMAN AHEARNE: It leaves the issue open. The
2 advantage of it is that it moves the rule forward.

3 COMMISSIONER HENDRIE: A procedural rule which
4 comes down finally and leaves a void between the steps -- It
5 says: Here are steps one, two, three, four. Then it gets
6 to step 42, and then says, "Well sometime thereafter there
7 will be a decision, and we are not going to explain in this
8 procedural rule how we get from step 42 to the end."

9 COMMISSIONER BRADFORD: That is not what it says.

10 COMMISSIONER HENDRIE: No.

11 CHAIRMAN AHEARNE: After all, Joe, in the next
12 five years, long before this would have to be resolved,
13 there might actually a little more understanding of the
14 process. All the giants of the earth are not walking around
15 at the moment.

16 COMMISSIONER HENDRIE: I am unprepared to agree
17 with that.

18 (General laughter.)

19 COMMISSIONER GILINSKY: I think also once an
20 initial decision comes down, I think this whole issue is
21 going to be reviewed by the Commission. The Commission is
22 going to have to deal with it, and since the rule says --

23 COMMISSIONER HENDRIE: It may be that the
24 formulation you are heading toward is one that can do it,
25 but I would like to see it drafted, and people scratch their

1 head. As soon as we can come back to it, let's come back to
2 it.

3 Before you leave that point, I thought it was very
4 helpful, remember back when we were doing the policy
5 statement that turned out to be Appendix B for reactors, one
6 of the concessions we made to our late colleague was that
7 the Commission would either do something, or say why it was
8 unable to do something in a certain number of days. I think
9 that on balance that is probably a useful prod to have in
10 the language, and I wonder if it is possible to consider
11 some similar provision here, not 20 days, but some
12 proposition.

13 CHAIRMAN AHEARNE: I was very strongly in favor of
14 it at that time.

15 COMMISSIONER BRADFORD: I was not wild for it the
16 last time around. I guess I can't point to any situation in
17 which it has made any difference.

18 COMMISSIONER HENDRIE: We have yet to have an
19 Appendix B case before us.

20 MR. BICKWIT: We had a small one up recently.

21 COMMISSIONER HENDRIE: You mean the Zero Power
22 situation?

23 MR. BICKWIT: Yes.

24 COMMISSIONER HENDRIE: It was a useful prod in
25 that case.

1 COMMISSIONER BRADFORD: Was it?

2 MR. BICKWIT: It was to our office.

3 (General laughter.)

4 COMMISSIONER HENDRIE: That is right, it moved
5 him.

6 COMMISSIONER GILINSKY: But the fact is, there is
7 going to be no lack of pressure.

8 CHAIRMAN AHEARNE: Len, you will try to draft
9 something for us?

10 MR. BICKWIT: Yes.

11 CHAIRMAN AHEARNE: Page 32? Page 33? Page 34?
12 page 35?

13 Those of you who have a page 36, which I don't --

14 COMMISSIONER BRADFORD: Not I.

15 CHAIRMAN AHEARNE: What is page 36?

16 MS. CAMELLO: I don't have a page 36 either.

17 Whatever it was, it has remained the same. I can find an
18 earlier page 36.

19 (General laughter.)

20 CHAIRMAN AHEARNE: Under the assumption, which we
21 will trust you to verify, that 36 is as it was.

22 Page 37? Page 38? Page 39?

23 Does anybody have any changes in the remaining
24 pages on the issues?

25 MS. CAMELLO: Page 36 deals with Part 21 solely.

1 COMMISSIONER HENDRIE: Other than definitions.

2 CHAIRMAN AHEARNE: Rather than counting out every
3 page, does anyone have any --

4 COMMISSIONER BRADFORD: You still owe me a staff
5 guidance memo, but that would not be part of this anyway.

6 CHAIRMAN AHEARNE: Which staff guidance memo is
7 that?

8 COMMISSIONER BRADFORD: That is the one where we
9 indicate to the director that at any point in the process
10 that calls for his approval in the rule, he is to consult
11 with the Commission. You, I think, were not in favor of it,
12 but the other two were.

13 COMMISSIONER HENDRIE: Was I?

14 COMMISSIONER BRADFORD: You were as long as it was
15 not put in the rule, but was made the subject of a staff
16 guidance memo.

17 CHAIRMAN AHEARNE: So you are in favor of having
18 the director come back up to the Commission every time he
19 has to do his job.

20 COMMISSIONER HENDRIE: Well, he would be doing
21 that at six-month intervals, I think.

22 CHAIRMAN AHEARNE: No.

23 COMMISSIONER HENDRIE: Don't they send you things
24 every six months?

25 CHAIRMAN AHEARNE: No, we changed that. We

1 changed it to where the director can request information
2 from DOE whenever needs to.

3 COMMISSIONER HENDRIE: Yes, but expect to get sort
4 of a six-month regular report, don't we?

5 MS. CAMELLO: There are semi-annual reports that
6 DOE has to make on the progress of site characterization.

7 COMMISSIONER HENDRIE: He can always go and ask
8 for things in-between, we allowed that. But the regular
9 flow, sort of the formal reporting, as it were, of the
10 project will come in the semi-annual reports. He will write
11 a letter back saying, "Wishing you lots of luck," or
12 whatever is appropriate. I think it is not inappropriate
13 that he come and brief us on what the semi-annual report
14 was, how things are going, and what he is writing back. I
15 don't find that a problem. He may find it a problem, but it
16 helps to keep the Commission informed of what is going on.

17 CHAIRMAN AHEARNE: Correct me if this is wrong,
18 Peter, but my impression was that you were going beyond a
19 briefing on the semi-annual reports. Whenever the director
20 was going to give his approval to something to the DOE, he
21 should first consult with the Commission.

22 COMMISSIONER BRADFORD: There are not that many
23 points in here, I think, where the director's approval is
24 called for in the rule. But you are quite right that on
25 those occasions where it is called for, my point was, in

1 essence, that he should brief the Commission as to what it
2 is that he is approving on a consultative basis.

3 I guess we would stop him if the majority
4 disagreed, but --

5 COMMISSIONER GILINSKY: Are you saying that he
6 would send up a note saying, "I intend to approve the
7 following," and would in so many days.

8 COMMISSIONER BRADFORD: The only thing I can
9 remember off-hand that I know that this would cover is the
10 approval of the site characterization plans. What other
11 situations are there in there that explicitly call for the
12 director's approval?

13 MR. DIRCKS: Is that during the site
14 characterization phase?

15 COMMISSIONER BRADFORD: I think in the rule
16 itself, what is there beyond the site characterization plan
17 that explicitly calls for the director's approval?

18 MR. MARTIN: That is a major event. It really not
19 approval, it is comment. That is what I understood, that we
20 would come down and give you a briefing on what action we
21 would intend to say. That should not be a problem. There
22 are not many of them, three or four.

23 COMMISSIONER BRADFORD: That is right.

24 COMMISSIONER HENDRIE: I think you would want to
25 come and keep us informed anyway about their progress and

1 what they were reporting, and what you were planning to say
2 back by way of written comments representing the agency.

3 MR. MARTIN: I think we discussed that.

4 CHAIRMAN AHEARNE: I think the point I was trying
5 to make is that as the future time develops, I think the
6 administrative responsibility for the flow of information is
7 something that has to be worked out by the then Commission,
8 or the then head of the agency, and the then staff.

9 I don't think that it is a good idea to try to pin
10 down at this stage administrative reporting arrangements.
11 Certainly if it were tomorrow, I would certainly expect them
12 to come in and tell us what they are doing.

13 COMMISSIONER HENDRIE: Pindown is a peculiar
14 word. This is a staff directive we are talking about
15 writing.

16 COMMISSIONER BRADFORD: That is exactly right.

17 COMMISSIONER HENDRIE: Which we would publish at
18 this time, and that would stand as sort of a Commission to
19 Bill or John when they get a repository project going. At
20 any time, our successor commissions can send down another
21 staff memo saying, "We thought it over, and never mind. We
22 don't want to hear about it," or whatever.

23 CHAIRMAN AHEARNE: I want to reiterate that I was
24 not saying that whoever is running the agency would not want
25 to hear about it. It is just it did not seem to me that we

1 were attempting to pindown, knowing that we are not going to
2 be the ones sitting here hearing about the comments. We
3 were still putting into place an administrative procedure
4 that was not going to affect us.

5 COMMISSIONER BRADFORD: The only point in that
6 same category was that we agreed that the technical rule was
7 to speak to some extent as to the criteria for what was in
8 these sites.

9 CHAIRMAN AHEARNE: Wasn't that in the staff
10 correspondence?

11 COMMISSIONER BRADFORD: If it already has been,
12 fine.

13 CHAIRMAN AHEARNE: I think so. I know one went
14 out in the last week.

15 COMMISSIONER BRADFORD: Okay.

16 CHAIRMAN AHEARNE: Do you have anything else,
17 Peter?

18 COMMISSIONER BRADFORD: No.

19 CHAIRMAN AHEARNE: Joe?

20 COMMISSIONER HENDRIE: Item 1, my recommendation
21 is that on page 76 of the Enclosure A, about six or seven
22 lines from the botton, that you take out the old English
23 spelling of full-time, "additional full-time inspectors,"
24 unless it means something other than full-time.

25 The second thing is with regard to our extended

1 discussions about the immediate effectiveness aspect. It
2 seems to me that we are not going to be able to enunciate
3 that section without some suggestion or idea of what the
4 appeals board is or is not going to do in the process.

5 What I recommend is that counsel and assorted
6 legal authorities scratch their heads, and see what they
7 would recommend to us.

8 CHAIRMAN AHEARNE: It is possible, however, to
9 leave 42 open. I think your point is that you would advise
10 against that.

11 COMMISSIONER HENDRIE: I would advise against
12 that. It seems to me a bad thing to do to issue a final
13 procedural rule, which does not in fact tell you how you get
14 from the beginning to the end.

15 CHAIRMAN AHEARNE: Any other comments?

16 COMMISSIONER BRADFORD: It has been pointed out to
17 me that if I were to adhere honestly to the spirit of my
18 agreement with Joe on the language on page 63, we should in
19 fact drop the word "explicitly." You had talked me out of
20 that one before, and you should be permitted to keep it.

21 COMMISSIONER HENDRIE: Thank you, Tom. You saved
22 a terrible miscarriage of justice in language.

23 Take out explicit?

24 MS. CAMELLO: I have it.

25 COMMISSIONER HENDRIE: May I have the name of the

1 typist who keeps typing back in --

2 CHAIRMAN AHEARNE: No, you may not. That does not
3 extend to your prerogatives.

4 Any other comments?

5 (No response.)

6 CHAIRMAN AHEARNE: The meeting is adjourned.

7 (Whereupon, at 4:10 p.m., the meeting adjourned.)

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NUCLEAR REGULATORY COMMISSION

This is to certify that the attached proceedings before the

COMMISSION MEETING

in the matter of: Discussion and Vote on SECY-81-48-Final Rule to 10 CFR
Part 60 - Disposal of High-Level Radioactive Wastes

Date of Proceeding: January 26, 1981

Docket Number: _____

Place of Proceeding: Washington, D. C.

were held as herein appears, and that this is the original transcript thereof for the file of the Commission.

Patricia A. Minson

Official Reporter (Typed)

Patricia A. Minson

Official Reporter (Signature)

LAW OFFICES

LOWENSTEIN, NEWMAN, REIS, AXELRAD & TOLL

1025 CONNECTICUT AVENUE, N.W.

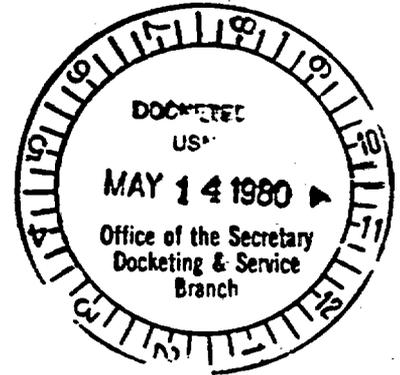
WASHINGTON, D.C. 20036

202-862-8400

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DOCKET NUMBER
PROPOSED RULE PR-60 ①
(45 FR 31393)



April 11, 1980

Chairman John F. Ahearne
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Chairman:

As the Commission has announced, the NRC Staff is preparing proposed technical criteria to be included in forthcoming regulations governing the geologic disposal of radioactive wastes (Subpart E - Technical Criteria of Proposed 10 CFR Part 60, Disposal of High-Level Radioactive Wastes in Geologic Repositories). In the course of this preparation, the NRC Staff has discussed the concepts it is incorporating into its proposals with interested agencies and organizations, including the Department of Energy, environmental groups and industry. We understand that the NRC Staff will be submitting a draft proposed regulation to the Commission for its approval and publication in the Federal Register relatively soon; perhaps next month.

We had an opportunity to discuss an early version of the draft technical criteria with the NRC Staff last October. We have been provided a more current version which still contains a number of concepts that we believe to be troublesome.

Although we realize that there will be an opportunity for public comment at such time as the proposed criteria may be approved by the Commission for publication in the Federal Register, we are writing this letter to you now because we believe that the Commission should be aware of certain basic problems before it makes a determination as to whether to issue a proposed regulation for formal comments.

8005290137 GPP.

7/5/11/80

Chairman John F. Ahearne
April 11, 1980
Page Two

Some of the problems identified below are so basic that we would urge the Commission to direct the NRC Staff to review these areas further and to develop revised proposed regulations which would be more consistent with a sound regulatory approach. In some areas it may be possible that the proposed regulations could be redrafted so as to include alternative approaches for public comments. We are concerned that if the proposed regulation is issued in its present form it will imply that the Commission has decided - albeit only tentatively for purposes of public comments - that the proposal reflects the Commission's current view of the appropriate regulatory approaches. We believe that if the Commission reviews these matters carefully at this time it will wish to avoid creating such a public impression.

We have two basic concerns with the draft regulation and the accompanying document entitled "Approach and Rationale." First, in our view, the proposal is largely inconsistent with the widely accepted "systems approach" to nuclear waste management. We believe it is essential that the NRC regulations define standards and criteria for the acceptable performance of an overall disposal system so that sound programmatic and implementing decisions can be made that result in a conservative approach to meeting performance requirements through an appropriate combination of natural and engineered components of the system. Instead of focusing on performance of the overall system, the proposed regulation, in its present form, specifies minimum or absolute requirements for various aspects of components of the system. Whether or not any of these requirements are individually justifiable, we are concerned that when imposed as a group upon a proposed system they will result in a set of unrelated, unrealistic requirements that are not based upon potential risk to public health and safety or the environment, and that may not be attainable in any one, specific geologic medium or site. In essence, they may amount to an unrealistic collection of redundant requirements which may conceivably be less conservative than appropriate requirements based on system performance. We urge the Commission to direct the NRC Staff to develop criteria and standards tied to a reference methodology for projecting repository performance that is delineated in a manner that bears a logical relationship to known risks (both radiological and non-radiological) from natural events and common activities.

Our second basic concern is that the proposal, in its current form, contains little analysis or rationale in support of the quantitative requirements to be imposed on components of the system, or on processes or conditions that may have some

Chairman John F. Ahearne
April 11, 1980
Page Three

potential impact on the system. Since the technical or other basis for the requirements is not set forth, it is difficult to evaluate the validity of the Staff's proposal. Moreover, in some instances, requirements are indiscriminately carried over from one area to another. For example, whatever may be the merits of a 2 km control zone for human activities, it is difficult to understand why the same area should be applied in order to preclude or avoid natural processes - a requirement which, in our view, would appear to be much more site dependent and, therefore, could vary under particular circumstances. Again, we urge the Commission to direct the NRC Staff to include in the proposed regulations only requirements for which the Staff can provide a meaningful analytical basis and rationale.

The Attachment to this letter contains a number of additional comments as examples of the types of problems we perceive in the Staff's current approach. We do not suggest that the Commission needs to review them in detail at this time; but they serve to buttress our view that the Commission should provide the NRC Staff with more explicit guidance as to both the objectives of the regulations, and the back-up that the NRC Staff should include for any proposal. For example, we believe that the NRC Staff's proposed lengthy retrievability requirement (see Item 4 of Attachment) not only has no appropriate basis, but will inevitably result in some compromise of containment-isolation integrity and, in addition, may also be misinterpreted as putting off disposal decisions to future generations.

The safe disposal of high level radioactive waste on a timely basis is a matter of transcendent importance. We believe that, at each stage in the development of relevant regulations, the Commission will want to proceed in as careful, fully-considered manner as possible. It is in this spirit which we write you now.

We would be pleased, of course, to discuss our views on these subjects with the Commission or with the NRC Staff.

Sincerely,

EDISON ELECTRIC INSTITUTE

By Michael A. Bauser
Michael A. Bauser

MAB:cfw
Attachment

Chairman John F. Ahearne
April 11, 1980
Page Four

cc: Commissioner Joseph M. Hendrie
Commissioner Victor Gilinsky
Commissioner Richard T. Kennedy
Commissioner Peter A. Bradford
William J. Dircks, Executive
Director for Operations

Examples of Specific Comments

1. Some of the requirements can be construed as unjustifiably precluding salt and basalt formations as potentially suitable for a deep geologic repository. (See proposed sections 60.122(b)(1)(ii), 60.122(b)(3)(iii), 60.122(b)(4)(ii), 60.122(b)(5).) Clarification and/or revision is needed to relate these requirements to acceptable system performance.
2. The limitation on annual release rate of radioactive material as proposed in section 60.111(b)(3) needs to be clarified (in addition to providing the analytical basis for the quantitative value). Such a requirement must bear some logical relationship to the potential for producing hazard rather than as an arbitrary expression of total inventory (e.g., is a release from a larger capacity repository a priori more acceptable than one from a smaller capacity one?).
3. The proposed regulations appropriately do not require the design to accommodate the effects of meteorite or aircraft impacts. They should similarly exclude from consideration geologic events (e.g., vulcanism, active faulting) that obviously will be extremely improbable at a suitable repository location.
4. The unduly lengthy retrievability requirement in proposed section 60.111(d) will inevitably result in some compromise of containment/isolation integrity. Not only does it violate a systems approach to attainment of effective radiological protection, it also re-raises the issue of putting off disposal decisions to future generations. The retrievability requirement needs much more careful and rigorous analysis before specifying any arbitrary requirement. One basis that should be included in such an analysis is the time

frame in which useful performance or test data and information may be acquired following waste emplacement.

5. 60.121(b): The purpose of the Control Zone (CZ) as stated in this section differs from its application in 60.122. The requirements for controlling human activities differ from the need to avoid natural processes, and the same dimension may not be appropriate for both. Indeed, the dimensions for avoiding some hazards will be different than for others. The vertical distance specified for the CZ would appear to allow directional drilling or mining below the actual repository. If this is intended, it should be clear that such activities must be shown not to compromise containment.

6. 60.122(c) (3) (i): Permeability of 1×10^{-12} is below the resolution of most measuring equipment and likely would be difficult to demonstrate with confidence. Instead, there should be included a more reasonable limit that could be measured within the state-of-the-art. Furthermore, existing and anticipated hydraulic gradients are equally important to fluid movement and should also be addressed.

7. 60.122(d) (1): Investigations in the area extending 100 km or more from the site may be appropriate. However, it should be clear that the actual distance investigated would be determined by the location of conditions affecting the site. It may be necessary to investigate certain aspects of some sites at distances of more than 100 km while investigations of other factors or at other sites may be adequate at distances much less than 100 km.

UNITED STATES ARMS CONTROL AND DISARMAMENT AGENCY

Washington, D.C. 20451

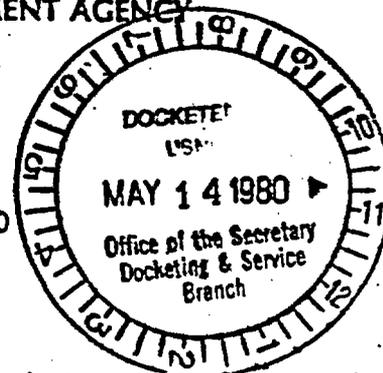
DOCKET NUMBER

PROPOSED RULE

PR-60 (2)
(45 FR 31393)

OFFICE OF
THE DIRECTOR

April 11, 1980



Dear Mr. Ahearne:

The Arms Control and Disarmament Agency appreciates the invitation, extended in your letter of March 12, to contribute to the Nuclear Regulatory Commission's rule-making proceeding on the disposition of radioactive wastes. Although ACDA has no direct programmatic responsibilities in this area, discussions related to the back end of the nuclear fuel cycle have important nuclear nonproliferation implications, and, as such, are of considerable interest to this Agency. Accordingly, we participated in both the International Nuclear Fuel Cycle Evaluation (INFCE) and Interagency Review Group (IRG) analyses of methods for managing and disposing of nuclear waste materials, including, especially, spent nuclear reactor fuel.

With respect to your first two questions, we note that the IRG and INFCE reports concluded that permanent disposal of radioactive waste is technically feasible, and that President Carter has established a schedule which calls for the first full-scale repository to be operational in the mid-1990's.

Your third question dealt with on-site storage of spent fuel in the event of the unavailability of an off-site capability at that time. We understand that the technology for storage of spent fuel in water-filled pools is well-established and has been proven through extensive experience. We know of no evidence that would preclude the use of this storage technology for extended periods. In addition, reliance on dry techniques for long storage periods also appears to be feasible.

We believe it would be useful to make several additional comments. As you know, for reasons associated primarily

Mr. John F. Ahearne
U.S. Nuclear Regulatory Commission
Washington, D.C.

4/18..To OGC for Appropriate Action....Cpys to: RF...80-0783

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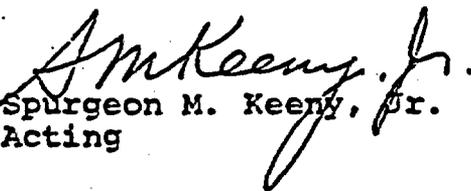
with nuclear proliferation concerns, the U.S. Government has indefinitely deferred support for deployment of a domestic commercial reprocessing capability. As a consequence, consideration is being given to providing for both temporary storage and permanent disposal of high-level wastes in the form of spent fuel which has not been reprocessed. In a position fully supported by ACDA, the IRG found that "reprocessing is not required to assure safe disposal of commercial spent fuel in appropriately chosen geologic environments. Moreover, current United States repository designs are and will continue to be based on the ability to receive either solidified reprocessing waste or discarded spent fuel as a waste material." Thus the question of whether spent fuel is reprocessed or not should not affect conclusions about the availability of off-site disposal facilities for high-level radioactive wastes.

In the shorter term, the Administration is moving toward creation of an away-from-reactor spent fuel storage capability as a further measure for assuring that spent fuel can be safely contained in off-site locations.

Finally, we would like to point out the important non-proliferation implications of an early demonstration of methods for off-site storage and disposal of spent fuel. While the decision to defer commercial reprocessing in this country was based primarily on economic considerations, it was also intended to encourage other countries to consider such deferral. The success of such a policy is, of course, dependent on demonstrating the availability of alternative technologies for coping with the resulting accumulations of spent fuel being generated by operating nuclear reactors. The NRC rulemaking process will constitute an independent assessment of the viability in the U.S. of such alternative technologies, and it may stimulate other countries to consider permanent disposal options which do not require reprocessing.

We hope that these comments will be useful in NRC's rulemaking proceeding.

Sincerely yours,


Spurgeon M. Keeny, Jr.
Acting

JOH HINSON
4TH DISTRICT, MISSISSIPPI

COMMITTEES:
BANKING, FINANCE AND
URBAN AFFAIRS
EDUCATION AND LABOR

Congress of the United States
House of Representatives
Washington, D.C. 20515

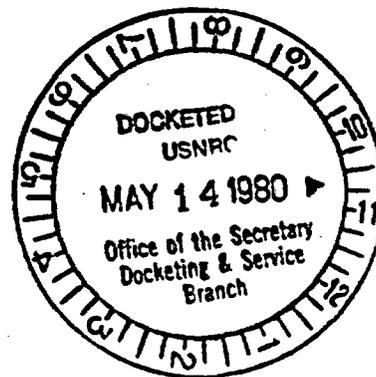
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ADMINISTRATIVE ASSISTANT
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DISTRICT OFFICES:
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(601) 955-3300
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April 16, 1980

DOCKET NUMBER
PROPOSED RULE PR-60 (3)
(45 FR 31393)

Mr. John F. Ahearne
Chairman
Nuclear Regulatory Commission
1717 H Street, NW
Washington, D.C. 20555

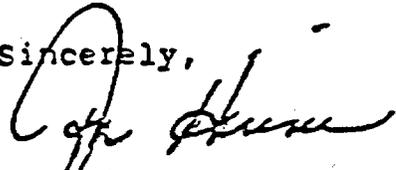


Dear Mr. Ahearne:

Please find enclosed a self-explanatory letter from Peter J. Walley.

I respectfully request a report on this matter. Thank you for your assistance.

Sincerely,


Jon Hinson, M.C.

JH/rl

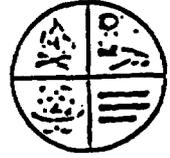
4/24..To OGC for Direct Reply..Suspense: May 2.. Cyps to: EDO
Docket, OCA to Ack...80-0830

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MISSISSIPPI DEPARTMENT OF NATURAL RESOURCES

Office of Energy
P. O. Box 10586
Jackson, Mississippi 39209
(601) 961-5060



March 3, 1980

Secretary
Nuclear Regulatory Commission
Washington, D. C. 20555

Attn: Docketing and Services Branch

Dear Sirs:

RE: COMMENTS ON PROPOSED RULE FOR DISPOSAL OF
HIGH-LEVEL RADIOACTIVE WASTE (HLW) IN GEOLOGIC
REPOSITORIES; PROPOSED LICENSING PROCEDURES

The present approach to the HLW Disposal process evidenced by the proposed licensing procedures outlined in FR Vol 44, No. 236 is an action in the proper direction. The Mississippi Office of Energy supports the concept of the NRC's involvement in expanded site characterizations rather than provisional construction authorizations and in the review of the Department of Energy's plans for site characterization and site selection procedures, methods and criteria prior to the use of such procedures, methods, and criteria.

There are, however, several comments and questions that deserve additional attention:

- 1) It is most important at the state and local level that agency representatives and citizens in general have a clear understanding of the roles to be played by DOE, NRC, EPA, and other federal agencies that might be involved. The process now defined tends to cloud and distort the view as to these roles.

Some overview of these relationships should be made an ongoing part of any state and local public hearing and/or meetings.

- 2) There are presently several site characterization decisions in progress by DOE, including three sites in Mississippi. The site characterization reports under the pre-application review should apply in retrospect to these efforts.
- 3) The site characterization report does not address directly the problems of site-related impacts, such as transportation, economic and social, on the local and state infrastructure and population. This should be specifically addressed in any site characterization report.

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Secretary, Nuclear Regulatory
Commission

Page 2

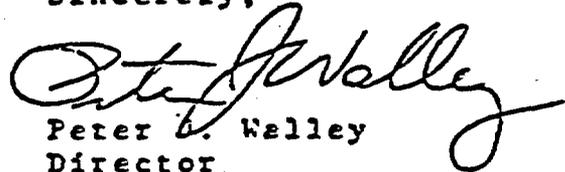
March 3, 1980

- 4) The contents of license applications require plans for coping with radiological emergencies. These types of plans place a considerable amount of responsibility for planning on the state and local governments. The extent and scope of the plans should be defined as in those regulations required for nuclear commercial power reactors.
- 5) In the license amendment to decommission the description of the program for post-decommissioning monitoring should be more specific and require some minimum level of activity in perpetuity.
- 6) The general tone of the Subpart C--Participation by State Governments--gives the impression that state and local governments are that of observers and occasional participants provided they generate enough activity.

The consultation process should give the state a stronger, more formalized role in the activities of site characterization, particularly those that relate to site specific data as opposed to generic data. The concurrence part of the consultation and concurrence process would then be addressed by any state and/or federal laws in place. The consultation definition and process should be made clearer to the extent that the state has the procedure available to recommend specific courses of action whereupon the Director of the NRC's Office of Nuclear Materials Safety and Safeguards would respond in writing as to why a particular recommendation was not taken, if so. This would define the state participation program in a formal sense. This, of course, would then modify the approval of proposals process (Section 60.83).

Please be assured that Mississippi is vitally concerned with this process and will provide additional comments and concerns as the issue matures.

Sincerely,


Peter A. Walley
Director

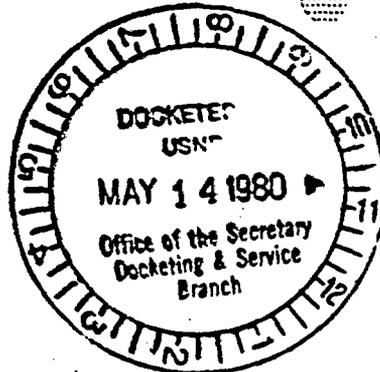
PJW/js

cc: Governor William Winter
Attorney General William A. Allain
Mississippi Congressional Delegation



National Aeronautics and
Space Administration
Washington, D.C.
20546
Office of the Administrator

PR-60



APR 18 1980

The Honorable John F. Ahearne
Chairman
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

DOCKET NUMBER PR-60⁽⁴⁾
PROPOSED RULE (45 FR 31393)

Dear Mr. Ahearne:

In response to your letter of March 12, 1980, concerning the proposed rulemaking related to safe disposal of radioactive wastes, we have no information that would modify the conclusions of the Report to the President by the Interagency Review Group (IRG) on Waste Management, TID-29442 March 1979. As a result of the IRG study, we consider it to be within the capability of the Nation to solve the waste problems.

Our internal review indicates that the subject of near-term disposal of nuclear waste lies outside of NASA's principle areas of expertise. Accordingly, we believe that it would be proper for us to defer to the judgment of others on the more immediate issues identified in your letter. For the longer term, as the Commission is aware, we are conducting an assessment of space concepts for nuclear waste isolation in support of DOE studies of alternatives in nuclear waste management. On the basis of these studies, we believe one technologically feasible future option may be permanent isolation of nuclear wastes in deep space.

We hope that you find this information useful.

Very truly yours,

Robert A. Frosch
Administrator

ACKNOWLEDGED by card. 5/13/80 mdy

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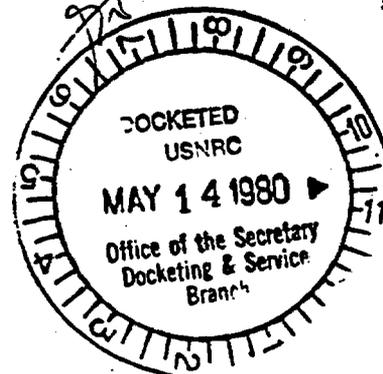


Department of Energy
Washington, D.C. 20545

APR 18 1980

DOCKET NUMBER
PROPOSED RULE **PR-60** (5)
(45 FR 31393)

Honorable Trent Lott
House of Representatives
Washington, D.C. 20515



Dear Mr. Lott:

Thank you for the opportunity to comment on Mr. Peter J. Walley's letter of March 3, 1980 to the U.S. Nuclear Regulatory Commission on their proposed procedures for licensing repositories for the disposal of high-level radioactive wastes. Many of his concerns were addressed by DOE and set forth in DOE's comments to NRC on the NRC proposed procedures. A copy of DOE's comments on the NRC proposed procedures is enclosed for your use in responding to Mr. Walley.

Some clarification of DOE's position may be useful with respect to the second and third itemized points of Mr. Walley's letter. On the second point, we certainly agree that the information presently being developed in site characterization studies underway should be included in reports filed with the NRC and fully intend to do so. An NRC opinion on the completeness of the characterization program would be welcomed and would be included in the planning of any additional tests.

On Mr. Walley's third point, the site characterization report might best, we believe, keep to technical issues related to public health and safety, in line with current recommendations that NRC emphasize those aspects of its oversight of nuclear matters. The socioeconomic and other community impacts mentioned by Mr. Walley would be analyzed in the documents required in compliance with the National Environmental Policy Act (NEPA) and would also be reviewed by the NRC and by State authorities.

Please contact me if I can be of further assistance.

Sincerely,

Original signed by
R. G. Bonatowski

Sheldon Meyers
Deputy Assistant Secretary
for Nuclear Waste Management

Enclosure.

cc: w/o enclosure
J. Martin, Dir., Division of Waste
Management, NRC
✓ E. Minogue, Dir., Office of Standards
Development, NRC

8005300 984 tp.

104 Neville Lane
Oak Ridge, TN 37830

DOCKET NUMBER

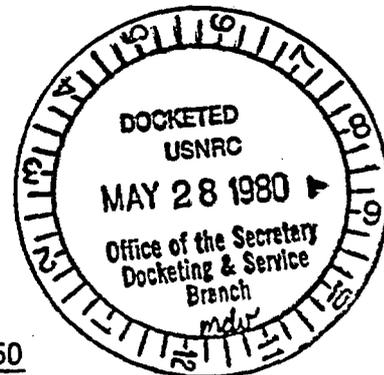
PROPOSED RULE

PR-60 (6)
(45 FR 31393)

May 21, 1980

Secretary of the Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Docketing and Service Branch



Gentlemen:

Subject: Proposed Draft Technical Criteria for 10 CFR Part 60

Given below are some comments on the proposed Draft Technical Criteria for 10 CFR Part 60, "Disposal of High-Level Radioactive Wastes in Geologic Repositories," as published in Volume 45 of the Federal Register on May 13, 1980, at p. 31393 - 31408.

Subpart 60.2 Definitions

"Disposal" is stated to mean "permanent emplacement within a storage space with no intent to retrieve for resource values." I would suggest that "disposal" should mean emplacement with no intent to retrieve for any reason after decommissioning of the repository. "Disposal" should emphasize that a final decision has been made with respect to these wastes except for unforeseeable circumstances that might occur within the repository prior to decommissioning.

"Important to safety" refers to "undue risk to health and safety of the public." Subpart 60.101(b) mentions "unreasonable risk to the health and safety of the public." Is there a difference between "undue risk" and "unreasonable risk"? Why not use either term, but not both? In any event, the term(s) should be defined to provide more specific guidance in the evaluations that are to be performed in accordance with 10 CFR Part 60.

Subpart 60.111 Performance objectives

Suggested wording in (a)(1) is: ". . . reasonable assurance that radiation exposures and releases of radioactive materials are as low as reasonably achievable and in any event within the limits set forth in Part 20 of this Chapter." (underlined words added)

Subpart 60.122 Siting requirements

It is suggested that the words "Demonstration of" be omitted from (3)(ii) and (3)(iii).

acknowledged by card. 5/28/80. mdv....

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May 21, 1980

Subpart 60.132 Design requirements

The word "practicable" is used in (a)(5)(ii). It should be defined, e.g., to include economic as well as technical and health and safety considerations. The word "feasible" could perhaps be used instead of "practicable." "Feasible" has been judicially defined with respect to OSHA standards for noise [Turner Co. v. Secretary of Labor and OSHRC, 7th Cir., 1977, 561 F.2d 82,85 (5 OSHC 1790)].

The phrase "essential to safety" is used in (a)(8)(iii). This should be defined or the previously defined phrase "important to safety" should be used instead.

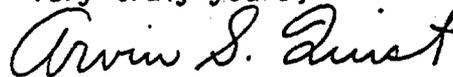
Suggested wording in (a)(9)(ii)(a) is: ". . . to insure that exposures are as low as reasonably achievable and in any event within the limits of Part 20 of this Chapter." Also, it would be useful to define what is meant by "significantly above background levels." Is this 25 percent greater, 50 percent greater, or what? "Small as compared with the natural background" has been suggested to be interpreted as the standard deviation of the natural background or about 20 millirems/year [H. I. Adler and A. M. Weinberg, Health Physics, 34, 719-720 (1978)]. (in suggested wording, underlined words added)

Subpart 60.133 Waste package and emplacement environment

Suggested wording in (c)(3) is: ". . . exposure to operational personnel will be as low as reasonably achievable and in any event not exceed the values in Part 20 of this Chapter; . . ." (underlined words added)

In general, the proposed rules appear to be reasonable and to provide a good basis for high-level waste disposal. It is to be hoped that most of the emphasis will be on the characteristics of the site and not upon the engineered containment features.

Very truly yours,

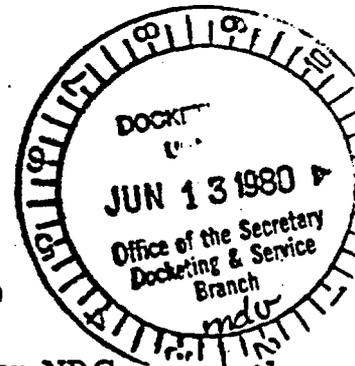


Arvin S. Quist

DOCKET NUMBER

PROPOSED RULE

PR-60 (7)
(45 FR 31393)



Attention: Docketing Division, Samuel Chilk
U.S. Nuclear Regulatory Commission
Office of Public Affairs
Washington, D. C. 20555

June 11/1980

RE: Comments on NRC proposed
rulemaking on Technical Criteria
for regulating geologic disposal
of high-level waste, release No. 80-92
Federal Register May 13, 1980

Dear Sirs:

Objection is hereby given in to storing high level nuclear wastes in rock formations. Nuclear wastes should be secured to the best present state of the art, be that in glass, or in other containers, but always with the option of retrieval.

Geology is not an exact science. It is a science in a constant state of flux, evidenced in reality in continental drift. Some of the high level wastes proposed for disposal will require isolation from the environment for 100,000 years or more. Neither the USGS, nor the NRC, nor DOE can guarantee stability of geologic formations, much less predict where and when earthquakes can occur. Modeling for stable ~~geologic~~ geological sites does not insure stability. Models only provide theoretical configurations.

In section 4. Treatment of Uncertainties you state "First, geologic disposal is an entirely new enterprise ~~is~~ - no experience exists with geologic disposal." The USSR has attempted geologic disposal. Perhaps the NRC should await the results of their initial attempts before committing the U.S. to this "disposal" method.

Section 5. Human Intrusions. The NRC would not have to be concerned about human intrusions in any high-level nuclear waste repository IF you were completely honest in telling the public the dangers associated with these wastes both qualitatively and quantitatively. The NRC and DOE have been very remiss in this and have simply put off the problem by promising a waste management and/or disposal program always sometime in the future.

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.

A. E. Wasserbach

Box 2308 W. Saug. Rd.

Saugerties, New York 12477

800/160779 16.

Acknowledged by card. 6/13/80. mdv.

DOCKET NUMBER

PROPOSED RULE

PR-60 (8)
(45 FR 31393)

June 13, 1980

Attn: Docketing and Service Branch
Nuclear Regulatory Commission
Washington, D.C. 20555



Dear Sir:

The following comments on your May 13, 1980, Federal Register notice are offered in the hope that they can be of some use in developing adequate criteria.

First, an observation. It seems that the very worst of all possible circumstances is where we now find ourselves. Because of delays in reprocessing and waste disposal, coupled with the ongoing military weapons program (and to a much lesser extent the civilian power program), we now have scattered throughout the country, millions of gallons of high level wastes and tons of plutonium and fission products. All this material requires continuous monitoring and is subject to terrorism, war, natural disaster, and assorted accidents. This situation has already been allowed to continue too long, and is a major issue that should be addressed in any environmental impact statement for the technical criteria. It appears that almost any repository design based on storing insoluble wastes would have less long term impact and risk than our current practice.

Accordingly, in your criteria development please consider the following:

1. No environment can be controlled or assured for very long periods of time. Therefore the fuel reprocessing step should be calibrated so that the activity resulting from the actinide content of the finished waste form does not greatly exceed that in naturally occurring uranium or thorium ores. If this is done, the repositories would need no special considerations for the very long term, including the 10000 years mentioned in 60.122(a-2-iii). 500 years would be more reasonable, as a suggestion.
2. Large amounts of geologic survey work will be done to establish the stability and hydrology of a candidate repository formation. Since this will allow establishment of a high level of confidence in continued stability for a few hundred more years, the repository should then be allowed to accept any reasonably immobilized recoverable waste form such as fused ceramic glass, or even encased metal oxides. Best presently available technology should become the guideline, not some hypothetical future perfection which further delays efforts to clean up our present mess.
3. We already have a fission product and transuranic waste repository, namely the Nevada bomb test site. That repository does not seem to be regarded as a particularly serious hazard, and it has not been engineered for multiple barrier containment, or to prevent future human intervention. Therefore, while it is necessary to have some plan for this, it does not appear justified to study this aspect of the problem exhaustively as

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Acknowledged by card. 6/19/80. mdv.

suggested in 60.122(1-3), nor to spend any major effort to validate the modeling of future conditions as called for in 60.122(a-6).

4. Since this is a waste repository, only packaging, not processing, of onsite waste should be required (60.132-b-5).
5. Per comment 3, major efforts to study alternative engineered barriers referred to in 60.132-C-2 do not appear reasonable or justified.
6. Section 60.132-D-1-iii does not seem creditable. If the mass of investigation done prior to the start of construction is not sufficient to generate the required confidence the site should be abandoned. No "pilot program" can prove what the site investigations didn't, unless it lasts hundreds of years.
7. Comparative evaluations of alternative waste forms for every repository, as called for in 60.133-a-1, are not justified. DOE should either specify allowable waste forms, or set specifications. In fact this appears to have done in (b), so (a) is entirely without merit.

In summary, the thrust of these comments is toward adopting criteria which tend to permit rather than hinder the development of a repository. The search for absolute perfection is futile, and dangerous, and will result in unjustified expenditures of public funds. Getting state agreement to site a repository could be made much easier, I suspect, by allowing them to charge "use fees" than it would by trying to convince them your criteria are perfect.


B.R. McElmurry
Chemical Engineer

BRM:klg

My address is:

Barry McElmurry
6000 Moongate Dr.
Rancho Palos Verdes, Ca 90274

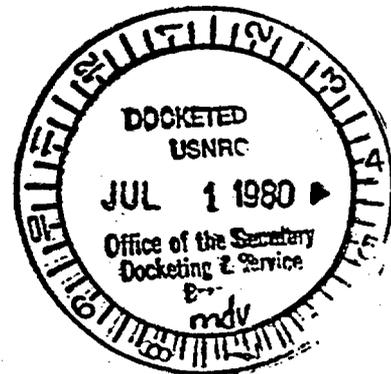


THE UNIVERSITY OF ARIZONA
TUCSON, ARIZONA 85721

COLLEGE OF ENGINEERING
DEPARTMENT OF NUCLEAR ENGINEERING

DOCKET NUMBER
PROPOSED RULE PR-60 (9)
(45 FR 31393)

June 26, 1980



Secretary of the
Nuclear Regulatory Commission
Washington, DC 20555

Attn: Docketing and Service Branch

Dear Sir:

Attached are some comments and questions relative to 10 CFR Part 60 as requested on the Federal Register Vol. 45, No. 94, Tuesday, May 13, 1980.

The proposed regulation, in general, is comprehensive, well written and much needed.

Sincerely,

James G. McCray, Acting Director
Nuclear Fuel Cycle Research Program

JGM/km

Enc.

Acknowledged by card..7/1/80.mdv...

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Comments:

1. Ref §60.122 (a) (2) (i) and §60.122 (a) (8)

100 kilometers is very arbitrary. The geologic setting could be such that the horizontal extent of investigations would be adequate within 25 kilometers of the operations area. The requirement should indicate detailed investigations to the horizontal extent necessary to define actual and potential, natural and human, impacts.

2. Ref §60.122 (b) (1) What about large populations?
3. Ref §60.122 (b) (2) (vii) Substitute "heat flux" for "gradient" in that gradients vary due to changes in thermal conductivity and boundary conditions.
4. Ref §60.122 (b) (3) What about endangered ecosystems or biota? What about archeological or historical sites?

823 Del Ganado Road
San Rafael, California 94903

June 26, 1980

DOCKET NUMBER

PROPOSED RULE

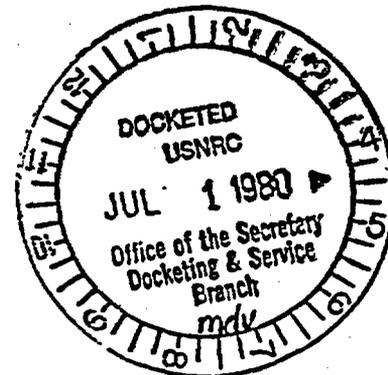
PR-60 (10)
(45 FR 31393)

Secretary
Nuclear Regulatory Commission
Washington, DC 20555

Attention Docketing and Service Branch

Dear Mr. Secretary:

10 CFR Part 60, Technical Criteria for
Regulating Geologic Disposal of
High-Level Radioactive Waste



This letter is written in response to your Advance Notice of Proposed Rulemaking on the above subject.

I would first like to generally concur and offer my compliments to your staff for an excellent development of the logic relative to a very difficult subject.

Next, I would like to offer the following major comments which I believe to be related to an omission rather than a comment on any one of the proposed criteria. This omission deals with the fact that it is fundamentally wrong to imply that we can predict everything that will occur, or all new factors or phenomena that we will ever discover during the radioactive decay period. However, such a problem is not new to the scientist, or engineer, except to the degree of time involved. The normal engineering solution to such a problem falls into two broad categories. The first category is to provide in the design, and in the construction of a facility, added margins of safety, or spare back-up equipment, which can be utilized when and if necessary. This first category is generally recognized in your criteria. The second category involves incorporation in the basic design, starting at its concept selection, of adequate bases by which future changes can be made to the facility to take care of any reasonably projected possible new factors or phenomena. As examples, the designer of a facility leaves adequate room so that a piece of equipment can be replaced — even though it may not be deemed important enough to have provided a spare, or to even have provided the needed crane. Thus, the distinction is the consideration of, and preservation of, possible future options as contrasted with those which should be fully incorporated into the facilities from the start.

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This logic leads one to further consideration at the concept selection stage of such future options as the reasonableness of diverting future groundwater flows, should they be found to occur, further sealing components that may have not been effectively sealed, and even the longer term recoverability concepts under extreme conditions. (It is also recognized that a strong emphasis on this latter item would lead in the direction of selecting a concept which makes such recoverability easier — i.e., probably the use of less depth, or even a surface final disposition concept. For this reason, I also would not favor the 300-meter minimum depth criteria.)

As a general strategy, I also believe that we ought not to be considering the subject as "disposal", which has a finality connotation that the above logic acknowledges we cannot accept, and which has a growing disfavor with the public. A more responsible scientific and engineering position to take is that we are providing for the "disposition" of wastes in a manner which will adequately store them until their inherent potentially harmful characteristics disappear. I would strongly recommend substitution of the word "disposition" for "disposal".

I also would like to offer the following more detailed comments:

- (1) The criteria acknowledges the need to avoid resources that are economically exploitable, and includes as such a resource "... a high and anomalous geothermal gradient relative to the regional geothermal gradient". However, we also should acknowledge that the placement of heat-producing materials in a repository will build up the surrounding temperatures to a level that might be interpreted by a future explorer as just such an anomalous geothermal gradient. Thus, we must conclude that we can have administrative controls for longer than 100 years, or we must not entice the explorer by allowing temperatures to rise to the level that he might interpret as being of interest.

In this regard, it is perhaps important to categorize the wastes by a thermal characteristic, as well as the radioactive characteristics, with the distinction being the time period during which the surrounding media temperature will be increasing (due to a heat generation rate that is greater than the heat dissipation rate) and a time period after which the surrounding media will have essentially returned to normal background temperatures. (It always will be somewhat above ambient.)

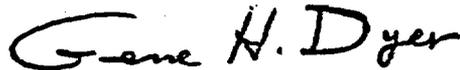
- (2) The requirement that radioactive waste "... can be retrieved for a period of 50 years after termination of waste emplacement operations, if the geologic repository operations area has not been decommissioned" and that they be able to be retrieved "... in about the same period of time as that during 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 techniques 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.

Secretary, NRC - 4
June 26, 1980

- (3) The requirement relative to the TRU waste release rate does not specify from where, or to where. Does the definition include the engineered barriers, or just the geologic barrier?

Thank you for the opportunity to offer these comments.

Very truly yours,



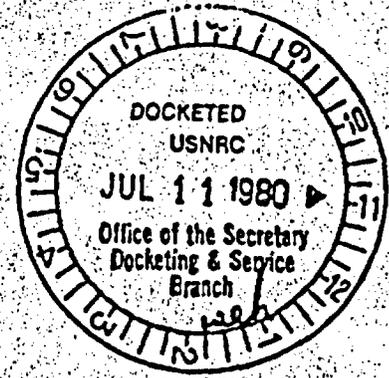
Gene H. Dyer
PE, Nuclear-234, California

DOCKET NUMBER
PROPOSED RULE PR 65
(45 FR 31393)

(11)



STATE OF NEW YORK
DEPARTMENT OF LAW
TWO WORLD TRADE CENTER
NEW YORK, N.Y. 10047
TELEPHONE: (212) 488-7565



ROBERT ABRAMS
Attorney General

July 9, 1980

Secretary
Nuclear Regulatory Commission
Washington, D.C. 20555

Attention Docketing and Service Branch

Re: Technical Criteria for
Regulating Geologic Disposal
of High-Level Radioactive
Waste; 10 CFR Part 60;
45 F.R. 31393 (May 13, 1980)

Dear Sir:

Enclosed please find comments of the Attorney
General of the State of New York with respect to the above
advance notice of proposed rulemaking.

Very truly yours,

EZRA I. BIALIK
Assistant Attorney General

EIB:mlr
Enc.

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Acknowledged by card... 7-11-80... [signature]

Thus, "the fundamental principle guiding all Commission licensing actions is the paramount consideration of public safety." In the Matter of Nuclear Engineering Company, Inc., 9 NRC 673, 676 (1979).

A method of disposal can be called safe only if it gives assurance of total isolation from the environment for the million years or more that isolation is required (see pp. 11-12, below). As the National Academy of Sciences explained in a report prepared at the request of the Atomic Energy Commission:

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...
Safe disposal means that the waste shall not come in contact with any living thing.

(Ref. 6, p. 3)* (emphasis supplied). EPA recently affirmed the goal of complete isolation during the hazardous lifetime of the waste. 43 F.R. 53265 (Nov. 15, 1978).

In fact, a majority of this Commission, in the final Table S-3 rule, assumed that there would be absolutely no release of radioactivity from a permanent nuclear waste repository after sealing. 44 F.R. 45362 at 45367-9 (Aug. 2, 1979). The standard should be no weaker now that the NRC faces the task of regulating proposed repositories. No releases should be permitted.

* The list of references appears in the back of the attached Appendix, a copy of our Statement in the Commission's Waste Confidence Proceeding.

Setting very stringent standards for a repository is all the more necessary because of the inherent difficulty in predicting geologic, meteorologic and human events far into the future. High-level waste will remain very toxic for a million years, which is many times longer than the entire span of recorded human history. No society has ever attempted to plan that far into the future, or even for a thousand years. Nor has any regulatory agency attempted until now to issue regulations to ensure safety and isolation for a million years. Also, we cannot rely on the continued existence of social institutions as we know them today for even a period of centuries.

The problem of long-term prediction has been widely acknowledged. For example, the U.S. Geological Survey has termed geology "a retrodictive rather than a predictive science," (Ref. 4, p. 11) and has observed:

[U]se of the geologic record to predict future events is a formidable task.

* * *

The past rates of occurrence of geologic events and processes have varied widely over time and there appears to be no clear philosophical basis for determining rates for these events or processes in the future.

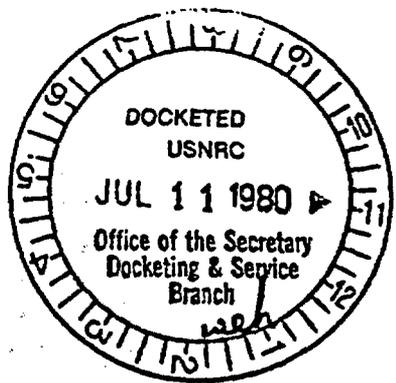
(Id.). DOE has acknowledged that "many important aspects of the evolution of the lithosphere ... are difficult, if not impossible to forecast," and that "simple projection

DOCKET NUMBER
PROPOSED RULE PR 65
(45 FR 31393)

11



STATE OF NEW YORK
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TWO WORLD TRADE CENTER
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ROBERT ABRAMS
Attorney General

July 9, 1980

Secretary
Nuclear Regulatory Commission
Washington, D.C. 20555

Attention Docketing and Service Branch

Re: Technical Criteria for
Regulating Geologic Disposal
of High-Level Radioactive
Waste; 10 CFR Part 60;
45 F.R. 31393 (May 13, 1980)

Dear Sir:

Enclosed please find comments of the Attorney
General of the State of New York with respect to the above
advance notice of proposed rulemaking.

Very truly yours,

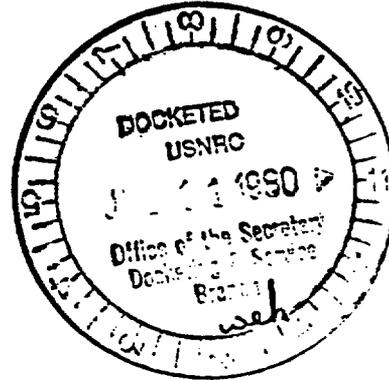
EZRA I. BIALIK
Assistant Attorney General

EIB:mlr
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Acknowledged by card... 7-11-80... [signature]

DOCKET NUMBER
PROPOSED RULE PR 60 (11)
(45 FR 31393)

COMMENTS OF THE ATTORNEY GENERAL OF THE
STATE OF NEW YORK ON NUCLEAR REGULATORY
COMMISSION DRAFT TECHNICAL CRITERIA FOR
REGULATING GEOLOGIC DISPOSAL OF HIGH-
LEVEL RADIOACTIVE WASTE; 10 CFR Part 60;
45 F.R. 31393 (May 13, 1980)



ROBERT ABRAMS
Attorney General of the
State of New York
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New York, New York 10047
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(212) 488-3474

EZRA I. BIALIK
JOHN W. CORWIN

Assistant Attorneys General
of Counsel

Acknowledged by card. 2-11-80 weh

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into the future from local geologic history alone is not a satisfactory basis for repository site selection."

(Ref. 1, p. 3.1.22). Moreover, according to DOE:

Much basic knowledge about geologic processes, their interactions and particularly their time of next occurrence is lacking for certain types of events over the time periods being considered. The events are those that would be possibly disruptive to a repository... It is questionable how much these problems can be resolved in the near future, and there will always be some uncertainty which must be considered in the repository design.

(Id., p. 3.1.50).

Earthquakes, of course, are important to be able to predict over a long future period, because a major breach of the repository as the result of a severe earthquake "would release enough radiation to make the site uninhabitable if the event occurs within the first few thousand years." (Ref. 29, p. 1-18). Our historical records of earthquakes, however, go back only 200 to 300 years (Ref. 4, p. 11; Ref. 5, p. 37). These records simply do not enable us to predict future earthquakes for thousands of years, let alone a million years. Nor are there reliable theories enabling us to make confident predictions of future earthquakes. See pp. 43-48 of the attached Appendix.

The problem of predicting seismic events is compounded because, as DOE recognizes, the building of a

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* * *

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COMMENTS OF THE ATTORNEY GENERAL OF THE
STATE OF NEW YORK ON NUCLEAR REGULATORY
COMMISSION DRAFT TECHNICAL CRITERIA FOR
REGULATING GEOLOGIC DISPOSAL OF HIGH-
LEVEL RADIOACTIVE WASTE; 10 CFR Part 60;
45 F.R. 31393 (May 13, 1980)

Robert Abrams, Attorney General of the State of New York, objects on several grounds to the proposed regulations on geologic disposal of high-level radioactive waste, and requests that the future drafts be changed in accordance with the comments below:

General Comments

1. The draft regulations do not appear to be designed to assure public health and safety to the necessary extent. Rather, they seem to facilitate the licensing of repositories to be proposed by the U.S. Department of Energy ("DOE"), even inadequate repositories.

It is the NRC's primary duty to assure public health and safety, not to guarantee that a license will be issued to DOE. As the Commission has said:

[P]ublic safety is the first, last, and a permanent consideration in any decision on the issuance of a construction permit or a license to operate a nuclear facility.

Power Reactor Development Corp. v. International Union of Electrical Radio and Machine Workers, 367 U.S. 396, 402 (1961).

repository could itself increase the risk of faulting:

Fault movement could also result from repository placement in several ways: from changes in the stress field due to the geometry of the repository cavity, from added thermomechanical stresses due to heating, or from influx of water along a fault plane.

(Ref. 1, p. 3.1.27).

Long-term prediction of future meteorologic events, such as continental re-glaciation or changes in temperature or precipitation, is equally impossible. Similarly, as the NRC admits, future human intrusions into repositories "cannot be prevented." "In spite of all efforts to avoid sites which may prove attractive to humans, there may be deliberate or inadvertent intrusion." 45 F.R. 31398, col. 2. Therefore, the human intrusion issue is acknowledged to be "a difficult one that is far from having been resolved." Id. col. 3.

Because of these uncertainties, it is necessary, at the minimum, that repositories be designed and regulated to meet the highest conceivable standards, and that they have no known defects or problems. Even if the highest standards are met, that would hardly solve the uncertainty question. However, to compromise our standard at the outset, to accept repositories already known to have defects or problems, or known adverse conditions, is to invite disaster, because

they are more than likely to fail during the very long period under consideration.

Accordingly, the regulations should require total isolation, not isolation "within acceptable limits."

§ 60.2, p. 31399, col. 2. Routine radioactive releases from the repository within the limits in 10 CFR Part 20, as set forth in § 60.111(a)(1), p. 31400, col. 1, should not be deemed acceptable.

The draft regulations do not comport with the NRC's duty of regulating DOE's activities so as to assure public health to the maximum extent. Rather, they are written in such a way as to suggest a standard of expediency: whatever DOE can easily achieve will be deemed sufficient to satisfy the NRC, regardless of what is truly needed to protect the public today and in the future.

For example, waste packaging is required, with "reasonable assurance," to contain the radionuclides for the "first 1,000 years after decommissioning and for as long thereafter as in [sic] reasonably achievable." § 60.111(c), 31400, col. 1. In effect, whatever the state of the art may be will be accepted by the NRC, without further thought. Again, the underground facility must be designed to provide "reasonable assurance" of containment for the first 1,000 years "and as long thereafter as is reasonably achievable." Id., col. 2. Since

the waste is highly toxic for a million years, there is little point in using the 1,000 year period -- it is a mere one-thousandth of the relevant time period. The standard should be true isolation for the necessary period, not for a very small portion of the necessary period.

Other provisions in the draft are vague, subjective, relative and too weak to assure safety. For example, § 60.111 (c)(2)(i) requires that the environment for the waste packages "promotes the achievement of § 60.111(c)(1)" -- which is much weaker than requiring that it in fact achieve the requirements of that section. P. 31400, col. 1. Similarly, the draft does not require that the site assure isolation, but only that it "exhibits properties which promote isolation." § 60.111(c)(4)(ii), p. 31400, col. 2. Again, DOE's convenience, rather than public safety, appears to be the motivating factor behind the regulations.

2. The draft regulations do not adequately deal with the difficulty of predicting future geologic, meteorologic, and human events. Instead, they evade the issue, discussing some minor issues evidently thought to reduce the problem -- but these issues are so minor as to be of very little value when compared to the enormity of the problem. For example, the proposed answer to the human intrusion problem is to select

deep, "uninteresting" sites of little value in terms of what are now considered valuable resources. P. 31395, col. 3. While such steps may be better than nothing, their impact on reducing the uncertainty of intrusion over a million-year period is very small.

Moreover, the draft regulations seek to avoid the human intrusion problem by defining it away. The definition of "expected processes and events" very specifically excludes human intrusion, § 60.2, p. 31399, col. 1 -- despite the admission that such intrusion cannot be prevented. This defined term is then used repeatedly in § 60.111(c) to free DOE from the responsibility of avoiding human intrusion in meeting performance objectives. P. 31400, col. 1-2. Thus, the theory behind the regulations is to define away the problem of intrusion and forget about it for licensing purposes -- despite the real possibility that an intrusion will permit a large release of radioactivity.

Similarly, the draft regulations do not face the fact that we cannot predict geologic events far into the future. Rather, they talk about compensating for the uncertainty, by selecting "geologically simple sites," avoiding potentially adverse features, and placing "constraints" on design and performance of components. P. 31395, col. 3. But these minor steps hardly compensate for the large uncertainty, or even reduce it by any significant degree. As against the problem

of uncertainty over a million years, they are a frivolous response. Indeed, talk of selecting geologically "simple" sites is pure fantasy and misses the point, because there is no way to predict that such sites will remain simple or stable even for centuries, let alone a million years. See above, pp. 3-5.

The draft sidesteps the problems of uncertainty also by turning to models and engineered barriers, but neither of these is an adequate response. Models are acknowledged to be very indefinite, approximate and "qualitative" rather than quantitative. P. 31395, col. 2-3; p. 31397, col. 2-3. The models are also highly subjective, based not on facts but on "expert opinion," yet it is recognized that different experts may have differing opinions. P. 31397, col. 3. Additional problems with reliance on models are spelled out at pp. 50-54 of the Appendix annexed to these comments. To rely on subjective, qualitative models known to be inaccurate and uncertain, and based on insufficient data, to assure isolation for a million years appears to be reckless.*

The draft regulations also assume that engineered barriers "might be used to compensate for, reduce, or eliminate at least some of the uncertainties inherent in reliance on

* The term "qualitative model" itself is confusing and requires explanation, but in any case such a model does not appear to have any real value for the process of assuring isolation for a million years.

the geologic setting alone." P. 31396, col. 3. While engineered barriers might be of some benefit in the short term, they are not going to reduce long-term uncertainty. They could be built to last perhaps decades, or conceivably centuries, but probably no longer. They are of very limited value where the uncertainties against which they are designed to protect will last for a million years. Moreover, even if such barriers could be helpful in the short-term for a narrow, quantitative uncertainty, they are virtually useless when there is great qualitative uncertainty with respect to virtually every geologic, meteorologic and human element involved. If we knew what the future condition would be but were unsure of its precise dimensions, the problem would be somewhat easier. But we cannot predict even what type of conditions will exist, so we cannot begin to rely on engineered barriers to overcome the uncertainties.

Specific Comments

3. The design requirements, § 60.132(a), pp. 31402-3, appear to contain special requirements for structures, systems and components "important to safety." While special treatment of items so classified is not new, it was criticized by the Kemeny Commission because the failure of items not so labeled can similarly have serious safety implications. Therefore, all items should be put to the more stringent requirements. The Kemeny Commission also criticized the NRC

requirement to analyze only "single-failure" accidents, noting that Three Mile Island was a multiple failure accident. The draft regulations, therefore, should not limit themselves to single-failure analysis. § 60.132(a)(8), p. 31403, col. 2. Indeed, during the course of a million years many multiple-failure accidents must be considered likely. This consideration also demonstrates the inadequacy of the criticality provision, § 60.132(a)(10), id., col. 3. During the course of a million years, "two unlikely, independent and concurrent or sequential changes" are not so unlikely.

4. In many places, the draft regulations require certain things for a period of only 1,000 or 10,000 years. Since the necessary isolation period covers the entire period of toxicity, one million years, the shorter time periods are irrelevant. Requiring isolation for 1,000 or even 10,000 years is far from adequate to assure public health and safety. As one court has noted:

Plutonium is generally accepted as among the most toxic substances known; inhalation of a single microscopic particle is thought to be sufficient to cause cancer. Moreover, with a half-life of 25,000 years, plutonium must be isolated from the environment for 250,000 years before it becomes harmless.

Natural Resources Defense Council v. U.S. Nuclear Regulatory Commission ("NRDC v. NRC"), 547 F.2d 633, 638-9, rev'd and rem on other grounds sub nom. Vermont Yankee Nuclear Power Corp. v. NRDC, 435 U.S. 519 (1978) (footnotes omitted)

(emphasis added). Other components of high-level waste have half-lives much longer than plutonium, and may require isolation for a million years. Because nuclear waste contains such long-lived substances, DOE has acknowledged the need to isolate it for up to one million years. (Ref. 1, p. 1.9).

5. The definition section, § 60.2, includes in the term "accessible environment" only those aquifers which are presently used and have been designated by the Environmental Protection Agency as underground sources of drinking water. P. 31399, col. 1. An "aquifer" is then defined in terms of yielding "significant quantities of water to wells or springs." In view of the water shortages already experienced in some parts of the country and those which could arise in the future, the regulations should attempt a more comprehensive protection of groundwater from radiation -- encompassing even small aquifers not currently used or designated by the EPA.

Moreover, the draft regulations do not require, as they should, avoiding all sites near aquifers or lakes or rivers. See Appendix, p. 58. Rather, they omit this obvious requirement from § 60.122(b)(3), p. 31402, col. 1. In addition, the regulations should require abandonment of any site where aquifers are found, but fail to do so. § 60.132(c)(9), p. 31405, col. 2.

6. The draft provides that the activities authorized by a license should "not constitute unreasonable risk to the

health and safety of the public." P. 31399, col. 3. As in other NRC licensing matters, the degree of risk deemed unreasonable is not defined. It is worth noting, however, that the public's perception of risk differs from that of the technical community, which defines risk as the probability than an event (such as a major release of radioactivity from a repository) will occur multiplied by the expected consequences of the event. By this definition, if the probability is small enough the risk may be viewed as modest, despite the possibly calamitous consequences of an accident. But the public does not accept that reasoning. According to a report by Battelle Pacific Northwest Division:

The general public often perceives the outcomes of an event to be more important than the probability.

Ref. 19, p. 14 (citation omitted). The NRC should learn to be responsive to the public's perception of risk.

7. The draft would require DOE to perform a resource assessment for the region of the proposed repository site "using available information". § 60.122(a)(8), p. 31401, col. 1. Yet DOE acknowledges that present levels of information on possible regions are inadequate. See pp. 65-67 of the attached Appendix. Because of the importance of a complete resource assessment for the human intrusion and other issues, DOE should be required to do further studies and testing, rather than limit itself to available information.

8. The regulations require DOE to design and construct surface facilities for retrieval of waste, but do not require storage capacity for all of the emplaced waste because "shipment offsite" is contemplated. § 60.132 (b)(2), p. 31403, col. 3 - p. 31404, col. 1. It is not clear, however, where the waste could be shipped offsite, or if any suitable site would exist. Even if one does exist, shipment of nuclear waste would be required, and that is very hazardous. Therefore, DOE should be required to have sufficient storage capacity in a safe, licensed storage facility at the repository site to permit prompt retrieval of all the waste in case DOE sees a need for retrieval, or the NRC orders it.

Also with respect to retrievability, the regulations require DOE to design the repository to permit retrieval for 50 years "if the geologic repository operations area has not been decommissioned." § 60.111(a)(b), p. 31400, col. 1. See also § 60.135, p. 31407, col. 2. While retrievability for at least 50 years may be desirable, it is not clear what period would be required in case the area has been decommissioned, or why a different period should be designated.

9. Various terms used in the draft regulations need to be defined. For example, DOE is required to establish that certain properties of the geologic environment "will not significantly decrease over the long term." § 60.111(c)(4) (i) and (ii), p. 31400, col. 2. The standard is very vague, and "long term" is not defined. Also undefined are "near field,"

in § 60.122(b)(2)(iv), p. 31401, col. 3, and "low population density," in § 60.122(c)(2)(v), p. 31402, col. 3.

10. The draft establishes a presumption against repository sites with potentially adverse conditions, but allows for a rebuttal of the presumption, § 60.122(b), p. 31402, col. 1. In view of the commitment to conservative planning expressed by DOE and NRC, any presumption based on the existence of adverse conditions should be irrebuttable.

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.

12. DOE is required by the draft to conduct site investigations so as to obtain the necessary information "with minimal adverse effects on the long-term performance of the geologic repository." § 60.122(a)(5), p. 31401, col. 1. The regulations should require that the investigation work have no adverse effects on the long-term performance, and certainly that it not breach the integrity of the repository.

13. In discussing emergency capability, § 60.132(a)(7), p. 31403, col. 1-2, the draft regulations do not require emergency plans for evacuating the surrounding population even

for the 10-mile area now being required for nuclear plants. Because of the serious consequences a repository accident could have, evacuation and other emergency planning no less than that required for power plants should be required for repositories.

14. As previously noted, p. 9, models are very inaccurate, uncertain and subjective, and therefore not reliable. For this reason it would be wrong to codify them in the regulations, as discussed beginning at p. 31397, col. 2.

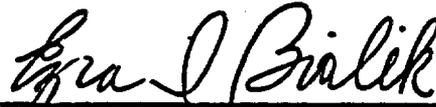
NRC Environmental Impact Statement

15. The NRC environmental impact statement on the technical criteria should discuss, among other things: (i) worst possible accident scenarios and consequences for a repository, including multiple failure accidents; (ii) the extent to which the draft regulations assure true safety for the present and future generations; (iii) the environmental impacts of permitting regular releases of radioactivity from repositories, and of requiring less than total isolation of the wastes for the necessary one million years; and (iv) the environmental impacts of licensing repositories despite the fundamental uncertainties caused by our inability to predict

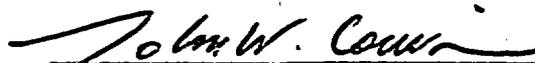
geologic, meteorologic and human events far in the
future.

Dated: July 9, 1980

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PROPOSED RULE

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(45 FR 31393)

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

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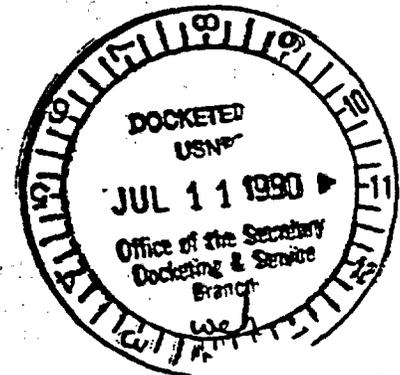
In the Matter :

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) :

-----X

STATEMENT OF POSITION OF
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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

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10 CFR Parts 50 and 51 :
(Waste Confidence Rulemaking)
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STATEMENT OF POSITION OF
ROBERT ABRAMS, ATTORNEY
GENERAL OF THE STATE OF
NEW YORK

SUMMARY

It is the position of Attorney General Robert Abrams that there is no factual basis today for confidence either that nuclear waste will be safely disposed of by any given date or that it will be safely stored indefinitely until it is disposed of safely. We urge the Commission to make a finding of no confidence on both disposal and storage, and, as a consequence, to discontinue the licensing of new nuclear plants until the waste problem has been resolved.

In order to make a finding of confidence at this time, the Commission, among other things, would have to conclude, from facts existing today, that all technical

and political-social ("institutional") problems will be resolved. However, there is no basis for reaching that conclusion with respect to either type of problem.

Waste disposal would involve a multi-step process, requiring many separate technologies, none of which is available. In fact, in most if not all of the technical areas, there are either serious deficiencies in information or known obstacles -- or both -- which, unless resolved in the future, will preclude safe disposal. Further, there is no geologic medium which has been determined to be capable of assuring safe isolation.

The Department of Energy ("DOE") says erroneously that because research is planned or in process we can be confident today that safe disposal will be achieved. However, we do not know today whether or not the research will remove all obstacles; instead, it may fail to do so, or even uncover new uncertainties or problems making the task still more difficult to achieve. Confidence cannot be predicated on hope or blind technological optimism. Until the research has been completed -- and it can be stated (rather than guessed) that all difficulties have been resolved successfully -- we cannot begin to talk about confidence.

In addition, there are many technical criteria for repository site selection, each of which rules out geographic areas under consideration. There is no basis for con-

confidence that any proposed site which meets all of these criteria can be located.

Moreover, much of the information necessary for waste disposal can be obtained only by testing at specific sites, and cannot even be addressed until candidate sites have been selected. But no site will be selected until at least several years from now, and the results of in situ testing will not be known for some years thereafter. Therefore, it will be many years before we will know enough to express an opinion on confidence. Indeed, at the present time we do not even have a proven method for testing specific sites without fracturing them and destroying their structural integrity during the testing process. Until such a method exists, and until we have generic and in situ test results that appear to resolve all questions, a finding of confidence in safe disposal cannot be made.

Further, it will not be enough to find just one repository site; many sites, perhaps a dozen or more, will be needed for the increasing quantities of waste requiring disposal. This, in turn, means that dozens of candidate sites must be found meeting all criteria for in situ testing and evaluation. In view of the uncertainty that any site will be found meeting all the criteria, the need for many sites underscores the lack of a basis for confidence in safe disposal.

Similarly, there is no basis for confidence that institutional problems can be resolved. As DOE itself acknowledges, the public is very concerned about the consequences of building repositories, and many State and local governments, through legislation or otherwise, have expressed opposition to accepting repositories. Indeed, every Government effort to date to select particular sites has been opposed. Since many repositories will be needed, and thus dozens of candidate sites must be selected for testing and evaluation, the factor of public opposition creates a state of uncertainty that precludes confidence.

Moreover, beyond the specific technical and institutional doubts looms an even greater problem -- the impossibility of predicting events so far in the future. The challenge of nuclear waste disposal is truly unprecedented and unique, because nuclear waste will remain highly toxic for about a million years, and must be isolated for that long. Yet this period is many times longer than the entire span of recorded human history. No society has ever attempted to plan that far into the future, or even for a thousand years. Our ability to predict geologic events far into the future does not exist. And, we cannot rely on the

continued existence of social institutions as we know them today for even a period of centuries; Similarly, we cannot prevent human intrusions into the repository even in the near future. Therefore, even if all technical and institutional problems are eventually resolved and our disposal method seems to be foolproof, still there would be serious doubts that nuclear waste would be safely isolated for the necessary period.

DOE and others will urge the Commission to declare confidence in waste disposal, but the facts militate against their position. Confidence at this time could be based only on hope, not facts. Government officials over the past two decades have repeatedly expressed their hope that the solution was at hand, but the facts have never supported that conclusion and still do not today. DOE's current position is not grounded in facts any more than were past pronouncements.

Moreover, DOE employs distorted definitions of some of the key terms in this rulemaking -- "safety", "isolation", and "confidence" -- and thus seeks to becloud the issue before the Commission. Indeed, DOE projects its watered-down version of safety for only ten thousand years, a mere 1% of the million-year period during which isolation is necessary. DOE also admits that many data

gaps exist, that in situ testing will be needed after selection of candidate sites, that long term predictions are virtually impossible, and that public acceptance of repositories is low. Thus, even DOE's own statements show that its expression of confidence is unsupported by the facts and is unrealistic.

Long term storage, for the indefinite period until and if safe disposal becomes available, is no answer. It could be decades, or even centuries or more, before safe disposal has been achieved, and there is no basis for confidence that nuclear waste can be safely stored for that period of time. To the contrary, serious safety problems are known to exist even for short-term storage, and many accidents have occurred. Furthermore, there is no basis for confidence that safe away-from-reactor ("AFR") storage sites will be found, or would gain public acceptance.

Throughout this rulemaking the Commission must distinguish between wastes which exist today and wastes which will be produced in the future if new nuclear plants are licensed. It is generally accepted that existing wastes will have to be managed in the safest feasible manner, and we certainly hope that a truly safe disposal method will be available when needed. The Commission's action in this rulemaking will have little impact on these wastes, because the policy options are very restricted.

However, the Commission's finding in this proceeding will have a substantial impact on waste from new plants, as to which a full range of options is available. Presumably a finding of confidence will be seen by the Commission and licensing boards as a green light to approve new nuclear plants, and allow them to generate additional waste which will have to be managed. A finding of no confidence, however, must lead to a different result, if this rulemaking is to have any meaning.

We are now at a point of planning and controlling what nuclear wastes can be produced by new nuclear reactors, and in what quantities. Since these choices are available, and the danger of radioactivity is so great, the viewpoint that the best we can do is good enough has no place. While unfortunately it may become necessary at some point to adjust our safety standard for existing wastes -- because there is literally no alternative but to manage them as best we can -- there is no excuse for lowering our standard when deciding whether or not to permit additional plants in the future. By the same token, it is incumbent on the Government to commit itself to do the necessary research to design a system that will be as safe as possible for disposing of the existing wastes. But that hardly means that any method it ultimately adopts should be regarded as safe enough to warrant licensing new plants to generate more and more waste.

Because we have concluded that there is no basis for confidence today in safe disposal or indefinite storage, even for the existing waste, we urge the Commission to implement its statutory duty of protecting public health and safety by halting the licensing of new plants until the problem of safe disposal has been solved. It is bad enough that there is no disposal method for the existing inventory of waste. To license new plants to generate new waste under the circumstances would be grossly irresponsible.

This Statement opens with a discussion of the Government's history of false optimism on safe disposal over the past several decades, which parallels the hollow optimism voiced by DOE in this proceeding (Point I, p. 9). It then defines the issue before the Commission (Point II, p. 15), and explains how DOE has distorted the issue (Point III, p. 28). We then set forth our basis for saying there is no factual basis at this time for confidence in either safe disposal (Point IV, p. 42), or long-term storage for an indefinite period (Point V, p. 102). Finally, we explain why the Commission should order a moratorium on licensing new nuclear plants (Point VI, p. 111). Throughout this Statement, we rely predominantly on materials issued by or prepared for Government agencies.*

* In the first prehearing conference order, dated February 1, 1980, the Presiding Officer limited this rulemaking to a consideration of spent fuel, to the exclusion of reprocessing waste (p. 9). This limitation, of course, could make a final rule in favor of confidence of doubtful validity if the Government decides to proceed with reprocessing. Without waiving any right to challenge the Presiding Officer's ruling, we have limited our discussion below to spent fuel, and use the term nuclear waste in that sense.

I. THE DEPARTMENT OF ENERGY'S EXPRESSION OF CONFIDENCE IN SAFE DISPOSAL MUST BE VIEWED WITH DOUBT IN LIGHT OF THE GOVERNMENT'S LONG HISTORY OF FALSE PROMISES AND FAILURES.

Our national Government has been attempting to develop safe, permanent radioactive waste disposal for more than 30 years. In assessing its confidence today in safe disposal and evaluating DOE's optimistic statements, the Commission must consider the long history of Government optimism and promises which, so far, have failed to produce a solution to the growing waste disposal dilemma.

In 1957 the National Academy of Sciences ("NAS") issued a major report on the subject of nuclear waste disposal. Identifying geologic disposal in salt deposits as the most promising method for the near future, the Report's Study Committee stated that it was "convinced that radioactive waste can be disposed of safely in a variety of ways and at a large number of sites in the United States." The report added: "It may require several years of research and pilot testing before the first such disposal system can be put into operation."

In its Annual Report to Congress in 1959, the Atomic Energy Commission ("AEC") stated that "waste problems have proved completely manageable." That year, researchers at the Oak Ridge National Laboratory began to study the storage of wastes in salt. Beginning in 1963, field studies and laboratory

tests were initiated by the AEC at two salt mines in Kansas, one at Hutchinson and one at Lyons. After two more years of tests and preparations, a two-year experiment known as "Project Salt Vault" was conducted at the Lyons site. The experiment was concluded in late 1967. After analyzing the results of the experiment, the Government published a report in June 1970, declaring that:

The feasibility of disposing of solidified waste in natural salt formation has been demonstrated in a salt mine in Kansas using spent reactor fuel...

On June 17, 1970, at "the culmination of a research and development program spanning more than 10 years," the AEC announced the tentative selection of the Lyons mine as "the nation's first underground radioactive waste repository." The Commission said that only one facility would be necessary to handle all of the commercial waste produced by the nation's nuclear reactors through the end of this century, and that it would be ready to start receiving wastes by about 1975. In its Annual Report to Congress in January, 1971, the AEC made its choice of Lyons "definite."

But several months later, the Lyons Project was aborted following the discovery of two major underground problems which cast doubt on the long-term safety and integrity of the site. One was a series of abandoned gas and oil drill

holes in the area; the other was an adjacent salt mine's extensive use of water to dissolve out salt. It was concluded that both of these problems made it possible that water might penetrate the area and allow radioactive wastes to escape. These problems, however, had gone undetected during the prior decade of research and optimistic pronouncements by the Government.

As a result of a study conducted by the United States Geological Survey ("USGS"), attention was then focused on a salt bed near Carlsbad, New Mexico. That site ultimately was designated as the "Waste Isolation Pilot Plant" (WIPP). John Deutch, head of energy research at DOE, stated as late as 1978 that he was "very confident" about WIPP, and predicted that it would be available by 1985.

In 1976, a report of the Energy Resources Council, representing several federal agencies, reaffirmed the feasibility of the safe management of radioactive wastes from nuclear production. Shortly after this report was issued, the assistant administrator of ERDA,* testifying before the Joint Committee on Atomic Energy of the United States Congress, outlined a timetable that would result in permanent storage of nuclear wastes in salt by 1985. The first storage location

* Energy Research and Development Administration.

was to be the site near Carlsbad, New Mexico. Commerce Secretary Elliot Richardson observed that although mistakes had been made in dealing with nuclear waste, health and safety problems had not resulted, and "we should do even better in the future."

By the end of 1976, ERDA had announced plans to start deep drilling in the Spring of 1977 in "at least several of a list of 13 states." The selection of the first two repository sites was promised for 1978.

But no repository site was chosen in 1978. Instead, the last several years have witnessed an increasing articulation of the gathering doubts about the technical feasibility of geologic disposal. During the same period, public opposition to establishment of repositories at a variety of locations has crystallized.

On the technical side, in 1978 the USGS published Circular 779, which concluded:

Key geologic questions are unanswered, and answers are needed before the risk associated with geologic containment can be confidently evaluated.

By 1978, ERDA had pushed back the date for selecting the nation's first repository to late 1979 at the earliest. In March 1979, the President's Interagency Review Group on Nuclear Waste Management ("IRG") concluded that "the scientific

feasibility of the mined repository concept remains to be established." A month later, a draft generic environmental impact statement on waste management was written by DOE. While professing hope in the ultimate feasibility of waste disposal in salt or other rock formations, DOE acknowledged numerous shortcomings in the data and the technology needed for permanent waste isolation. And in February 1980, the President declared that "past government efforts to manage radioactive wastes have not been technically adequate." Over DOE's objection, he cancelled the proposed WIPP Project, saying that further investigation of geologic sites was necessary before any media or sites could be selected.

Meanwhile, on the political side, the Government's efforts to choose candidate sites for repositories encountered public opposition in a number of States, including Michigan, Louisiana, South Dakota, Georgia, Vermont, South Carolina, and even New Mexico, which the Government had long viewed as friendly territory for a repository.

Today, after more than 30 years of scientific research and experimentation, no high-level waste repository exists, and the solution to the waste disposal problem continues to elude us. There are more questions than ever, and there is no factual basis for optimism. Indeed, the possible dates for a repository's being available have become more and more distant. While DOE and its predecessors have repeatedly and

confidently predicted during the past 20 years that disposal facilities would be operating within several years, DOE now concedes that final disposal might not be available until 26 years from now.

Meanwhile, more than half of the nation's nuclear reactors have now used up the spent fuel storage capacities which they were initially designed to accommodate. These reactors have obtained, and others will seek, permission to store additional spent fuel on-site; but these reprieves will only delay for several years the pressing need to solve the permanent waste disposal problem. In the apt words of the Court of Appeals for the District of Columbia:

No one disputes that solutions to the commercial waste dilemma are not currently available. The critical issue is the likelihood (or probability) that solutions, either ultimate or interim, will be reached in time.

State of Minnesota v. NRC, 602 F.2d 412, 416 (D.C. Cir. 1979).

II. THE ISSUE BEFORE THE COMMISSION

The principal issue in this proceeding is whether the Commission is now confident, on the basis of existing facts, that nuclear waste will be safely disposed of by a given date.

A potential source of great confusion in this rulemaking is that different participants will define the issue and its key elements in different ways. For example, there will be different opinions as to what type of assurance is needed to create a basis for "confidence," or as to what degree of "isolation" is necessary, and for how many years, to provide for "safety." It will thus be necessary for the Commission to analyze each filing to determine what definitions and assumptions, stated or implied, are made which might affect the validity of the conclusions drawn.

For the purposes of clarity, then, the task before the Commission may be viewed as embracing several distinct elements. In order for the Commission to reach a determination in favor of confidence:

- A. The Commission must be confident that nuclear waste will be safely disposed of by a given date. This requires making 3 separate determinations:
 - 1) There must be confidence that disposal will be actually accomplished, not merely that it is technically feasible;

- 2) There must be confidence that the disposal will be safe; and
 - 3) There must be confidence that the disposal will be available by a given date.
- B. The Commission must decide that it has the necessary confidence today, based on facts which exist today.
 - C. The Commission must have the highest degree of confidence.

In this section, each of these essential elements of the issue of confidence is amplified. Section III will demonstrate that DOE distorts the issue, and fails in its Statement to satisfy the elements necessary to any finding of confidence.

- A. The Commission Must Be Confident That Nuclear Waste Will Be Safely Disposed of By a Given Date.
 1. There Must Be Confidence That Disposal Will Be Actually Accomplished, Not Merely That It Is Technically Feasible.

The issue before the Commission is not only whether it is confident that nuclear waste can, from a technical point of view, be disposed of. The issue, as stated in its notice of proposed rulemaking, is the Commission's present confidence

"that radioactive wastes produced by nuclear facilities will be safely disposed of." 44 Fed. Reg. 61372-3 (emphasis added). Thus, President Carter has urged the Commission to provide its judgment on whether or not radioactive wastes "can and will be disposed of safely." (Ref. 21, p. 5).

Echoing the President's statement, his Council on Environmental Quality said, in its April 15, 1980 letter to the Commission with respect to this rulemaking:

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. (Emphasis in original).

DOE's National Waste Terminal Storage Program has recognized as well that "the resolution of the waste disposal problem requires a political consensus, a technical consensus, and a social consensus." (Ref. 15, p. 5). Some of the non-technical, institutional factors which in and of themselves should lead this Commission to determine that it lacks confidence that safe disposal will be achieved are discussed at pp. 68-76 of this Statement. The technical factors precluding confidence are discussed at pp. 58-67, 77-101.

Moreover, disposal of wastes means disposal of all wastes, not just some wastes. Thus, the Commission must be confident not merely that one safe repository can and will be available, but rather that many safe repositories can and will be available -- a sufficient number for all of the presently existing commercial and defense waste, for all the waste that may be produced by existing nuclear plants and ongoing defense activities, and for all the waste which any new plants would produce. This could require a large number of repositories. Indeed, since USGS suggests reducing the thermal load of each repository to avoid some technical problems produced by heat (Preliminary Statement, dated April 15, 1980, p. 10), it may be necessary to have a larger number of repositories, each containing less waste and less heat, than initially envisioned by DOE. In short, it may be that a dozen or more repositories will be needed just to handle the existing wastes plus those to be produced by existing plants and defense programs.*

* DOE's Statement of Position (hereinafter cited as "DOE Statement" or "Statement") assumes that 8 repositories would be needed in salt or granite. Statement, p. II-289. There must also be additional repositories available to handle wastes which have to be retrieved from other repositories. Thus, in 1976 ERDA planned to establish 6 repositories even though only one and a half repositories were then thought to be needed to house the anticipated waste inventory; the extra space was provided so that "waste could be transferred in case of problems at other repositories." New York Times, Dec. 3, 1976, IV, p. 7, col. 1. DOE has also recognized the need to be able to re-route wastes to other repositories if necessary. See pp. 62, 97, below, and DOE Statement, p. I-25. Applying even a factor of 2, rather than the factor of 4 used by ERDA, the need for backup facilities would require 16 or more repositories to be established.

In addition, as explained below at pp. 59-65, no potential site can be finally approved for repository construction until actual testing has been performed at the site. This means that a far greater number of potentially eligible sites would have to be identified, approved, and explored.

The question then is whether the Commission is confident today that the necessary number of safe repositories can and will be established.

In short, both technical and institutional difficulties must be considered in deciding whether or not any repositories will be established. The Commission then must decide if it is confident that many . repositories will be found which meet all the siting and technical requirements and which also gain public acceptance. As the IRG said of the institutional difficulties, in a statement that could be applicable as well to the siting and technical constraints:

The level of difficulty of all these problems could increase 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.

(Ref. 10, p. 89).

2. There Must Be Confidence
That The Disposal Will
Be Safe.

The hazards associated with nuclear waste are well known and need not be belabored here. As one court has noted:

Plutonium is generally accepted as among the most toxic substances known; inhalation of a single microscopic particle is thought to be sufficient to cause cancer.

Moreover, with a half-life of 25,000 years, plutonium must be isolated from the environment for 250,000 years before it becomes harmless.

Natural Resources Defense Council v. U.S. Nuclear Regulatory Commission ("NRDC v. NRC"), 547 F.2d 633, 638-9, rev'd and rem on other grounds sub. nom. Vermont Yankee Nuclear Power Corp. v. NRDC, 435 U.S. 519 (1978) (footnotes omitted) (emphasis added).

And, beyond being carcinogenic, plutonium also causes changes in the genes (Ref. 14 , p. 247). Thus, each affected individual could transmit unpredictable genetic defects for generations to come. It is no exaggeration to say that exposure of a significant number of people to the plutonium from a waste repository could threaten the genetic integrity of the human race.

Other components of high level waste have half-lives much longer than plutonium, and may require isolation for millions of years. The Commission noted in its Table S-3 decision, for example, that Technetium-99 has a half-life of 213,000 years. 44 Fed. Reg. 45370, n.33 (August 2, 1979). Also having very long half-lives are Beryllium-10, Calcium-41, Rubidium-87, Zirconium-93, Palladium-107, Iodine-129, Cesium-135, Uranium-233, 234, 235, and 236, Neptunium-237, Plutonium-242 and 244, and Curium-247. Because nuclear waste contains such long-lived substances, DOE has acknowledged the need to isolate nuclear wastes for up to one million years. (Ref. 1, p. 1.9).

A method of disposal can be called safe only if it gives assurance of total isolation from the environment for the million years or more that isolation is required. As the NAS explained 23 years ago in a report prepared at the request of the AEC:

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... Safe disposal means that the waste shall not come in contact with any living thing.

(Ref. 6, p. 3). (first emphasis supplied). EPA recently affirmed the goal of complete isolation during the hazardous lifetime of the waste. 43 F.R. 53265 (Nov. 15, 1978).

The need to isolate plutonium and other radioactive wastes from the environment for about a million years is most troublesome. No society has ever attempted to plan that far into the future, and no governmental institution has endured so long. See pp. 43-50, below. One writer has commented that the entire recorded history of mankind is only a fraction of the necessary storage time of plutonium, observing that Neanderthal man appeared only about 75,000 years ago. D. Farney, "Ominous Problem: What To Do With Radioactive Waste," 5 Smithsonian Mag. 20 (1974), cited by the court in NRDC v. NRC, 547 F.2d 633 at 652, n.54 (D.C. Cir. 1976). It is therefore necessary to develop a methodology that appears fool-proof, i.e., that has no detectable risks or flaws.

Of course, even such a methodology will carry with it very grave risks and be subject to unanticipated accidents. It will be subject to the uncertainty posed by our inability to predict geologic or human events even thousands of years from now. But to compromise our standard at the outset, to accept a methodology already known to have gaps and deficiencies, is to invite disaster. Such a weak methodology is more than likely to fail during the very long period under consideration.

President Carter has committed the Administration to work toward achieving a truly safe methodology. In his February 1980 message to Congress, he said: "My paramount objective in managing nuclear wastes is to protect the health and safety of all Americans, both now and in the future." (Ref. 21, p. 1). The President added: "We will act surely and without delay, but we will not compromise our technical or scientific standards out of haste." Id. at 5.

3. There Must Be Confidence
That The Disposal Will Be
Available By A Given Date.

The Commission must decide that it either does or does not have confidence today that nuclear waste will be safely disposed of by some specific date. The relevant date should be the time by which disposal facilities "are needed."

44 Fed. Reg. at 61372-3. As an outside limit, the Court of Appeals identified the year 2007 because one of the two power plants whose license amendments were before the Court happened to have an operating license which will expire in that year. However, there are a number of power plants in the United States whose operating licenses expire prior to 2007; for example, the license for Dresden-1 expires in the year 1996 (Facility Operating License # DPR-2); for Yankee Rowe in 1997 (License # DPR-3); and for Big Rock Point and Humbolt Bay in the year 2000 (License ## DPR-6, DPR-7). Had any of these specific plants been before the Court in State of Minnesota, it is clear that such earlier dates would have been identified as relevant.

More fundamentally, it is clear from the record below that the Commission itself, in using the phrase "when needed," was not referring to a date so far into the future. Thus, in its 1977 policy statement, the Commission clearly contemplated a repository license application in 1980 and facility operation soon thereafter. 42 F.R. 34393. The Appeal Board below interpreted the phrase "when needed" to mean "well before the termination of either the Prairie Island or Vermont Yankee operating licenses," 602 F.2d at 416, and explained:

It is highly improbable that, by its reference to "when needed", the Commission had in mind a date even approaching the year 2007--

2009 (when the Prairie Island and Vermont Yankee operating licenses are due to expire).

7 NRC at 51 n. 10. Thus the Commission should not mechanically and arbitrarily assume for the purposes of this proceeding that the waste disposal facilities are not "needed" until 2007. Rather, at the outside, the Commission should choose 1996 as the deadline since reactor operating licenses begin to expire in that year. It then should decide whether or not it is confident that disposal will be available by 1996.

B. The Commission Must Decide That It Has The Necessary Confidence Today, Based On Facts That Exist Today.

It is insufficient for the Commission to decide that a basis for confidence may come into being sometime in the future. The issue is whether the Commission is confident today, based on the facts that exist today. Confidence cannot be based on hope, wishful thinking, an optimistic frame of mind, or absolute belief that science will overcome all technical problems and that institutional problems will evaporate. It must be based on facts that exist today. The long search for disposal methods and facilities described above amply demonstrates the unreliability of wishful thinking and the havoc it wreaks upon attempts at rational planning.

The requirement of a factual standard marks a departure from the Commission's prior basis for formulating nuclear waste policy. In 1977 the Commission, without a factual record, expressed confidence in ultimate waste disposal based solely on the ground that the Federal Government was then working on the problem, just as DOE is working on it now. The Commission cited ERDA's "dramatically expanded" program for repository development, and its "programmatic EIS" on waste management then in preparation. On the basis of a stepped-up program for site selection, ERDA was "expected to apply to the NRC for a license for such a facility in early 1980 or before." The Commission concluded:

Thus, there is now a coordinated Federal program to develop an actual disposal facility.

42 F.R. 34393 (July 5, 1977). The decisions of the licensing appeal boards which were reviewed in State of Minnesota relied heavily on the above-quoted language in refusing to develop a formal fact-finding record on the issue of waste disposal. 7 NRC at 49-51. By remanding and directing the Commission to hold this rulemaking proceeding, the Court of Appeals made it clear that the bare existence of a "dramatically expanded" and "coordinated Federal program to develop an actual disposal facility," combined with NRC's ongoing development of licensing regulations, did not by itself constitute a factual basis for confidence.

Thus, the Commission may not find confidence merely because DOE is working on the problem, and presents a plan of action with hopes for technical progress. Rather, the Commission must look behind and beyond the plan to ascertain whether facts exist today which justify a conclusion of confidence. In the words of Judge Tamm, concurring in NRDC v. NRC, 547 F.2d at 658:

[NEPA] forbids reckless decisions to mortgage the future for the present, glibly assuring critics that technological advancement can be counted on to save us from the consequences of our decisions.

C. The Commission Must Have The Highest Degree of Confidence.

Defining "confidence" for this proceeding requires an analysis of the implications of the rulemaking. If the Commission makes a finding of confidence, presumably the result will be a green light for licensing new nuclear plants and permitting amendments to waste storage licenses. As we have seen, the growing inventory of nuclear waste includes highly toxic plutonium and many other radionuclides which are dangerous for a million years. The challenge of providing for safety over such a long period is unprecedented, and the consequences of unsafe disposal could be staggering. See above, pp. 19-21. Because of the recognized hazards, we submit that the highest degree of confidence is called for.

At a minimum, in the words of the IRG, "a high degree of assurance" of safe disposal would be required (Ref. 10, p. 42).

This Commission's prior declarations of confidence in safe disposal are not entitled to any weight in this proceeding. The Court of Appeals for the District of Columbia found such confidence to be unsupported in both the NRDC v. NRC (Table S-3) decision in 1976 and, as already observed, in the later State of Minnesota ruling, in 1979. Moreover, in July 1979 two members of the Commission, in separate opinions in the Table S-3 proceeding, questioned the policy of confidence. Commissioner Bradford expressly disassociated himself from it, and noted "the past record of the Commission's obsessive need not to know about the uncertainties regarding its waste disposal assumptions." 44 Fed. Reg. 45373 (Aug. 2, 1979). Commissioner Gilinsky also rejected the optimistic view on safe disposal of nuclear waste, saying:

No such [waste] repository has yet operated. The prospective constructors of such a repository have not yet agreed on a design or even chosen a geologic medium. It seems anomalous, at this stage, for the regulators to express more confidence on this score than the repository designers and builders themselves have expressed.

Id. at 45374.

III. DOE DISTORTS THE ISSUE
BEFORE THE COMMISSION.

The Department of Energy here expresses a kind of "confidence" in safe disposal that is totally different from the confidence that the Commission must have. This is because DOE's presentation of the issue to be decided fails to meet each of the essential elements set forth above (Section II).

A. DOE Has Not Shown That Nuclear Waste Will Be Safely Disposed Of By A Given Date.

1. DOE Has Not Shown That Safe Disposal Will Actually Be Accomplished.

At the very outset, DOE seeks to shift the issue away from whether or not wastes will be disposed of. It purports to define the objective instead as whether its program will result in "licensed waste disposal systems." DOE Statement, p. II-1. This in turn is defined as a finding

that the Department is able (i) to understand and address the technical, social, political and institutional aspects of waste management; and (ii) to use the results from its program to develop licensed systems for the disposal of spent fuel in a time frame which is responsive to national needs.

(Id., emphasis supplied).

The issue in this proceeding, however, is whether the waste will in fact be disposed of, not whether DOE will obtain a license. Even if a license were ultimately obtained, DOE could fail to establish the needed number of permanent repositories because of technical problems or in situ tests which subsequently reveal the unsuitability of the sites. Technical problems aside, DOE could be unable to utilize any license it might receive because of public opposition or other institutional obstacles. To frame the issue solely in terms of whether or not DOE will get a license, therefore, misses the point. Even so, the license question at this time is too speculative to address intelligently -- not only because there are data gaps and no sites have been selected, but also because the NRC regulations are in preliminary form and the underlying EPA regulations have not been issued. The question as posed by DOE, therefore, is not only the wrong question, but is also impossible to answer in any meaningful way.*

* The quoted material from DOE's Statement is an example of the DOE doubletalk intended to obscure the weakness of its case. DOE must prove that it will overcome and resolve all technical, social, political and institutional problems. But the Department makes no claim that it will, hiding behind the empty phrase. "understand and address".

2. DOE Has Not Shown, And Does Not Even Claim, That Disposal Will Be Safe For The Necessary Period.

In its draft impact statement, DOE said that nuclear waste has to be isolated for up to one million years. (Ref. 1, p. 1.9). This is because plutonium and other components of waste have half-lives of tens of thousands to hundreds of thousands of years. See above, pp. 19-20 . Yet its Statement of Position fails to demonstrate, or even to claim, that such isolation can be accomplished.

DOE now takes the absurd position that, for the purpose of finding confidence, isolation for only 10,000 years is sufficient -- and indeed DOE predicts isolation for only that long. (Statement, pp. I-14, 20). That period, however, is a mere 1% of the time for which isolation is needed for safety, by DOE's own reckoning. There is simply no rational basis for accepting an isolation period of only 10,000 years for finding confidence in safety when the scientific community knows the necessary period for safety is in truth 100 times longer. The fact that DOE does not even predict isolation for the necessary period is an admission of lack of confidence in safe isolation.*

* In any case, DOE fails to demonstrate a factual basis for confidence even for the inadequate 10,000 year period.

Moreover, DOE does not deny that releases of radiation from repositories will occur, but rather asserts that any releases will be small and comparable to releases experienced by members of the public in the course of engaging in common activities. The basis for this assertion is apparently that the repositories will have to meet NRC and EPA regulations, which will require that the repositories be constructed to insure safety.

The essential flaw in this circular argument, of course, is that there is absolutely no reason to assume, as DOE does, that regulations can prevent breaches in the future or guarantee that any breaches will be small. On the contrary, if the repository is breached, then, regardless of what the regulations say, common sense indicates that the releases are likely to be large. First, among the most serious and likely causes of a repository breach are human intrusion and groundwater entry. (See pp.49, 83,below.) If future generations drill into the repository at all, they are likely to breach it quite dramatically, leading to a substantial release of radioactivity. Similarly, once water establishes an escape route from the repository to the biosphere, there is more reason to think the migration of wastes will continue and indeed grow than that it will mysteriously subside. In short, when a closed system springs a leak, everything inside

can get out. And the likelihood of significant releases is compounded by the fact that during the course of a million years not just one but many, many breaches can occur, each one capable of releasing significant radiation -- either abruptly or gradually. Viewed in this light, DOE's claim that any release which occurs will be de minimus is pure fantasy and must be rejected.

But even if we assume for the sake of argument that releases from the repository would not exceed NRC and EPA regulations, this too would not assure safety. For one thing, the regulations have not even been issued, so there can hardly be confidence today that an as yet non-existent repository will some day meet some as yet non-existent standards. Moreover, regulations and policies are often found inadequate in light of experience. The Commission had to confront that situation after the accident at Three Mile Island, with the result that safety regulations have been revised in light of the Lessons Learned Reports. In addition, the Commission has decided to hold hearings aimed at reducing the risks of occupational radiation doses in NRC-licensed activities; EPA will conduct similar hearings. 44 F.R. 10388 (Feb. 20, 1979); 44 F.R. 53785 (Sept. 17, 1979). Thus, even if a proposed repository could meet regulations to be adopted by NRC and EPA, that would be no assurance of safety. Indeed, no regulatory agency has previously attempted to issue regulations to insure

safety for a one-million-year period. The regulations to be issued, at best, will represent the agencies' best current guess on how to do the job, but will hardly be a basis for confidence in safety for even the 10,000-year period cited by DOE, let alone the necessary million-year period.

Moreover, issuance of regulations is not tantamount to a declaration of confidence. EPA, in issuing regulations, would not be deciding that it has confidence in safe disposal for the necessary period. It would be saying only that its regulations are the best it can do, given present-day data gaps. The Court of Appeals has required that this Commission determine its confidence, and the task cannot be evaded by relying on regulations to be issued by EPA.

As previously noted (p. 28), DOE frames the issue in terms of licensability of its repository. But the possible existence of a license is not proof of safety. After all, Three Mile Island-2 had a license at the time of its accident, as have other nuclear plants where mishaps have occurred. The nuclear plants whose operations have been suspended by the Commission over the years for health and safety reasons have had licenses. Therefore, whether or not DOE gets a license for a repository -- itself an uncertain thing -- is irrelevant to the safety question.

Finally, DOE's definitions of isolation and containment are so watered down as to be unacceptable. "Isolation"

by the near field is defined to mean "insuring that any migration of radionuclides through the near field will be very slow". However, "very slow" is not defined, and hence this definition does not establish true isolation. "Containment" is defined as something which "should be virtually complete during the period when radiation and thermal output are dominated by fission product decay". Id., p. II-7. "Virtually" is not defined, and the period in question is only hundreds of years -- a tiny fraction of the 10,000 year period DOE claims is sufficient to provide a basis for confidence, and an even smaller fraction of the million-year period for which isolation is truly required. Later, we are told that the near field of the desirable repository provides containment "by minimizing the likelihood that circulating groundwater will contact the waste package." Again, "minimizing" is undefined and thus this definition does not insure containment.

Thus, all of these definitions fall far short of the true isolation required to protect public health and safety, a standard evident to the NAS 23 years ago and affirmed recently by EPA. (See above p.21). In fact, a majority of this Commission, in the Table S-3 proceeding, assumed that there would be absolutely no release of radioactivity from a permanent nuclear waste repository after sealing. 44 Fed. Reg. 45362 at 45367-9 (Aug. 2, 1979). The standard should be no weaker now that the Commission faces the issue head on in this proceeding.

3. DOE's Projection Of A Repository By
The Year 2006 Is Contrived And
Unreliable.

DOE's projection that a repository will be available by the year 2006 appears contrived to meet the suggested deadline of 2007 in the State of Minnesota v. NRC ruling. Moreover, DOE projects only one repository by that date, while conceding that many repositories will be needed. No outside date is given as a deadline by which all necessary repositories will be available. (Statement, pp. II-289 and III-8 to III-13).*

The projected date for repository availability has again and again been postponed, from the early 1960's predicted by the NAS to the mid-1970's predicted by the AEC, to 1985, to 1988, to the early 1990's, and now to some date between 1997 and 2006. Moreover, the longest postponements in the projected date have occurred most recently; even as late as 1976, operations were projected to start in 1985, 9 years hence, as compared with today's projections which look 26 years hence. It is obvious that the 2006 deadline may again be postponed.** In short, the DOE

* As previously argued (p. 24), the Commission should not gear this rulemaking to that artificial date just because the operating license involved in that case will not expire until 2007. Instead the Commission should select the year 1996. Consequently, DOE's suggestion of 1997 as the earliest possible date by which the first repository could open is, on its face, unsatisfactory.

** An editorial in a periodical of the nuclear industry has observed: "There should be no surprise at all when the next delay, or the one after that, is announced." Nuclear News, June 1978, p. 35.

Statement in this proceeding may be no more reliable than previous hopeful plans announced by the Government over the course of more than twenty years. If history is any guide, there is considerably more basis for skepticism than for confidence about fruition of the plan in the time designated.

The illusory nature of DOE's date is highlighted by the agency's recognition that many data gaps exist and in situ testing is needed. DOE has chosen to assume that the gaps will be cured, the testing will not uncover new obstacles, and institutional problems will go away, but these cannot be predicted to occur at all, let alone by a given date. The notion that everything will fall neatly into place by 2006 is totally divorced from reality. Indeed, it is inconsistent with DOE's own view expressed only last year. In commenting on a report issued by the General Accounting Office in June 1979 on the need for spent fuel storage facilities, DOE said that it was not then possible to develop specific time frames for the final disposal of spent fuel (Ref. 17, p. v). Developing specific time frames is no easier now than it was last year, but DOE has nonetheless apparently contrived an artificial date solely for the purpose of this proceeding.

B. DOE Says That A Basis For Confidence Will Arise In The Future, And Will Be Based On Facts Which It Hopes Will Exist In The Future.

Repeatedly throughout its Statement, DOE offers promises that at some time in the future a basis for confidence

will emerge in some aspect of the plan of action:

Confidence in the suitability of the repository will be high at the time waste emplacement operations commence...

* * *
The Department's approach ensures...
that a high confidence in safety will be attained....

* * *
Site and host rock characterization will be carried out using state-of-the-art techniques which will provide confidence in the characterization of geologic and hydrologic conditions existing at the site.

(Statement, pp. II-280, II-299, II-300-301) (emphasis supplied).

These are no more than promises, of a type that have proven illusory in the past, that at some time in the future there will be a factual basis for what now is blind confidence. The Commission, however, is charged with deciding its degree of confidence today. It cannot assume that the results of the proposed experiments will achieve everything DOE says they will. It must instead limit itself to determining its confidence today, based on the objective facts known today.

DOE's Statement of Position sets out a proposed plan of action toward development of a geologic repository. However, a written plan of action is no basis for confidence that the plan will be implemented as written, or that the

result will assure public safety. As noted above (p. 25), the Court of Appeals has ruled that similar plans by DOE's predecessor were no basis for confidence -- and, indeed, those plans failed to materialize.

Further, as more fully appears in Section IV, below, p. 77 , DOE recognizes that significant technical data gaps now exist concerning geologic disposal. The Department's response is twofold: first, research and development which will be done in the future will reduce the data gaps and thereby provide the basis for confidence; and, second, the sheer diversity of programs underway ensures that enough of them will succeed to provide confidence. (Statement, pp. II-160, 298, 302.)

DOE's reliance on methodology still to be developed is reflected in the following passages:

[T]echniques for efficient seal emplacement methods, quality assurance techniques, and in situ characterization of seals will be developed.

* * *

Systems will be designed such that, in the event of accidents, involuntary exposure of both workers and the general public will be minimized.

Statement, pp. II-185, II-279 (emphasis supplied).

Once again, these hopes are no substitute for a factual basis for confidence. We simply do not know whether further research will lead to progress on the geologic repository concept, as envisioned by DOE, or whether it will instead reveal new obstacles tending to undermine the proposal. Research could lead to bad news, as indeed it has on more than one occasion in this very field, rather than to good news. Also, diversity is clearly no answer since it is very possible that no aspect of the program will result in a repository meeting all criteria.

DOE's confusion between fact and hope is aggravated by the agency's lack of objectivity about nuclear waste disposal, which has been recognized by sister agencies of the Government. Its optimistic conclusion in the draft GEIS that waste disposal can be accomplished safely in geologic formations was questioned by NRC staff, which suggested "restructuring the GEIS to support a more modest conclusion." (Ref. 7, p. 1). Similarly, the Department of the Interior -- the agency that encompasses the USGS -- said that the impact statement was "biased in its technological optimism" (Ref. 8, p. 3). Interior also charged that DOE chose to rely upon the judgment of "experts" who shared the prejudices of DOE and the "pro-nuclear industrial-government sector," to the exclusion of disinterested professionals employed by other government agencies, academic institutions or environmental groups. Id. at 7-8.

Perhaps the clearest rebuke to DOE and its predecessors came in President Carter's message to Congress in February 1980. The President there declared that "past government efforts to manage radioactive wastes have not been technically adequate." (Ref. 21, p. 1). Mr. Carter cancelled the proposed Waste Isolation Pilot Plant ("WIPP") near Carlsbad, New Mexico, saying that further investigation of geologic media and sites was needed before any site could be selected. (Ref. 21, p. 3).

In short, DOE's expressed confidence, unsupported by fact, is based on bias and/or hope, and cannot support a finding of confidence by the Commission.

C. DOE's Proposed Standard For Confidence Is Inadequate In Light Of The Enormity Of The Risk And Gravity Of The Danger

The Commission should squarely reject the standard proposed by DOE based on "the preponderance of available technical evidence as interpreted by objective experts in the field." (Statement, p. II-9). For one thing, DOE has been known to rely on "experts" who are not "objective." See above at p. 39. Moreover, a mere preponderance of the evidence is insufficient because an erroneous conclusion by the Commission could have consequences that are calamitous for future life on earth. Thus, if a Commissioner believes that the weight of evidence tips only slightly toward confidence,

his vote should be for no confidence.*

* In its Statement of Position in this proceeding, USGS expresses confidence in ultimate disposal, but is unable to give a date -- and therefore expresses no confidence that repositories will exist even by the year 2007 (p. 1). It also ignores the institutional obstacles to repository siting -- terming them "significant [but] outside the scope of this filing" (p. 9). It therefore is not even addressing the question of whether a repository will ultimately be established, but only the technical possibility. Furthermore, USGS acknowledges and outlines many gaps in technical knowledge and the research that must still be done -- including in situ testing (pp. 9-12). Indeed, it indicates that confidence will not come before successful in situ testing -- something which is years or more in the future. Therefore, its conclusion that safe disposal will some day be available -- although not necessarily by 2007 -- is based not on existing fact but on hope, and fails to satisfy the critical elements of the confidence issue facing this Commission.

IV. THERE IS NO FACTUAL BASIS FOR
CONFIDENCE THAT NUCLEAR WASTE
WILL BE SAFELY DISPOSED OF IN
REPOSITORIES BY ANY GIVEN DATE.

This section demonstrates that there is no factual basis for the Commission to have any confidence that nuclear waste will be safely disposed of by any given date. The reasons that no such basis for confidence exist are:

- A. Radioactive waste disposal presents a unique challenge, because it is necessary to predict far into the future, yet we are not able to do so;
- B. There are serious technical and institutional problems that preclude confidence that even one satisfactory site, let alone the sufficient number of sites, will be selected; and
- C. There are a myriad of defects, uncertainties and gaps in the many technologies which will be needed to implement waste disposal.

Each of these three areas is discussed below. Although DOE's Statement is filled with conclusory expressions of confidence, it will be seen below that in fact DOE's Statement, upon careful reading, concedes a great many of the specific factors which show that there cannot be a finding of confidence at this time. The data gaps are further spelled out by USGS and by various other reliable sources, primarily reports and studies recently published by the Government.

A. Radioactive Waste Disposal Presents
A Unique Challenge, Because It Is
Necessary To Predict Far Into The
Future, Yet We Are Not Able To
Do So.

Never before have science and technology been called upon to develop a safe method for disposing of deadly substances in such a way that they will remain isolated from the biosphere for up to a million years. As DOE observed in its Statement:

The unique requirements of radioactive waste management have generated the first demands for applying long-term geologic predictions.

Statement, p. II-102. NRC staff has said that "geologic disposal is an entirely new enterprise -- no experience exists with geologic disposal." 45 Fed. Reg. 31395 (May 13, 1980). Yet it is not simply that we have no experience in meeting such a challenge; more fundamentally, the very requirement that our actions today assure the safety of our descendants for tens of thousands of generations is inherently fraught with great uncertainty. As DOE has explained:

A prime uncertainty in conventional geologic disposal is verification of the safety and reliability of the concept in the long term. To verify the safety and reliability with certainty would require observation of the repository throughout the time the emplaced wastes have the potential to jeopardize the public health and safety. The ability to assure observation for such a time is clearly beyond any human experience. The use of analytical models and in situ testing then become an essential first step for predicting the long-term safety and reliability of a repository.

(Ref. 1, p. 3.1.239).

Despite the inherent difficulties in long-term prediction, DOE has recognized the importance of such prediction:

Since HLW disposal systems will be required to function far into the future without active assistance from man, the ability to assess and predict long-term system performance is a key factor in determining licensability.

* * *

Confidence in the capability of a technology requires that its performance be predictable by currently available techniques.

Statement, pp. II-3, II-18.

The fact is, however, that we are simply unable to predict long-term geologic processes. This inability has been recognized both by DOE and by the USGS. The latter has termed geology itself "a retrodictive rather than a predictive science," (Ref. 4, p. 11) and has observed:

[U]se of the geologic record to predict future events is a formidable task.

* * *

The past rates of occurrence of geologic events and processes have varied widely over time and there appears to be no clear philosophical basis for determining rates for these events or processes in the future.

(Id., p. 11). DOE has acknowledged that "many important aspects

of the evolution of the lithosphere ... are difficult, if not impossible to forecast," and that "simple projection into the future from local geologic history alone is not a satisfactory basis for repository site selection."

(Ref. 1, p. 3.1.22). Moreover, according to DOE:

Much basic knowledge about geologic processes, their interactions and particularly their time of next occurrence is lacking for certain types of events over the time periods being considered. The events are those that would be possibly disruptive to a repository... It is questionable how much these problems can be resolved in the near future, and there will always be some uncertainty which must be considered in the repository design.

(Id., p. 3.1.50).

Nor does DOE see a quick answer to the problem of predictive uncertainty:

"Some events and geological processes may not be resolvable in the next decade or two to the degree of certainty presently felt to be necessary to time periods of hundreds of thousands of years and longer."

(Ref. 1, p. 3.1.51) (emphasis supplied).*

* In view of these candid acknowledgements appearing in DOE's draft generic EIS on commercial waste management last year, the Commission should view with the utmost skepticism DOE's present claim that the "geologic principle of uniformitarianism" is a basis for confidence today. See Statement, p. II-101.

There are a number of kinds of geologic events which are important to be able to predict over a long future period. Earthquakes are perhaps the most obvious. In fact, a major breach of the repository as the result of a severe earthquake "would release enough radiation to make the site uninhabitable if the event occurs within the first few thousand years." (Ref. 29, p. 1-18). Our historical records of earthquakes, however, go back only 200 to 300 years (Ref. 4, p. 11; Ref. 5, p. 37). These records simply do not enable us to predict future earthquakes for thousands of years, let alone a million years.

Earthquake prediction suffers not only from a lack of data but from a lack of reliable theory as well. The theory of plate tectonics holds that earthquakes are concentrated in belts, and occur infrequently in the large stable plates of the United States. However, the "New Madrid" earthquakes, among the most violent earthquakes known, occurred in the North American stable plate:

From 1811 to 1812, a series of hundreds of earthquake shocks devastated the central part of the Mississippi Valley ...Three very large shocks...were felt over two-thirds of the United States. In Washington, D.C., 1300 km away, sleepers were awakened, dishes and windows were rattled, and walls were cracked... The vibrations rang church bells in Boston. The earthquakes caused major changes in topography over 130,000 square kilometers.... The course of the Mississippi River was changed.

(Ref. 13, p. 51) (emphasis supplied). The history of large earthquakes in the United States "does not give a useful

indication of where future earthquakes might occur," except in certain regions of high frequency earthquakes. "At the present time we have no way of predicting the likelihood of such an occurrence [as the New Madrid Earthquake] in the supposedly stable plates." (Id., pp. 51-52).

The problem of predicting seismic events is compounded because, as DOE recognizes, the building of a repository could itself increase the risk of faulting:

Fault movement could also result from repository placement in several ways: from changes in the stress field due to the geometry of the repository cavity, from added thermomechanical stresses due to heating, or from influx of water along a fault plane.

(Ref. 1, p. 3.1.27)

Another problem is that continental re-glaciation has "a very high probability of occurring within the time period of concern," and could bring with it faulting, flooding, and dramatic changes in climate. (Ref. 5, p. 38). For example, the effects of a shift from arid to rainy climate upon the hydrological regime of a waste repository has been "largely ignored in current risk assessments of repositories such as Hanford and the Nevada Test Site." Id. DOE has stated that inundation by rising sea level, creation of lakes, and formation of ice sheets are sufficiently likely to occur that their effects should be assessed for each region of the United States. (Ref. 1, p. 3.1.27; see also p. 1.14). If the top of a salt dome repository were accessible to sea-water, a large

quantity of salt could dissolve and the waste could be exposed. (Ref. 5, p. 39).

Penetration of a repository by groundwater is considered by DOE to be a "potentially significant release and transport process" which would bring nuclear wastes into the biosphere and thus into contact with human life. (Ref. 1, p. I.1). In fact, in its Statement in this proceeding, DOE states:

Knowledge of groundwater hydrology is perhaps the most important requirement for understanding the long-term behavior of a mined geologic repository. The transport of radionuclides away from the waste-emplacement zone by moving groundwater is by far the most likely mechanism by which radionuclides might migrate from a repository to the biosphere....

Surface water must also be evaluated as a potential source of flooding during repository operation.

(Statement, pp. II-76, II-77). And, since water is almost universally present in the underground, no rock formation can be considered to be completely impervious to water entry. (Ref. 20, p. 521). A report prepared for the NRC concurs:

Seams within the salt can be quite permeable and hence could possibly provide a major pathway for water or waste movement. Even if these features are found to be initially quite dry... there remains the potential for future water intrusion.

(Ref. 9, Vol. 4, p. 7-12)*

* The adverse effects of groundwater entry are further discussed below at p. 83.

In addition to unpredictable changes in the physical characteristics of the repository environment, future human activity must be considered:

It is clearly impossible to predict what the world will be like 50 years from now, let alone in several centuries.

(Ref. 19, p. 43). DOE has recognized as much (Ref. 1, p. 3.1.62), and accepts the "general consensus" that "we cannot rely alone on the continuity of existing governments and institutions over this long time period to insure isolation of the concentrated wastes." (Ref. 2, p. 7.1). In the area of land use, DOE has admitted that our predictive capabilities beyond even 100 years are "virtually non-existent." (Ref. 1, p. 3.1.25). Future generations might forget that a particular site is a repository (Ref. 20, p. 521). Or, they might prospect for salt (id. at 522): Significantly, 95 of the 263 salt domes of the Gulf Coast region have already undergone industrial development. (Ref. 27, p. 174). People might also prospect for oil, gas, sulfur, potash, or other commercial minerals which tend to be near salt deposits (Ref. 8, p. 6); or for the uranium and TRU elements that were buried at the site (Ref. 5, p. 35). They might also dig to satisfy archeological curiosity (id.). In the words of the EPA Panel of Scientists:

Man's unpredictability far outstrips most of the imagined geologic hazards we can foresee, and we doubt that it is amenable to meaningful probability analysis. (Ref. 5, p. 35).

The severity of the human intrusion problem was stated by NRC staff, as follows:

Simply stated, human intrusion cannot be prevented; In spite of all efforts to avoid sites which may prove attractive to humans, there may be deliberate or inadvertent intrusion.

45 Fed. Reg. 31398 (May 13, 1980).

Significantly, DOE has no answer to the problems posed to the repository by possible human intrusion. The Department admits that "work is just beginning in this area and there is much to be learned" (Statement, p. I-18), yet it concludes without analysis that the problem could be reduced to an acceptable level. This is just one of many areas in which DOE's case is based on fantasy rather than a factual basis for confidence. DOE also contravenes its own stated objective to isolate the environment from the effects of "any reasonably foreseeable events or processes." (Statement, p. II-9).

Because of the impossibility of predicting geologic or human events with any certainty for the period of necessary isolation, DOE purports to rely on risk assessment models for its conclusion that disposal will be "adequately" safe for 10,000 years. Unfortunately, however, these risk assessments are very tenuous and suffer from a lack of essential data. They cannot justify confidence in predictions for 10,000 years, let alone a million years. As the IRG has said:

Uncertainties associated with risk assessment derive from lack of data, lack of experience, inability to identify all release mechanisms for radionuclides, the natural variability in physical properties of geologic media, and inability to predict long-term geologic and climatic processes and social evolution.

(Ref. 10, p. 46).

The models must account for all of the variables which affect the repository viewed as parts of an integrated system of activity. As DOE explains:

All of [the] analyses [of the components of the waste disposal system] are strongly interrelated and must be considered together in predicting the performance of all or any of the components of the disposal system. In order to make quantitative predictions, analyses like these require the use of mathematical descriptions, called models, of the phenomena. Before the models can be used with confidence, they must be developed and verified.

(Statement, pp. II-201 to II-202) (emphasis supplied). The fact is, however, that these models have neither been developed nor verified. Modeling analysis of effects on the environment near the repository is "just beginning." (Ref. 15, p. 57). "Realistic modeling of flow in fractured rock and of possible geochemical reactions remains to be achieved," says the IRG, "and this will undoubtedly be necessary before site suitability analyses can be made." (Ref. 11, p. 19). DOE admits

that developed and/or verified models will not be available until 1983 for overall repository performance, 1985 for waste-rock interaction, and 1987 for thermomechanical impacts on ground water. (Statement, pp. II-203, II-222, II-219). The development of detailed, accurate hydrologic models will require "considerable time." (Id., p. II-98).

The requirement of verification, of course, is not merely a formality; it is a substantive requirement that all steps in the verification process lead to positive results. During the verification process, facts may be revealed showing that an operating assumption is wrong, or that a proposed technique will not be feasible. See above, pp. 38-39.

Thus, there is no dispute that models for predicting the long-term performance of geologic repositories are still under development and will not be available for years, and that data on specific sites to use in the models are incomplete (Statement, p. I-19). Nonetheless, DOE expresses confidence, arguing that the "analyses performed to date give no indication that a geologic disposal system, designed and constructed according to the requirements described in this Statement, cannot isolate radioactive waste safely." Id. However, the claim that analyses to date using models which are not fully developed and which lack data do not prove the impossibility

of safe isolation can hardly justify a conclusion that the inverse is true -- that, when all the data are in and the model is further developed, the analyses will affirmatively establish the safety of repository storage. The only honest response is that we do not know what the analysis will show -- and that in any case we cannot begin an analysis until a site has been fully tested. Selection and testing of a site are years away, and therefore we will not know for years whether or not models will ultimately suggest a basis for confidence.

The limited value of models is discussed by NRC staff in its proposed regulations for a geologic repository. Staff there says that the models necessarily contain many uncertainties and approximations, and are qualitative rather than quantitative; indeed, it may be impossible to develop credible quantitative models. 45 Fed. Reg. 31393 at 31395, 97-98 (May 13, 1980).

The inadequacy of risk assessment models was highlighted as well in the USGS Preliminary Statement in this rulemaking, dated April 15, 1980. As pointed out by USGS, much of the data and "understanding of the processes and events involved" are not available, and much of it will become available only "from site-specific investigations" (p. 11). Once again, therefore, until a site has been selected, and tested, the necessary assessment cannot be

made. Furthermore, says USGS, predictive models suffer from inherent uncertainty (p. 12).

The IRG has characterized estimates of probabilities which have been made for disruptive events as "little more than guesses," and notes that "for many geologic processes, it will never be possible to estimate probabilities without large uncertainties." (Ref. 11, pp. 49-50; See also Ref. 29, p. 7-19). It is evident that if the probability of a certain geological event is not known, a reliable risk assessment of the potential impact of such an event cannot be calculated. (See Ref. 8, p. 5).

DOE says that while there are residual uncertainties in waste disposal -- i.e., "uncertainties that cannot be eliminated" -- the problem is not unique to this field, and engineered barriers can "accommodate" the uncertainties. Statement, pp. II-17, I-8. It may be true that other projects involve uncertainty, but here the damage which can flow from an accident -- contamination of large regions of the earth -- is enormous and incomparable. Moreover, the likelihood that accidents will occur is particularly high because we must plan for a million years. That factor also is unique to radioactive waste management; in no other human endeavor do we attempt to plan for even a thousand years.

Engineered barriers could be built to last perhaps decades, or conceivably centuries, but not longer. They are of very limited value where the uncertainties against which they are designed to protect will last for a million years. Moreover, even if such barriers could be helpful in the short-term for a narrow, quantitative uncertainty, they are virtually useless when there is great qualitative uncertainty with respect to virtually every geologic, meteorological and human element involved. If we knew what the future condition would be but were unsure of its precise dimensions, the problem would be somewhat easier. But we cannot predict even what type of conditions will exist, so we cannot begin to rely on engineered barriers or "conservative assumptions" to overcome the uncertainties.

In conclusion, the risk assessment models utilized by DOE are too speculative and lacking in data to compensate for the inherent impossibility of prediction. They cannot form a basis for confidence in safe disposal.

B. Serious Technical and Institutional Problems Preclude Confidence That Even One Satisfactory Site, Let Alone The Sufficient Number of Sites, Will Be Selected.

The preceding discussion has demonstrated the great uncertainty that we will be able to achieve safe waste disposal, largely because we are unable to predict geologic and human events for even a fraction of the necessary isolation period. Yet, even if we were somehow able to predict the future, there would still be no basis for confidence in safe waste disposal. This is because we can have no assurance at this time of our ability to identify and select even one repository site -- let alone the necessary number of sites -- meeting all relevant criteria. On the contrary, as shown below, the difficulties inherent in selecting satisfactory sites may well be one of the greatest obstacles to a finding of confidence by the Commission, especially since a dozen or more sites may be needed. See p. 18, above.

In particular, site selection for repositories can be expected to be very difficult and time-consuming for both technical and institutional reasons. Extensive in situ testing will be needed, and might reveal, or even produce, unacceptable conditions -- such as fractures which would permit water intrusion. Institutional problems would include the likely public opposition as well as difficulties in obtaining

approvals from State and local governments and Federal agencies.

Because of all these siting difficulties, DOE has recognized the possibility that no site will be found to satisfy all criteria of the selection process. (Ref. 1, p. 3.1.19). Until we know that a sufficient number of satisfactory sites do exist, have been thoroughly tested, and have received all necessary Federal, State and local approvals, we cannot be confident of safe disposal. As will be discussed below, it will be many years at best before we will be able to know if any such site exists.

In this section, the technical problems involved in assessing, selecting, and evaluating candidate sites will be outlined. (pp. 58-67). In addition, the institutional problems in site selection will be discussed (pp. 68-76). The many gaps in the technologies needed to implement waste disposal -- apart from site selection problems -- are discussed below, in Section IV (C) (pp. 77-101).

1. Technical Problems Preclude Confidence That A Sufficient Number Of Satisfactory Sites Will Be Found.

(a) Geologic Siting Constraints Will Limit The Areas Which Can Be Considered For Possible Repository Sites.

DOE admits that site characterization and site selection require extensive technological analysis, and that the necessary technology has not been adequately developed. (Ref. 2, p. 2.2). Among the technologic constraints are geologic criteria which impose limitations on site selection.

First, groundwater often constitutes the major potable water supply of many regions, and is the most likely agent for transporting radioactivity away from the repository and into the environment. Thus, known major aquifers should be avoided. (Ref. 7, p. 3-42; Ref. 1, pp. 3.1.48, 3.1.49; Ref. 16, p. 16). Similarly, areas near large rivers and lakes should be avoided because of risks of flooding or water entry into the repository. (Ref. 1, p. 3.1.47). Further, areas of interior drainage can become covered with water during wet climatic eras, and thus might not be suitable for a repository. (Ref. 7, p. 3-28).

Second, areas of known active faults, joints or fractures, zones of recent earthquakes or volcanic activity, and crusted plate boundaries should be avoided. (Ref. 1, pp. 3.1.47, 3.1.48).

Third, the selection of some potential site locations may result in unacceptable, irreversible losses of valuable oil, gas, sulfur, potash, or other commercial minerals. (Ref. 8, p. 6). The importance of natural resources as a siting limitation has been recognized by DOE (Statement, pp. II-79 to II-80).

Significantly, these various limitations are cumulative, and may lead to ruling out very large areas of the country, perhaps making it impossible to find one potential site meeting all criteria -- let alone the many sites that are needed.

(b) In Situ Investigation Has Not Been Conducted At Potential Sites, Yet Such Investigation Itself Could Undermine The Sites' Integrity

Few propositions elicit more agreement among those concerned about nuclear waste disposal than that in situ tests must be performed before any candidate site can be considered acceptable. DOE repeatedly acknowledges this in its Statement. For example:

An understanding of the character, condition and geometric configuration of the rocks in the vicinity of a repository is essential for developing predictive models used to estimate the performance of a repository.

* * *

[S]ubsurface exploration [is necessary to] allow the character and configuration of the rocks to be determined in detail. The data

thus collected are used ... in computer models to predict the site's containment and isolation qualities... The potential effects of fractures ... must be evaluated for each site... Subsurface characterization and testing methods may need to be developed at each site before final decisions on suitability can be made.

(Statement, pp. II-72, II-73).

The IRG has explained the need for in situ tests as follows:

Because the behavior of rock masses is influenced by inhomogeneities and discontinuities, results of laboratory tests on small, relatively homogeneous and intact specimens can be seriously misleading as predictors of rock mass behavior. In situ tests will be needed to develop reliable information on mechanical, thermal, and fluid flow properties at the site, and techniques will need to be developed to permit utilization of laboratory test data in the design and interpretation of in situ field measurements.

(Ref. 11, p. 58). Data from laboratory experiments, said the IRG, "are not adequate in themselves for engineering design of a repository because they do not represent the rock mass."

(Id., p. 33). A report prepared for the NRC concurs:

The only practical method to achieve final design must rely upon in situ monitored experiments conducted after initial excavation of a portion of the repository.

(Ref. 9, Vol. 4, p. 3-29) (emphasis in original). See also, Ref. 23, p. 4-95; Ref. 7, p. 3-9; USGS Statement of Position, pp. 7-9. President Carter recognized this principle in his

recent policy statement:

Because the suitability of a geologic disposal site can be verified only through detailed and time-consuming site-specific evaluations, actual sites and their geologic environments must be carefully examined.

(Ref. 21, p. 3) (emphasis in original).

Moreover, no site can be assumed to be adequate for use as a repository until in situ testing has been conducted for many years -- and even then, new discoveries may require abandonment of the site. One well-known example of the elimination of a proposed site on the basis of in situ testing is Project Salt Vault (see above, p. 10). After several years of exploratory work in the 1960's at the unused salt mine near Lyons, Kansas, the AEC decided that the site was suitable for use as a federal repository for disposal of commercial high-level waste. Nonetheless, despite the years of exploration, the site was later found to be subject to water penetration and hence unsuitable, and the project was abandoned. (Ref. 2, Vol. 1, p. 1.5.1; NRDC v. NRC, 547 F. 2d at 648 n.46 and 651 n.52).*

* DOE's Statement of Position briefly discusses Project Salt Vault (pp. II-251 to II-253), summarizing five "significant results" from the Project. Incredibly, the discussion makes no mention of the Government's subsequent plans to use the mine as the nation's first underground radioactive waste repository, nor of the ultimate abandonment of those plans. See p. 10 of this Statement, above. This incomplete portrayal is a telling example of DOE's lack of objectivity about nuclear waste disposal, discussed above at p. 39.

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 retrieval 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).

Unfortunately, however, the in situ tests that are so essential to assure a safe repository are also likely to ruin the site by breaching the integrity of the candidate repository and permitting water intrusion.

As the IRG has found:

The more extensively a potential site is examined, except with remote sensing geophysical techniques, the greater the likelihood that the integrity of the site will be jeopardized.

(Ref. 11, p. 46). Despite the clear need for in situ testing, DOE has acknowledged:

Standard techniques for analyzing geologic formations in a non-destructive manner are not available. Uncertainties in this area center around the ability to develop instrumentation to measure certain in situ bulk rock characteristics without resorting to existing techniques which require core drilling.

(Ref. 1, p. 3.1.238) For example, wave-probing of rock to determine inhomogeneities or structural flaws is "in its infancy, and a substantial amount of basic work is needed before operational status can be claimed," including "considerable improvement" in instrumentation, understanding of wave-propagation phenomena, and development of interpretive tools and techniques. (Ref. 15, pp. 18, 19.) "There is a significant need to measure fracture geometry in hard rock...

The data obtained [in local measurements] are difficult to interpret" because of the non-uniformity of the medium.

"A satisfactory global-type fracture geometry measurement is not yet available." (Id., p. 131).

The problem of non-destructive testing is a major obstacle to adequate exploration of specific sites. The IRG has said that "accurate prediction of the transport of radionuclides from a repository requires detailed knowledge" of many site-specific facts and processes, but "[t]hese types of hydrogeologic and geochemical information are currently not fully available even for the best known aquifers, and would require considerable effort to obtain at a repository site because of the need to minimize disruption of the repository area by drilling." (Ref. 11, p. 38).

DOE's Statement of Position wishes away the many technical gaps that could prevent or delay for many years selection of a repository. That Statement (e.g. at pp. III-65 to 68) discusses some of the many vital areas in which necessary information is lacking, but says that work is being done or planned and that the information will be available by specified dates.

DOE again appears to be indulging in wishful thinking. It cannot predict exactly how long it will take to get all the data. Indeed, it is possible that by the specified dates the researchers will conclude only that still more

information is needed. Furthermore, DOE assumes that all the data will be favorable to site selection, but that too is an arbitrary assumption.

- (c) The Site Investigation Work Which Has Been Conducted To Date Affords No Basis For Confidence That Satisfactory Sites Will Be Found.

A good example of DOE's unfounded optimism about site selection lies in its conclusion that "the diversity of media under evaluation, the large number of potentially suitable sites... and the NWTs* Program's ability to successfully screen for sites using criteria and the available performance assessment techniques will result in identifying, qualifying, and licensing repository sites." (Statement, p. II-128). Assuming, for the moment, that DOE meant to say that a sufficient number of acceptable repository sites would be found, close examination of DOE's own description of its site exploration efforts shows the claim to be utterly devoid of any factual basis.

Thus, according to DOE, in 1980 two or three domes from the Gulf Interior Region Salt Domes will be "recommended for further examination in the 'location' study phase of the

* Nuclear Waste Terminal Storage Program.

site exploration process. Several characteristics need careful evaluation against the siting criteria." (Statement, pp. II-108, II-106). With regard to the Paradox Basin, "existing information is not yet sufficient for assessing the suitability of individual parts of the region for a repository." (Id., p. II-109). The data assembled to date on the Palo Duro and Dalhart Basins are "preliminary." "Specific questions pertaining to hydrology, tectonics, geology, and resource evaluations will be the subjects of proposed investigations." (Id., p. II-112, emphasis supplied).

Although the Carlsbad, New Mexico site has been under investigation for 8 years, DOE says that the site may suffer from a conflict with natural resources, and it is possible that future exploration at depth or improved understanding of geologic processes could reveal aspects undesirable for a repository. (Id., p. II-114) No field investigations have even been carried out by the Department in the Salina basin; the amount of glacial scour in valley areas needs to be investigated further, and resource conflicts may be severe for siting a repository anywhere in Ohio. (Id., p. II-117) "Much additional information is needed before a repository site could be identified in the Salina basin. At the present, no part of the basin can be judged acceptable or unacceptable for repository siting." (Id.) At DOE's

Hanford site in the State of Washington, "[q]uestions about the location and movement of the water in the interbeds and interflows of Wanapum and Grande Ronde Basalts are being addressed and should be resolved in the next 2 to 3 years." (Id., p. II-118). Finally, one location is being explored at DOE's Nevada test site. The geology is complex. Welded tuff within the site may contain up to 10% water by weight; the effects of this water "have to be assessed and are being investigated." Moreover, "few reliable estimates of ground water flow velocity are available" for the region. (Id., pp. II-118 to II-124).

This, then, is the status of DOE's investigations to date, almost none of which have proceeded beyond regional evaluations to studying or even identifying specific candidate sites. As already observed, a dozen or more repositories may be needed, yet no candidate site will be selected until 1985 at the earliest. (Ref. 21, p. 3). The discussion above shows that there is no basis for knowing whether any of the ongoing investigations will identify even one technologically satisfactory region, let alone a specific site.

In claiming that many sites will be available, DOE places reliance on its "ability to successfully screen for sites using criteria," see p. 65 , above, But careful screening will simply distinguish between unsatisfactory sites and, if any are found, satisfactory sites. The screening process cannot transform an unsatisfactory site into a satisfactory one.

2. Institutional Problems Preclude Confidence That Satisfactory Sites Will Be Established.

Apart from the many technical obstacles which create doubt about establishment of repositories, institutional problems must be considered. Among these issues are the possible opposition by State and local governments, the public, and even other federal agencies, as well as the uncertainty about DOE's obtaining the necessary licenses from the NRC. See above, p. 29.

As earlier observed, the primary issue as posed by the Commission is whether "radioactive wastes produced by nuclear facilities will be safely disposed of." 44 Fed. Reg. 61372-3 (Oct. 25, 1979) (emphasis added). This question cannot be answered by looking at technical issues only. Even if those issues are ultimately resolved, nuclear waste will not be safely disposed of unless all the institutional problems are also resolved satisfactorily. Resolution of the matter requires not only a technical consensus by the scientific community on the methodology to be employed, but also a political consensus and a social consensus by the public to accept that methodology (Ref. 15, p. 5). The IRG report concluded that:

the resolution of institutional issues, required to permit the orderly development and effective implementation of a nuclear waste management program is equally important as the resolution of outstanding

technical issues and problems and...
the resolution of institutional issues
may well be more difficult than finding
solutions to remaining technical
problems.

(Ref. 10, p. 87). (emphasis supplied). The reason for this is obvious. There can be no confidence that "radioactive wastes... will be safely disposed of" if society -- for whatever reasons, rational or emotional -- refuses to permit repositories to be constructed. "Only if such a social consensus is obtained," said the IRG, can disposal of nuclear waste in geologic formations "actually be implemented." Id. at 47.

We will discuss below public acceptability of the repositories, as well as the problem of using land subject to federal jurisdiction.

(a) It Is Doubtful That Repositories
Will Be Accepted By The Affected
Public As Well As State and Local
Governments.

Significantly, DOE acknowledges that all of the waste disposal options being considered -- including geologic disposal -- rate very poorly in terms of public acceptability. The GEIS comparative analysis includes discussion of "Policy and Equity Considerations," which is supposed to assess public acceptability (Ref. 1, p. 48). That criterion, in turn, is

subdivided into two items, one of which is labeled "Distribution of Risk" and is said to measure the "Index of Perceived Risk" (Id. at 4.9). The analysis concludes that on a scale of 1 to 5, each of the ten disposal options receives the lowest possible score of only 1 for "Distribution of Risk," id. at 4.11, a score which "represents the less desirable [condition]". Id. at 4.10. In short, all of the options are acknowledged by DOE to have very low public acceptability and high perceived risk.

Indeed, the possibility of public opposition was spelled out by Battelle's Pacific Northwest Laboratory in a report prepared for DOE (Ref. 19). Battelle pointed out that increasing numbers of State officials were seeking to veto proposed repositories within their States, and added:

These expressions of interest by State government can be backed by legal and political actions that can impede or halt efforts by the federal government to site nuclear repositories or implement a national nuclear waste management program.

Id. p. 88. Battelle noted that State and local governments could frustrate repository development through their environmental laws and regulations of land use, construction, and transport of radioactive materials. Id. pp. 96-103.

There is already impressive evidence to the effect that opposition to the siting of waste repositories could be

significant. The federal government's plan to bury wastes at Lyons, Kansas aroused local opposition ten years ago; the Waste Isolation Pilot Plant has faced intense citizen protest in New Mexico. Science, Vol. 202, Nov. 3, 1978, p. 501; Vol. 199, Mar. 10, 1978, pp. 1050-1; Vol. 172, Apr. 16, 1971, pp. 249-50; Wall St. Journal, Aug. 29, 1978, pp. 1, 32. In 1976 ERDA sought to conduct exploratory drilling for a repository in Alpena County, Michigan. In response to questions from State Governor William Milliken, ERDA stated: "The project will be terminated in Michigan if the state raises issues...that are not resolved through a mutually acceptable procedure." Two months later, local voters overwhelmingly opposed waste repositories in their counties. As of November 1978, twenty-three States had passed or considered laws or resolutions to limit or ban radioactive waste disposal within the State. Nuclear News, Nov. 1978, p. 86). Eleven States passed such laws during 1979.

Thus, at the present time public acceptance of repositories cannot be assumed. Moreover, even if the scientific community were able to devise methods which reduced the probability of a repository accident, that would not necessarily improve public acceptability. The public's perception of

risk differs from that of the technical community, which defines risk as the probability that an event (such as major release of radioactivity from a repository) will occur multiplied by the expected consequences of the event. By this definition, if the probability is small enough the risk may be viewed as modest, despite the possibly calamitous consequences of an accident. But the public does not accept that reasoning. According to Battelle's report to DCE:

The general public often perceives the outcomes of an event to be more important than the probability. This may be due to the fact that the public is familiar with Murphy's Law: If something can go wrong, it will go wrong. Thus, probabilities are often perceived to be less meaningful than outcomes.

Ref. 19, pp. 13-14 (citations omitted). The point is that whichever definition of risk may be considered technically correct, the public's perception of risk is high and its willingness to take risks is low. Public opposition, therefore, can be expected.

The most vigorous opposition might be expected to come from those living near proposed repository sites or along the many proposed routes for shipping nuclear waste to each repository. People living in any of these areas would be exposed to "low levels" of radiation from normal operations,

and to extremely dangerous levels from major accidents. They are not likely to be persuaded by DOE's conclusion that repository operations or spent fuel shipments pose only "acceptable" levels of risk. Their opposition can be expected and must be considered.*

The DOE Statement of Position in this proceeding fails to deal realistically or candidly with the institutional difficulties facing repository siting. On the one hand,

* DOE fails to acknowledge that even within the scientific and federal regulatory communities, the health effects of "low-level" radiation are the subject of considerable controversy. Significantly, the NRC has expressed its desire to "reduce the risks of occupational radiation doses in Commission-licensed activities," and has proposed amendments to current dose regulations. 44 F.R. 10388 (Feb. 20, 1979).

Moreover, the health effects of radiation are cumulative; doubling present exposures by adding "acceptable" doses from nuclear wastes should not be countenanced. Indeed, other phases of the nuclear fuel cycle, such as uranium mining and reactor operation, add their share of radiation to people and the environment. Thus, waste disposal cannot be discussed in a vacuum; the entire nuclear fuel cycle may add a several-fold increase in prior levels of radiation.

Finally, DOE argues that the public should accept radiation from nuclear wastes because comparable levels of radiation from voluntary activities are "routinely accepted without question." (Statement, p. II-14). The truth is that the public has clearly demonstrated its unwillingness to accept the risk of radioactive waste, or to have that risk forced upon it.

DOE says that "[b]ecause social concerns are less easily predicted [than technical considerations], less confidence can be placed in assessment of their impacts on the repository program" (p. III-87). DOE also acknowledges that it is "possible that unanticipated or unresolved issues of concern at the State or local level could cause prolonged perturbations in the schedule." Id. at p. III-31. On the other hand, DOE proceeds to discount these problems on the mere hope that the particular State and local governments having potential sites will agree to the siting of repositories within their borders.

DOE's assumption of State and local cooperation is without factual basis. DOE assumes that simply because it will discuss siting with the concerned State and local officials, the latter will agree to the siting. In the eyes of DOE, discussion inevitably leads to consensus; however, in the real world it often leads to disagreement. Since the public perceives and is unwilling to accept a high level of risk, State and local officials are likely to oppose the repository.

In the face of this evidence of public fear and opposition, DOE says that creation by the President of a State Planning Council will eliminate friction (p. III-24). This appears to be naive, for it cannot be assumed that the Council will agree to any particular site -- or, if it did, that the host State or local government would agree. Again, DOE relies on the unrealistic notion that discussion must inevitably lead to agreement.

DOE's failure to come to grips with institutional problems was recognized by the Hearing Board which it appointed to hold public hearings across the country on the draft GEIS. In its report to DOE in February 1980, the Board said that the GEIS gave inadequate attention to social and political issues although "the degree to which human concerns are taken into account could result in the success or failure of any waste management plan" (p. 10).

(b) Other Institutional Factors Could Prevent Selection of Repositories.

Statutory environmental requirements are imposed by the National Historic Preservation Act and the Land and Water Conservation Act. (Ref. 8, p. 6). The Interior Department has said it would not agree to repository selection inconsistent with those Acts. (Id.) In addition, the Interior Department has expressed opposition to repository siting on or adjacent to other lands subject to its jurisdiction, such as portions of the National Park System, the Wild and Scenic River System, and the National Trail System, as well as Indian Trust lands. (Id., p. 7).

DOE assumes that the Secretary of the Interior would make lands under his administration available to DOE temporarily for repository testing (P. III-48). In light of Interior's expressed views on the subject, that cannot be assumed. Nor can it be assumed that Congress would then agree to a permanent transfer of the site to DOE for a repository, as assumed at p. III-49.

In conclusion, even apart from the many technical problems and gaps still to be resolved, consideration of the institutional issues alone requires the conclusion that there is no basis for confidence that nuclear waste will be safely disposed of. DOE has not forthrightly addressed the institutional barriers which shed serious doubt on its plans for repositories.

C. There Are A Myriad Of Defects, Uncertainties,
And Gaps In The Many Technologies Which Will
Be Needed To Implement Waste Disposal.

DOE has chosen to found its confidence on the mined geologic repository concept. Yet, according to the IRG, that concept has not yet been shown to be scientifically feasible (Ref. 10, p. 42). Indeed, it is an oversimplification to say that the methodology for geologic disposal is not available, because geologic disposal actually would involve a series of stages of implementation, each of which requires its own methodology. Thus, to begin with, one must learn a great deal about the properties of various potential host rocks, and about how radioactive wastes would interact with them. After acquiring this type of knowledge, a generic decision must be made as to which rock medium or media, if any, are feasible for geologic repositories. Then, in order to actually place nuclear waste in a repository, methods must first be developed to (1) place the waste in canisters and ship it to the repository site; (2) excavate the repository without destroying the site's integrity; (3) insure for an adequate period that the waste can be retrieved if a particular site is determined to be unsatisfactory after waste emplacement there has begun; (4) seal the boreholes, shafts, and buildings at the surface after the repository operations are concluded, to prevent leakage; and (5) monitor underground activity within the site from remote locations for the necessary period of time. None of these methods has been developed;

to date, DOE has offered only "conceptual" plans and "technologies of the future" to dispose of real nuclear waste.

Two broad categories of difficulties help explain why the technologies for the various phases described above do not exist. The first is that, as to many phases, we have already learned enough to know that all options now under study are plagued with serious defects and drawbacks which so far cannot be overcome. Secondly, in almost every phase, we know so little about the critical aspects of the available technology that no one is in a position to say whether it will work. In the earlier-quoted words of the USGS, "some key geological questions are unanswered, and answers are needed before the risk associated with geologic containment can be confidently evaluated." (Ref. 4, p. 3).

1. The Properties of Potential Host Rocks And Their Interactions With Radioactive Wastes Are Not Understood.

As DOE has recognized, "important gaps exist in knowledge regarding rock properties and responses under extreme conditions of temperature, stress and radiation over long periods of time". (Ref. 1, p. 3.1.26). "Additional research is needed to develop accurate methods for determining rock strength". (Id., p. 3.1.33).

Moreover, apart from the properties of the host rock as measured in the laboratory, there are many things about how the wastes and the host rock would interact which are not understood, including the effects of heat, radiation, chemical reactions, and water, and the potential for migration of wastes out of the repository. In the words of USGS, "the uncertainties associated with hot wastes that interact chemically and mechanically with the rock and fluid system appear very high." (Ref. 4, p. 6; see also Ref. 23, p. 4.94; Ref. 5, p. 2). DOE's Statement acknowledges that verified models describing interactions between waste and rock are not expected to be available until 1985. (Statement, p. II-222). These models, even if verified, however, would be of limited use. See above, pp. 52-54.

The effect of the heat emanating from the wastes on the surrounding rock of a repository is acknowledged by DOE to be "a major unknown geologic factor [presenting] the most difficult engineering uncertainties." (Ref. 1, p. 3.1.34). The heat flows through the canister and other protective materials into the host rock and eventually into the atmosphere. (Ref. 2, p. 7.3.1). The heat affects

- 1) the integrity and recoverability of the waste canisters
- 2) room and pillar stability
- 3) integrity of the waste matrix over long periods of time

- 4) integrity of the host rock and the surrounding rock
- 5) overlying aquifers and groundwater flow
- 6) long-term uplift and subsidence of overlying rock. (Id.)

Comparatively little work has been done on the effect of temperature on the compressive strength of rocks; more investigation is required. (Ref. 9, Vol. 4, p. G-2). We do know, however, that heat will induce stresses in the surrounding rock (Ref. 2, pp. 3.1.35, 1.13), and will reduce its strength (Statement, p. II-165). This can cause increased permeability. (Ref. 1, p. 3.1.34). Some data show that these stresses can significantly affect pillar stability within a mere five years after waste placement (Id., p. 3.1.35).

Moreover, displacement of the overlying rock mass by heat can cause fracturing in the rock, thereby giving rise to "perturbations in the hydrologic flow regime" and "potential pathways for waste migration". (Statement, p. II-165; Ref. 1, p. 3.1.24). NRC staff has observed that high-velocity flow paths for underground water, resulting from fractures, can bring radionuclides into the biosphere. (Ref. 7, p. 3-35).*

* Salt might not be expected to fracture, but if the surrounding strata were breached by fracturing, salt could be vulnerable to rapid solution by groundwater. (Ref. 1, p. 3.1.24). Moreover, stress can exacerbate creep. (Statement, p. II-75). See below, p. 86.

DOE has accordingly recognized that "limiting the impacts of heat generated by the waste is a principal consideration in the design of a repository." (Statement, p. II-164). Moreover, "precision [in thermal models] is important in insuring that heat loads designed for the repository will not produce adverse effects in the host rock." (Id., p. II-215).

As DOE has observed, there is comparatively little information on the influence of radiation on rock strength. (Ref. 1, p. 3.1.24; see also Ref. 9, Vol. 4, p. G-6). Indeed, radiation effects have not yet been assessed "even in the most cursory manner" (Ref. 15, p. 114). Because of this lack of data, in-depth comparisons of alternatives with regard to radiation are not available.

Much of what is known about radiation effects, however, is disturbing. Tests have shown, for example, that radiation can reduce the compressive strength of salt by 30 to 40%. (Ref. 1, p. 3.1.36). Also, underground pressure can increase as a result of the entrapment of gases such as helium and radon which are released through radioactive decay. "This increased pressure, if not properly relieved, could lead to the development or reopening of fissures that would result in the escape of radioactive materials to the surface." (Ref. 8, p. 12). Finally, radiolysis of brine can lead to

buildup of gas pressure, formation of explosive gas mixtures or chemicals, and unknown interactions with the high-level waste. DOE identifies radiolysis as "one of the principal factors that could affect canister longevity." (Statement, p. II-177).

The IRG found "major gaps" in current knowledge of the chemical interactions of spent fuel, its cladding and containers with salt or any other candidate host rock. DOE acknowledges that our understanding of spent fuel stability is limited, and that the long-term chemical, mechanical, thermal and radiation effects have not even been assessed. (Ref. 1, p. 1.15). According to the IRG:

There are a number of questions associated with the disposal of spent fuel that require resolution through further research. Specifically, it is necessary to determine if the fission gases and the significant quantities of uranium and plutonium in the spent fuel present a potential problem in the repository, either during the operation phase or after closure. At least several years of experimental work needs to be conducted to determine the chemical reaction among the fuel pellets with their cladding, the spent fuel container, and the potential host rocks. More needs to be known about the chemical forms of the fission products and actinides in the spent fuel pellets and cladding, and about the resistance of these forms to leaching or reaction with repository rocks.

(Ref. 11, pp. 27-28; see also Ref. 10, p. 74) (emphasis supplied).

Moreover, there are wide variations in the characteristics of different fuel assemblies. (Ref. 26, p. 4). As USGS has observed, the chemical properties of spent fuel "depend on its burnup, location within the reactor core, age and physical integrity." (USGS Statement of Position, p. 9). Therefore, "[d]esign of a system of engineered barriers to accommodate this heterogeneity within the context of a given geohydrologic environment will be a major undertaking" (Id., pp. 9-10). Spent fuel also poses the added problem of "its potential for release of gases" (Id., p. 10).

There are also "large uncertainties" concerning the speed and modes of migration of radionuclides through the underground. (Ref. 18, p. 10; see also Ref. 4, p. 8). Indeed, "uncertainty is the distinctive element of radionuclide transport analysis." (Ref. 5, p. 32). Measurement of the physical and chemical properties that control underground transport for a sufficiently long flow path is theoretically feasible but "still in the future". The USGS has said:

We need, as a minimum, the permeability and porosity of the media and the hydraulic head gradients all in three dimensions. In addition, we need to know the sorptive characteristics of the media along all paths, and we need to estimate the variable rates at which the solidified wastes will enter the transporting fluids. Needed, in particular, is information on the distribution and extent of major heterogeneities. The need for such data severely taxes both the available data base and the technology for generating it. Most of the requisite data are

presently unavailable; most of the available data have such large error limits that their usefulness in predictive models is limited.

(Ref. 4, pp. 8-9) (emphasis supplied) (See also Ref. 5, p. 33, and Ref. 11, p. 38).

2. No Geologic Medium Or Media Have Been Determined To Be Capable Of Assuring Safe Isolation

Assuming a decision to establish geologic repositories, there remains the question of which geologic medium or media will be used. Salt has been most thoroughly studied, but, as shown below, it has significant drawbacks which may ultimately exclude it from being used. Nor have shale, basalt, or granite been shown to be suitable host rocks; rather, as with salt, serious deficiencies are already known to exist with each of these media. The IRG and the President have explicitly refrained from endorsing any particular medium (Ref. 10, p. 42; Ref. 22, p. 15), because no medium has been shown as yet to be satisfactory.

(a) Salt

More is known about salt than about other candidate media. Nevertheless, despite many years of research, "major uncertainties" remain concerning the viability of using salt formations as waste repositories. (Ref. 16, pp. 16, 17). The reason for continuing uncertainty is that we already do know of serious troubles with salt. These troubles arise because salt is soluble in water, forming brines; salt creeps,

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

a repository. (Ref. 5, p. 21).

Finally, as DOE has recognized, we do not have enough data to evaluate the performance of shale over the necessary temperature and pressure ranges. (Ref. 1, p. 3.1.51) And the results of various chemical and physical reactions in shale are "difficult to predict." (Id., p. 3.1.27). "Years of intensive effort" would be required to obtain adequate generic knowledge concerning the suitability of shale repositories. (Ref. 11, pp. 74-75).*

(c) Granite

Granite, too, has serious defects as a repository medium. Groundwater inflow can be expected to be significant (Ref. 7, p. 3-30; See also Ref. 5, p. 9).** Granite will deform under varying combinations of high confining pressure, high temperature, or long-term stress (Id., p. 3-6), and will decompose at surface temperatures and pressures (id., p. 3-5). Granites are brittle, and thermal expansions can cause ruptures and surface heave. (Ref. 5, p. 22; Ref. 2, p. 7.2.9). Rock bolts may be required to prevent buckling of granite in underground openings. (Ref. 1, p. 3.1.31). As with shale, the data needed to evaluate potential repository performance are not

* There are also unsolved problems relating to the disposition of the mined shale, because the run-off of acids derived from a shale constituent will cause adverse environmental consequences. (Ref. 1, p. 3.1.41).

** Laboratory tests showing low permeability of granite and basalt cannot be relied on, since actual rock mass permeability is frequently several orders of magnitude higher than the value of a laboratory sample. (Ref. 7, p. 3-23).

available. (Ref. 1, p. 3.1.51; Ref. 2, p. 7.2.9).

(d) Basalt

Basalt repositories are unlikely to be established within the next 30 years. Because the thermal conductivity of basalt is low, the wastes would have to be cooled at the earth's surface for several decades prior to emplacement. (Ref. 11, p. 81). Further, it will be difficult to find a basalt site that can be opened and resealed without developing unacceptable fractures (Ref. 5, p. 23). Like granite, basalt can buckle, jeopardizing underground stability. And, as with every proposed medium, our present knowledge is insufficient. For example, we do not know what consequences would flow from an inundation resulting from a climate change (Ref. 11, p. 81); nor do we know the effects of irradiation on basalt (Ref. 2, p. 7.2.27). "Considerable generic and site-specific research over the next decade will be required to quantify" the concept of a basalt repository. (Ref. 11, p. 81).

In conclusion, there is no basis for confidence today that any of these four media will be found adequate for a repository. To the contrary, serious questions and problems are known to exist for each one.

3. Technologies Needed To Package And Ship The Waste Have Not Been Developed.

Before wastes can be placed in final isolation, they must, at the very least, be placed in canisters and shipped. The wastes and their containers must be resistant to leaching and to transportation accidents, and must be retrievable for a specified period.

(a) Canisters

The design of canisters, says DOE, "has received little attention"; "almost no effort has been expended ... in estimating the potential lifetimes under geologic disposal conditions of the canister designs that have been proposed." (Ref. 1, p. 3.1.59). The EPA Panel of Earth Scientists has said that it is "likely" that the canisters would be breached within a decade or less. "For this reason," continues the Panel, "we do not consider the canister to be a significant barrier to the solutions, at least for the time scales of centuries to a million years with which we are dealing." (Ref. 5, p. 10). Clearly the canisters are almost worthless for insuring long-term isolation.*

* Significantly, the Commercial Waste and Spent Fuel Packaging Program, conducted by Rockwell Hanford Operations, has been designing spent fuel packaging with a design life of only 10 years. (Ref. 15, pp. 158-159).

As DOE has acknowledged in this proceeding:

It is obvious that much remains to be learned about individual package components and their interactions within the waste repository environment.

(Statement, p. II-159).

(b) Shipment

Transporting waste from the many reactors and other storage points to repositories would require hundreds, or even thousands, of shipments -- each of which represents a possible danger to public health. First of all, DOE admits that individuals living along the many transport routes will receive doses of radioactivity from passing shipments of waste, even in non-accident situations. (Ref. 3, p. 7.1.3.) In addition, DOE acknowledges that in the event of a severe impact and fire in a high-level waste cask, persons living along the transportation paths could receive radiation doses sufficient to result in serious illness and -- in DOE's euphemistic language -- "substantial life shortening". Id., p. 7.1.6). While the Government has had tests performed for the purpose of demonstrating the integrity of shipping casks in crashes, these tests have been rejected by the railroad industry as scientifically deficient. (Ref. 10, p. 112).*

*Sandia Laboratories reports that 655 radioactive transport incidents have occurred since 1971, including 120 with releases of radioactivity and 228 where surface contamination was found.

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Downplaying the public health impacts of nuclear waste, DOE severely understated the consequences of trucking accidents in its impact statement. According to NRC staff, "impacts presented in the GEIS for 100% of all shipments by truck should be about 25 times greater than the impacts given.... A severe [transportation] accident occurring in a suburban or urban area would have a substantially greater environmental impact than the accident consequences presented in the GEIS." (Ref. 7, pp. 2-9, 2-15).*

Not surprisingly, the public perceives a severe danger in transporting nuclear waste, and public opposition, therefore, could develop to plans for shipping waste to repositories. As previously noted, public opposition is important because it could frustrate DOE's plans and require a negative response to the question whether nuclear waste will be safely disposed of. Public opposition has found expression in the many State and local laws passed to limit radioactive shipments within their jurisdictions (Ref. 17, pp. 25-26), and the refusal of rail carriers to transport spent fuel (id., p. 24). According to the IRG transportation subgroup:

Lack of high quality, credible and candid information about defense and commercial nuclear transportation methods, equipment, and performance has left State and local officials and questioning citizens with little confidence that health, life and property are adequately protected.

Id. p. 25.

* The discussion of truck accidents is especially significant, since about half of the nation's currently operating reactors must rely on truck shipments because they do not have access to rail lines. (Ref 25, p. C-6).

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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 these

considered in previous applications." (Statement, p. II-183). Satisfactory techniques for backfilling and sealing a repository have not been developed or proven. (Ref. 8, p. 20; Ref. 15, p. 142; Ref. 9, Vol. 1, p. 3-33). This lack of technology is a "serious potential problem," according to NRC staff, (Ref. 7, pp. 5-2, 5-3), which makes it "difficult to see how one could do an adequate job of either backfilling or retrieving if a repository becomes flooded." (Id., p. 3-30).

There is no consensus that the technology which is currently anticipated will provide adequate seals even for a period of decades. (Ref. 11, p. 42). One problem is that "the data that is generally available from mining industry experience is considered inadequate to properly predict the long-term integrity of shaft sealing techniques." (Ref. 9, Vol. 1, p. 2-25). Moreover, "the effect of thermal expansion on the integrity of the shaft lining and the shaft seal is not well documented." (Id., p. 2-26). In short, "much more work is needed to define the reliability of achieving a low permeability backfill." (Id., p. 2-24).

The Department of Energy has termed the sealing problem a "key unknown". (Ref. 1, p. 3.1.238). Inadequate sealing would, of course, act as a "dangerous short circuit from the repository to the biosphere." (Ref. 8, p. 16; Ref. 11, p. 42).

7. Equipment And Methodology To Monitor The Repository After Closure Have Not Been Developed.

A new technology will be needed to detect migration of wastes from the repository. (Ref. 5, p. 41). DOE believes that a monitoring system should be designed and developed to operate for a few centuries. (Ref. 1, p. 3.1.63). One component of the system would consist of instrument packages sealed into the boreholes, shafts and repositories. No existing instrumentation system has been required to function for so many years, or shown to be capable of doing so. (Ref. 9, Vol. 7, p. 2-4). During the entire monitoring period, no one would be able to gain physical access to these devices to test their reactions to water, to radioactivity, or to waste-rock interactions; and no one could adjust or fix them if they failed to function properly.*

DOE has utterly sidestepped the monitoring problem, saying only that:

Instrumentation will be installed with the initial canisters. The details of this monitoring program will be developed in conjunction with the Commission licensing review.

* Of course, even a perfect monitoring system would be powerless to prevent or mitigate releases of radioactivity. At best, monitoring can only warn people to leave the area rendered uninhabitable.

(Statement, p. II-280). That review, of course, is many years away, while the Commission must decide whether it has confidence today that a safe, complete disposal system will be available when necessary. In truth, monitoring equipment is not available.*

* Because DOE has chosen to base its case for confidence on the mined geologic repository concept, much of the discussion in this Statement refers specifically to that concept. Significantly, neither the draft generic EIS nor the Department's Statement in this proceeding claims that any of the other 9 concepts is either feasible or a basis for confidence at this time. In fact, three of the technologies are admittedly unavailable for spent fuel (chemical resynthesis, reverse-well injection, and partitioning/transmutation), and three more are, as a practical matter, equally unavailable for spent fuel (very deep hole, ice sheet disposal, and space disposal). (Ref. 1, pp. 4.5 to 4.7). Since DOE says that this proceeding is limited to spent fuel, and the Presiding Officer has agreed, this shortcoming is rather fundamental. Rock melting is not really a separate technology, but is rather a variation on geologic disposal (Ref. 1, pp. 3.4.5, 3.4.7). Island and subseabed disposal have more serious drawbacks than mainland geologic disposal (Ref. 1, pp. 3.5.25, 3.6.1ff); the latter also involves international legal and political obstacles (id., pp. 3.6.1, 1.27). Indeed, all of the nine "alternatives" are far less developed than the geologic disposal concept, and none can be viewed as a serious basis for confidence that safe nuclear waste disposal will be available by the time it is needed.

V. THERE IS NO BASIS FOR CONFIDENCE THAT
NUCLEAR WASTE WILL BE SAFELY STORED
UNTIL SAFELY DISPOSED OF.

If the Commission decides it does not have confidence that final disposal will be available by the time it is needed, then it must reach the question of whether spent fuel can be stored safely "for an indefinite period."

State of Minnesota v. Nuclear Regulatory Commission, 602 F.2d 412, 419 (D.C. Cir. 1979) (Tamm, J., concurring).

One of the major problems with storage, however, is precisely that it would have to be for an "indefinite period" -- because we do not know when, or even if, the necessary number of safe repositories will be available. Storage, therefore, might have to continue for many decades, or even centuries or longer, a period during which the wastes are extremely toxic. But there is no basis for confidence that these wastes can be stored safely for an indefinite period, because there simply has been no experience with storage over a very long-term. On the other hand, we do know that many storage accidents have occurred during even short storage periods. In addition, the danger of transportation accidents, terrorism or sabotage is great, and all the more so over longer periods of time. Indeed, surface storage in some respects presents greater and more immediate hazards than disposal, because the waste is at the surface of the earth, and thus any releases of radioactivity

could more easily inflict direct injury to the storage facility workers and surrounding population. Moreover, the difficulties of predicting geologic and human activities far into the future (pp.43-50) come into play for indefinite long-term storage.

1. There Is No Basis For Confidence That Indefinite Long-Term Storage Is Safe.

Waste storage at the sites of existing reactors is becoming increasingly difficult because of space constraints and the growing volume of spent fuel. Increasingly, indefinite long-term storage would necessitate transporting very large quantities of spent fuel from reactor sites to away-from-reactor ("AFR") storage sites. These AFR's would have very high concentrations of radioactivity and would pose a serious threat of a large accidental release into the atmosphere, thus endangering the local population. Indeed, smaller but frequent releases can be expected to result from routine operations. There would also be a risk of sabotage and terrorism at the AFR. Even with constant surveillance, security and monitoring, there would be no assurance of safety. Psychological and physical danger to the surrounding community could also be anticipated.

Another problem with indefinite long-term storage is the necessity for transporting radioactive materials. Hundreds or thousands of shipments from the many reactor

sites to the AFR's would be required, each of which would pose a great danger to the public. As already noted, see above p. 94 , in the event of a transport accident there could be a large release of radiation, with obviously serious consequences to life and health. Even without such an accident, the populations living around transport routes would be subject to radiation on a regular and continuing basis, as would the workers involved in the transportation. These shipments would also be subject to terrorist attacks and sabotage.

It is true that transportation of wastes would be necessary as well for ultimate disposal, and therefore the hazards represented by waste shipments would be borne anyway. Nonetheless, it would be foolish to multiply our exposure to such dangers by transporting the wastes initially to intermediate storage sites and later having to ship them again, to a repository -- should one be available.

DOE's Statement of Position is unjustifiedly optimistic about the safety of storage, as some parties were unduly optimistic about the safety of nuclear power plants prior to the accident at Three Mile Island. That accident demonstrated that despite the so-called "redundant" safety systems, accidents can and do occur. There is surely ample evidence that mishaps can occur as well with storage.

Indeed, DOE has acknowledged that many accidents have occurred in the handling of spent fuel assemblies, and that "high intensity tornadoes will blow away the roof over the [storage] basin." (Ref. 25, pp. B-22, B-59).

Moreover, NRC compilations of Licensee Event Reports ("LER's") relating to spent fuel storage reveal that between August 1971 and October 1979 about 67 events were reported, involving mechanical failure, human error and violation of NRC requirements.* In many cases, the cause of the problem was unknown. Twelve events involved leaks or cracks in equipment, and sometimes multiple failures -- such as 30 leaks in the stainless steel fuel pool liner at Millstone-1 in March 1972, six leaks in spent fuel pool cooling system piping at Three Mile Island-1 just days after the TMI-2 accident in March 1979, and cracks in eight spent fuel storage racks delivered to Dresden-2 in May 1978. The LER's also report improper handling or storage of spent fuel on many occasions, insufficient water in refueling water storage tanks several times, inadequate design problems, and insufficient boron in the spent fuel pools.

* It is also possible that other events occurred but were not reported.

Apart from these incidents, the LER's also point out that several serious accidents have occurred; luckily, so far as we know, no calamity resulted. For example, in August 1974 at the Surry-1 plant in Virginia there was a "minor unplanned release of radioactive liquid effluent," up to 150 gallons, which went into the James River through the storm sewers. At the Haddam Neck-1 plant in Connecticut, in November 1973, there was an "unplanned release of radioactivity" into the storm sewers when 270 liters of water from the refueling water storage tank leaked, releasing Tritium.

Several spills have also occurred at Turkey Point-4, in Florida. In April 1975 there was an unplanned release of radioactivity during refueling, with 2960 gallons of contaminated water absorbed by the soil, and a release of Cobalt-58. Another spill at the plant, in May 1978, was contained, but contaminated two operators. A third incident occurred in September 1978, when radioactive water contaminated a paved area outside the pump room. Similarly, at Commonwealth Edison's Dresden-1 plant, in February 1978, contaminated water leaked out of the plant and onto the outside gravel. That plant had had a spill of several thousand gallons of water in April 1977, but evidently without being released. Releases evidently did occur at the Ginna plant

in New York during August 1975, and at the Peach Bottom-1 plant, in Pennsylvania, during November 1976.

DOE cannot take comfort from the fact that none of these events has resulted in a major accident, because, after all, that may have been said of nuclear power plants before Three Mile Island. That accident was caused by multiple technical and human failures. Similar failures at storage facilities are also possible, and could cause serious health effects and require the relocation of many people, resulting in severe economic and personal disruption. The likelihood and number of accidents increases, of course, as the period of storage is extended. That no disaster has yet emerged is reason to be thankful. It is no reason to be confident that a major accident will never occur.

In addition, it appears that a major accident involving stored nuclear waste did occur in the Soviet Union. While the event was not officially disclosed by the USSR, it has been pieced together from numerous sources, and was recently reported by researchers at the Oak Ridge National Laboratory (Ref. 24). The report concludes that the accident, in the winter of 1957-58, was the result of an explosion of reprocessing wastes stored in tanks at a Soviet military waste-storage facility. It resulted in a high contamination of the air with Strontium-90 and the

resettlement of the population from an area of from 38 to 380 square miles (Id. p. v). While many details are not known, the magnitude of a possible waste storage accident is vividly demonstrated by the Oak Ridge report.

2. There Is No Basis For Confidence That The Necessary Number Of Storage Facilities Will Be Accepted By The Public.

Because of these grave risks, the institutional problems that are involved in the selection of a repository will likewise arise with selection of sites for AFR's (See pp. 69-75 above.) It must be assumed that there will be local opposition to establishing an AFR. Opposition can be expected from people living near the proposed sites or along the shipment routes, and conflicts with State and local laws regulating shipping are likely. Opposition from the Interior Department can also be expected to siting on land under its jurisdiction. DOE concedes that public acceptance of a repository is extremely low; it will be very low for an AFR as well -- particularly since removal of the wastes from the AFR to a repository could be postponed for decades or more. Without political and social consensus, indefinite storage cannot be implemented. DOE has acknowledged that public opposition to AFR siting exists. It has said that State and local governments and interested citizens have opposed such construction, in part because they fear it

"would result in de facto permanent storage." (Ref. 25, p. VIII-10). DOE has also acknowledged the existence of State and local laws restricting the transportation of radioactive materials. (Id., p. C-4). State laws, however, are of vital importance, because DOE recognizes that any AFR would have to obtain all State and local permits and follow local regulations. (Id., p. B-15). The expected opposition from State and local government, therefore, could prevent the establishment of storage facilities.

To be successful, the AFR option would require the establishment of many storage facilities around the country so as to reduce the costs and risks of transportation as well as the concentration of radioactivity in any one facility. Because of the likely opposition to siting, however, it cannot be assumed that any AFR site -- let alone many sites -- will be approved.

The fact is, however, that many sites would be needed. The quantities of spent fuel that would require AFR storage are very great. For example, DOE projects that if the first repository becomes available in the year 2006, there would then be 70,000 metric tons of uranium (MTU) which would require off-site storage. Assuming each AFR could be built to store 5,000 MTU, 14 storage facilities would be needed by that year. If, however, a repository

is not available until the year 2010, off-site storage will be needed for over 90,000 MTU -- which would translate into 18 facilities. (DOE Statement, p. VI-3; Ref. 25, p. I-6). Further projections appear in a draft report prepared for the Office of Technology Assessment (Ref. 28). That report indicates that if the first repository goes into operation in the year 2005, a total of 19 AFR facilities would be required to store the wastes from nuclear plants now in operation or under construction, but 27 facilities would be needed if the Commission continues to license new plants. Moreover, assuming that no repository is available for 50 years -- or that spent fuel is allowed to cool for a long period before disposal -- the corresponding number of facilities needed would be 35 or 67.

However, as shown above, there is no basis for confidence today that even one AFR will be built. Surely there can be no confidence that the required number of facilities will be established, having met all technical requirements and gained public acceptance. Nor can there be confidence that any AFR that may be established will operate safely and without serious releases of radioactivity for an indefinite period of time.

VI. THE COMMISSION SHOULD ORDER
A MORATORIUM ON LICENSING
NEW PLANTS PENDING RESOLU-
TION OF THE WASTE ISSUE.

The Attorney General's position, in short, is that reasonable persons should not feel even close to having a factual basis for confidence that nuclear waste will be safely disposed of, or safely stored until safely disposed of. Planners are faced at the outset with the nearly impossible task of predicting geologic or human events tremendously far into the future. In addition, we now know enough to see that there are many unresolved problems that have and could continue to put off a technical solution for many years. We know that many repositories will be needed, and that many years of testing will be needed after each candidate site is chosen -- assuming non-destructive testing methods have been found -- and that conclusion of such testing is at least a decade away. We know that no rock medium has been determined to be acceptable. We know that none of the needed methodologies -- from waste packaging to mine excavation to retrieval to sealing the repositories -- has been developed, or is even around the corner. Finally, we know that substantial public opposition exists, and is likely to continue.

Unfortunately, it has been the policy of this Commission, and the AEC, to license nuclear plants without considering how the wastes would be disposed of. This

short-sighted approach was rejected by the court in NRDC v. NRC, 547 F.2d 633, 640 (D.C. Cir. 1976) as a violation of the Commission's duty under the National Environmental Policy Act. As the Court of Appeals there said:

Once a series of reactors is operating, it is too late to consider whether the wastes they generate should have been produced, no matter how costly and impractical reprocessing and waste disposal turn out to be; all that remain are engineering details to make the best of the situation which has been created.

Id. (footnote omitted) (emphasis added).

As a result of the Commission's policy in past years, we now have substantial quantities of hazardous waste that must be managed safely, yet we know of no method for doing so. Eventually they will have to be handled somehow, whether or not the Commission makes a finding of confidence in safe disposal.

Even if we must do the best we can in the short run -- because we have no choice -- we have it within our power not to continue limiting ourselves to unacceptable options. The Commission's decision in these proceedings must look to the future production -- and thus the disposal -- of radioactive wastes. The Commission cannot make the existing wastes disappear, but it does have both the power and the duty to protect public health and safety by regulating the licensing of new plants. It should determine

that the facts at hand do not afford a basis for confidence that any wastes, even the existing inventory, will be safely disposed of. Once it does so, the Commission must act by using its licensing powers to prevent the problem and the hazard from becoming worse.

Continued licensing of new plants would result in a waste inventory far greater than that which exists today. Many more repositories would be needed. However, the many stringent siting criteria which must govern the site selection process could eliminate all potential site locations. Because the number of acceptable sites, if any, could be very small, the threat to public health and safety would be substantially enlarged by a many-fold increase in the amount of waste requiring isolation. The Commission must do whatever it can to limit the growth of the waste inventory until the disposal issue has been resolved.*

* A moratorium will significantly reduce the number of repositories needed despite the continued generation of military wastes. The accumulated inventory of fission products generated by civilian reactors now exceeds that generated to date by U.S. military nuclear programs, and the civilian proportion is rising. While the volume of military waste is large, it is on the average almost 100 times more dilute than commercial high-level waste. Science, Vol. 197, August 26, 1977, pp. 883-884.

We must in the final analysis return to fundamental responsibilities. Under the Atomic Energy Act and the Energy Reorganization Act, Congress has placed the responsibility to assure public health and safety upon this Commission. As the Commission has stated:

[P]ublic safety is the first, last, and a permanent consideration in any decision on the issuance of a construction permit or a license to operate a nuclear facility.

Power Reactor Development Corp. v. International Union of Electrical Radio and Machine Workers, 367 U.S. 396, 402 (1961).

In fact, this duty to protect public safety continues beyond the issuance of licenses:

If, in the Commission's judgment, the public health and safety so requires, the Commission may take action to revoke, suspend, or modify licenses, impose civil penalties, or issue cease-and-desist orders....Such actions may be taken with immediate effect.

In the Matter of Petition for Emergency and Remedial Action, 7 NRC 400, 404 (1978). Thus, "the fundamental principle guiding all Commission licensing actions is the paramount consideration of public safety." In the Matter of Nuclear Engineering Company, Inc., 9 NRC 673, 676 (1979).

In view of the substantial waste inventory which will continue to grow even if no new reactors are licensed,

and because we are not even close to having a factual basis for confidence in safe disposal, it is incumbent on the Commission to stop the licensing of new plants until what appears to be a fool-proof method has been established and fully tested at specific sites, accepted by State and local government, and other federal agencies if necessary. To continue licensing without a satisfactory disposal method violates the Commission's duty to assure public health and safety. It is totally unreasonable.

Because of its duty to protect public health and safety, the Commission has from time to time ordered nuclear plants shut down. It is equally necessary that the Commission hold up licensing new plants until the serious public health issues involved in nuclear waste disposal have been resolved. Such a moratorium has been recommended by the President's Council on Environmental Quality.

If new plants are licensed, and their waste must ultimately be disposed of in a less than satisfactory way, the fault will lie squarely with the Commission. Some courts have even gone so far as to say that the Commission has the exclusive power in the field of protecting the public from radiological hazards. If those decisions are correct, it appears that unless this Commission protects the present and future generations from the dangers of nuclear waste, nobody else will be able to. We urge the Commission to make the necessary decision today not to let us start the future.

CONCLUSION

We have shown above that there is no factual basis for confidence today that nuclear waste will be safely disposed of by any given date, and that even DOE's Statement reveals many of the factual gaps and known problems which preclude a finding of confidence. We have also shown that there is no basis for confidence that nuclear waste will be safely stored for the indefinite period until safely disposed of -- conceivably a period of decades or centuries or more.

We therefore ask the Commission to make a finding of no confidence on both disposal and storage, and to impose a moratorium on the licensing of new nuclear plants until the technical and institutional problems of nuclear waste have been resolved.

Dated: July 7, 1980

Respectfully submitted,

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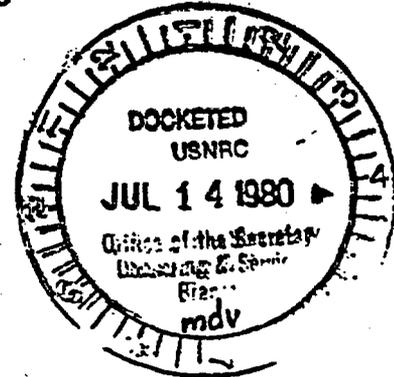
United States Department of the Interior

GEOLOGICAL SURVEY
RESTON, VA. 22092

JUL 10 1980

In Reply Refer To:
EGS-ER-80/482
Mail Stop 760

DOCKET NUMBER
PROPOSED RULE **PR-60** (12)
(45 FR 31393)



Secretary
Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Sir:

We have reviewed the advance notice of proposed rulemaking on technical criteria for regulating geologic disposal of high-level radioactive waste as requested in the Federal Register of May 13.

On the whole the document represents significant progress toward defining technical criteria for high-level waste (HLW) repositories. The overall approach to development of the criteria appears to be sound and appropriately conservative for establishment of a regulatory framework for the licensing of a new technology. Considerations given within the supplementary information are well thought out and adequate, and a rule structured upon these considerations would likely address the important issues properly.

In particular, we believe that section 60.111(c), Performance of required barriers and engineered systems, represents a sound approach to licensing. It is sometimes stated that only the performance of the total waste isolation system is relevant to licensing and performance requirements. But assessing the total system, whether by models or some other approach, is an extremely complex undertaking subject to considerable uncertainty as the supplementary information points out. By requiring each major element in the waste isolation system to independently meet certain performance objectives, the proposed rules break the problem down into more manageable parts and allow for uncertainties in the performance of some components. The requirements stipulated for the major barriers in 60.111(c) should, when met, provide reasonable assurances that the short-lived fission products (especially Sr and Cs) will be isolated from the accessible environment. The prognosis for the longer-lived radionuclides will always be more uncertain than for Sr and Cs, but the longer-lived nuclides may present a lower risk.

Acknowledged by card. 7/14/80. mdv...

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Page 31397, col. 1, part (3). In the first paragraph the phrase "so that the site can be easily understood" could be made more precise by substituting in future documents "so that geologic and hydrologic conditions can be easily extrapolated from one area to another."

Page 31397, col. 2, part (5). It would seem almost impossible from a practical standpoint to codify in the regulations the models to be used to simulate the geologic processes affecting the performance of a repository. However, in view of the fact that predictions of alternative possibilities cannot be made without modeling, the regulations should state that judgements of the adequacy of a site will be based in part on the results of modeling. The statement in the regulations regarding modeling should be more positive than merely allowing the use of models. It should make it clear that the use of appropriate models will be expected particularly for predictive purposes. Without such models there will be no sound basis for forming expert opinions as to overall site suitability.

The appropriateness of the various models for their intended purpose and the degree to which the models approximate natural conditions must be evaluated. We question the assumption that only "old models" will be used in the foreseeable future.

It appears inconsistent to permit the use of quantitative models to compare sites and designs, which involve evaluation of the same parameters and uncertainties as a licensing decision, but to downgrade their significance in a licensing decision. Models are an essential tool for evaluation although they may be insufficient as a sole basis for judgement.

Page 31398, col. 2, part (7). It is noted that human intrusion cannot be prevented and that such intrusion may be either deliberate or inadvertent. Is it suggested that design of the repository consider methods that would facilitate intrusion and recovery of the wastes? Extensive knowledge of the repository and its contents would seem to be the best way of protecting future generations from the deliberate intruder. It would seem fruitless to try to specify a time when either deliberate or accidental intrusion is most likely to occur or to try to define a "reasonable" period of time.

Page 31400, cols. 1 and 2, sec. 60.111. We support the performance objectives presented here. Although demanding, they seem to be attainable, though at considerable cost in funds and at a cost of several years delay in attaining operational status for a repository, when compared to the performance characteristics DOE formerly assumed.

Page 31400, col. 2, par. (3)(ii). We suggest the following insertion: "at a rate that is as low as reasonably achievable and in no case greater than an annual rate of one part in one hundred thousand" (addition underlined).

Page 31400, cols. 2 and 3, sec. 60.121. This section might be modified to specify that prior to granting a permit for normal and routine operations, DOE shall have acquired the lands. We doubt that lands need to be permanently

acquired by DOE during preliminary site characterization or even in situ characterization. We expect that several sites will need to be evaluated for each one found to qualify, and premature assignments to DOE could deny other valid use (such as grazing, timber, etc.) that do not have the potential to compromise the site for repository uses.

Page 31400, col. 3, sec. 60.122. The tenor of (a) is that only the simplest of geologic sites need be considered. This is too restrictive; rather the point should be that the knowledge acquired be complete and thorough, regardless of how difficult this was to do or how complicated the details may appear as they become understood. In reality, most "simple" sites have been and are subjected to very complicated geologic processes of recrystallization (WIPP), creep and/or folding (WIPP), emplacement as domes with differential flow between portions of the body, complex regional stresses and resulting fracture patterns, and so forth.

Page 31401, col. 1, pars. (ii) and (iii). How is it possible to present bounding values, etc., that affect "demonstration" of repository stability or nuclide isolation?

Page 31401, col. 2, par. (v). This paragraph should be augmented by specific reference to sorption properties (" K_D ") determined in situ at the candidate site.

Page 31401, col. 2, par. (vi). Detailed characterization of this large volume of rock using available or foreseeable geophysical methods does not appear possible.

Pages 31401-31402, sec. 60.122(b). This part specifies those potentially adverse conditions which may result in the major components of the system not meeting the performance objectives of section 60.111(c). At this point, the language seems to depart from the sense intended in section 60.111 in that repeated references are made to the geologic repository (total system), not individual barriers. For example (p. 31401, col. 3, par. (1)(ii)), prior drilling to depths below the lower limit of the accessible environment will not affect the waste package and, depending on depth, may not affect the underground facility. It most likely would affect the geologic environment. It would sharpen up the regulations and make the potentially adverse conditions less sweeping if the following changes in language were made:

1) On page 31401, col. 2, last sentence: "The presence of any of the potentially adverse human activities or natural conditions will give rise to a presumption that those barriers affected by the adverse human activity or natural condition will not meet the performance objectives of 60.111(c)" (change underlined).

2) On page 31402, col. 1, par. 4, sentence 2: "A presumption that any of the major barriers will not meet the performance objectives stated in 60.111 can be rebutted upon showing that the presence of the potentially adverse condition does not adversely affect the performance of any of the barriers within the system" (change underlined). As it stands, the applicant might argue that the waste package alone ensures that the system will perform as required and that therefore any adverse condition may be tolerated.

Page 31401, col. 3, par. (1)(vi). The statement about the effect on the regional ground-water flow system of large-scale impoundments is vague. The statement should specify which elements of the flow system might be affected and the extent of change that would be considered significant.

Page 31401, col. 3, par. (2)(i). The term "extreme" is vague in this context. The concern here, presumably that erosion might exhume the repository, should be stated explicitly.

Page 31401, col. 3, par. (2)(iii). With the exception of fracturing ("fracture zones" is not a process), the processes listed could result in structural deformation of the volume of rock in a repository. However, it should be stated that structural deformation is significant to the extent that it results in an increase in the hydraulic conductivity of the rocks (through fracturing), and the consequent increase in the rate of leaching and transport of waste radionuclides. Uplift or subsidence may not be harmful by themselves if they are not differential within the candidate area.

Page 31401, col. 3, par. (2)(iv). The phrase "near field of a fault" requires definition. In fact, the whole question of how to assess tectonic conditions and future tectonics could well be the subject of a Regulatory Guide.

Page 31402, col. 1, par. (vii). This criterion is questionable. We believe a more relevant criterion would be "There are geophysical indications of the presence of a magma body at depth." A cooling regime is as likely to have a high gradient as a warming regime, but would not be equally adverse.

Page 31402, col. 1, par. (3)(i). "Storativity" is somewhat an archaic word; "storage coefficient" clearly indicates the attribute intended.

Page 31402, col. 1, par. (3)(iii). Refer to our comment (above) regarding page 31401, col. 3, par. (1)(vi).

Page 31402, col. 1, par. (3)(iv). What is the basis for stipulating a horizontal fault length of "more than a few hundred meters?" There is no obvious relation between fault length and hydraulic properties.

Page 31402, col. 1, par. (4). Clarify as follows: "...Geochemical. The sum of the rock units ... exhibits".

Page 31402, col. 2, par. (4)(c), line 11. Clarification is requested as to what constitutes full documentation. Does this imply QA standards or some lesser set of records?

Page 31402, col. 2, par. (c), Favorable characteristics. The first paragraph contains the notion of isolating the waste from the accessible environment by restricting the access of ground water to the waste. A repository depth of 300 meters would place the waste below the regional water table in most of the United States. It must be assumed, therefore, that after some time the closed repository would be saturated. Of most significance is the travel time of ground water and its contained radionuclides from the repository to a discharge area or some other accessible part of the environment. The notion of restricting the access of ground water to the waste is meaningful only over the short

term with respect to an engineered barrier such as the waste container. The movement of the water and nuclides through the geologic medium is related to its natural characteristics and the effect, on the hydraulic conductivity of the medium, of stresses produced by the presence of the repository.

Page 31402, col. 2, par. (1)(ii)(b). What is meant by "inactive ground-water circulation?" Virtually all ground water is moving but rates of movement can range over 20 or more orders of magnitude.

Page 31402, col. 2, par. (1)(ii)(C). What is meant by near-normal pH?

Page 31402, col. 3, par. (iii)(a). This paragraph should read "very low ground-water content."

Page 31402, col. 3, par. (iii)(b). Stipulation of "prevent ground-water intrusion" is in clear contradiction of section 60.101(3) which assumes disposal in a saturated medium--by definition a zone where ground-water intrusion must occur. In reality, what is to be regulated is not the presence of water, but its movement. We suggest rewording: "(b) Retard circulation of ground water in the host rock."

A generalization about Section 60.122 is that in many ways these attributes resemble the general site acceptability criteria described on page 31397, item 4, last paragraph.

Page 31402, col. 3, par. (iii) (d). Low hydraulic gradients are commonly indicative of high permeability and rapid water movement. A low hydraulic gradient does not indicate a low rate of water movement. Conversely, a high hydraulic gradient does not imply rapid water movement. What is the intent here?

Page 31402, col. 3, par. (vii). Assuming that a reasonable range of climatic extremes can be postulated, it is difficult to conceive of a relationship between climatic change and tectonic characteristics.

Page 31403, col. 3, par. (b)(2). There is vagueness here as to whether the retrieved wastes were recovered because they failed themselves, or were recovered because of a failure of some other portion of the repository, or for an institutional reason. We believe there normally would be time to rig the special facilities required for failed canisters before retrieving them, but the present statement does not distinguish among the kinds of facilities needed as related to reason for retrieval.

Page 31404, col. 3, par. (5). Substitute the word "build" or "construct" for "design."

Page 31404, col. 2, par. (iv)(b) and (c). These two items should demand equally effective sealing. We believe that item (b) is so demanding as to be virtually impossible to attain: restoring the disturbed annulus about any hole or shaft to the same or higher performance as a barrier to migration than the original rock will be a heroic undertaking in general. Section 60.132(c)(2)(v) then prescribes how to do this task (with multicomponent seals), a suggestion that may be unwarranted in view of present (and possibly of future) understanding of borehole sealing technology. We suggest paragraph (v) be merged into other paragraphs.

Page 31405, col. 1, par. (5)(i) and col. 2, par. (9)(v). Both paragraphs deal with water-bearing rocks encountered in subsurface facilities. As written these are vague. It would be more appropriate to set limits to permissible potential inflows from aquifers. In the event of failure of the positive control device (linings, grouting, etc.), the repository might be flooded if the capacity of the water control system is exceeded. Furthermore, the potential inflow specifies the capacity of the devices that must be supplied to restrict the release of radionuclides through mine waters that must be routinely pumped or would need to be discharged to contain or recover from flooding.

Page 31406, col. 1, part (e). The quality assurance records demanded by section 60.171 are not integrated with this section. Must all the records demanded by section 60.132(e) meet QA standards?

Page 31407, col. 2, par. (5). This paragraph prohibits the presence of chemically toxic wastes, which is what many radioactive wastes are. The wording about the chemical toxicity of these wastes should be deleted or modified.

Thank you for the opportunity to comment.

Sincerely yours,


for H. William Menard
Director

Bechtel National, Inc.

Engineers - Constructors

Fifty Beale Street
San Francisco, California

Mail Address: P. O. Box 3965, San Francisco, CA 94119



DOCKET NUMBER

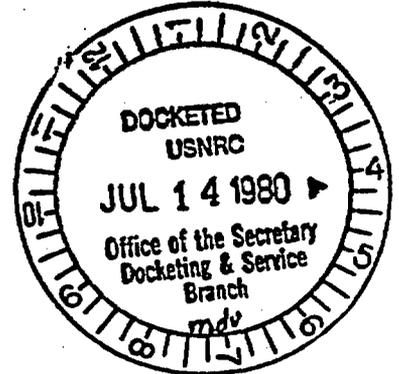
PROPOSED RULE

PR-60 (13)
(45 FR 31393)

Secretary of the Commission
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Docketing and Service Branch

Subject: Advance Notice of Proposed Rulemaking
on Technical Criteria for Regulating
Geologic Disposal of High-Level
Radioactive Waste



Gentlemen:

We appreciate the opportunity to provide comments during this formulative stage of developing technical criteria for regulating geologic disposal of high-level radioactive waste. In general, we are pleased that the NRC is developing such licensing criteria; however, we are disappointed with the unrealistic, arbitrary and imprecise nature of much of the current draft. We hope that the NRC final criteria will recognize the need for flexibility to allow greater realization of the benefits from existing geologic evidence, tested engineering practice, and future scientific innovation. In this regard, we request the NRC to take careful note of the information which will be generated and evaluated during the forthcoming Waste Confidence Rulemaking (44 FR-61372) and not to finalize these proposed technical criteria until that proceeding is complete, and the findings derived therefrom have been carefully considered.

Detailed comments from our review of the proposed technical criteria based on our engineering and construction experience are attached. In addition, we offer the following general comments which are more philosophical in nature and which underlie many of the more detailed comments of the attachment:

- Reasonable Assurance of Conformance to EPA Standards - The most significant of the overall repository performance objectives defined in Section 60.111 of the technical criteria is for the DOE to provide reasonable assurance that, after decommissioning, the isolation of the radioactive waste will conform to the applicable environmental standards established by the EPA. A major portion of this proposed rule deals with what the NRC considers to be necessary to provide this reasonable assurance. In dealing with this question, we believe that the NRC has placed undue emphasis on the nature of the uncertainties associated with transport of the waste through

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the geosphere to the exclusion of other important considerations such as: the extent to which uncertainties can be negated or made inconsequential by bounding analysis and design; the very large costs in both time and effort associated with quantifying and reducing uncertainties; and the incremental magnitude of risks associated with residual uncertainties. The deficiencies in the NRC approach are evidenced not only by the tone of the supplementary information and the excessive conservatism of the proposed criteria, but also by the working draft of the bases and rationale document which was placed in the NRC Public Document Room for inspection. This working draft deals almost exclusively with the uncertainties associated with geologic/hydrologic site characteristics, waste transport models, and supporting data. Little or no information or rationale is provided on the extent to which these uncertainties impact the risk to the public health and safety, or how these uncertainties when found to be safety significant can be reduced in importance by conservative design and analysis. Bechtel believes that the NRC requirements could be greatly simplified and the apparent excessive conservatisms removed if these additional factors in dealing with the question of reasonable assurance are given adequate attention.

- Codification of Models - The staff's position "not to require modeling to be the primary decision tool to determine the capability of the geologic repository to contain and isolate waste from the biosphere", as stated in the Supplementary Information, is unfounded and inappropriate. Models are generally recognized as the primary means for assessment of all complex technological systems where neither direct experience nor recourse to experimental verification exists. They are the means to systematically and logically express the sum of our knowledge (both factual and judgemental) concerning the behavior of a system under a postulated set of conditions. In addition, models can and should be used as a means to unify "expert opinion" so as to eliminate controversy and the imposition of arbitrary and capricious judgements on an ad hoc basis. Qualitative factors and judgements can be readily incorporated into models to assure that they provide conservative predictions of system behavior and adequately bound or account for the uncertainties of our knowledge. Furthermore, requirements can be established that require models to predict acceptable system behavior under a set of initial conditions that are extreme or even incredible. Consequently, the staff's arguments that models cannot accurately predict the behavior of a repository system do not detract from the fact that models can and should be used as the primary decision tool for system assessment.
- 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.

- Waste Package Integrity - The requirement that the waste package integrity be maintained for 1000 years with full or partial water saturation of the repository area is excessively conservative and cannot be justified if the other requirements for siting and design of the repository system have been achieved. Such an occurrence should be incredible if the repository has been properly sited and designed. It should be noted, however, that even if the waste package should fail in considerably less than 1000 years due to hypothetical water intrusion, the consequences to the public health and safety would be negligible unless the geology/hydrology of the repository area also changed drastically in that short geologic time period. If such arbitrary and totally unfounded postulations are to be made, geologic disposal of nuclear waste may be ruled out entirely.
- As Low As Reasonably Achievable (ALARA) - ALARA should not be applied to a new technology where an experience base does not exist and cost-benefit analyses have not been performed. However, if the provision is retained in the regulation, guidance should be given for performing the cost-benefit analysis. An example of this type of guidance is indicated by the following statement from 10CFR50, Appendix I:

"....the applicant shall include in the radwaste system all items of reasonably demonstrated technology that, when added to the system sequentially and in order of diminishing cost-benefit return, can for a favorable cost-benefit ratio effect reduction in dose to the population....As an interim measure and until establishment and adoption of better values (or other appropriate



criteria) the values of \$1,000 per total body man-rem and \$1,000 per man-thyroid-rem (or such less values as may be demonstrated to be suitable in a particular case) shall be used in this cost-benefit analysis."

When the ALARA approach is used, it is generally recognized that a "de minimus" level has not been achieved. For waste repositories, it is expected that for most repository breach scenarios (with the possible exception of human intrusion) it can be shown that de minimus levels of radiation exposure will be achieved. For this reason it is recommended that the ALARA objective be deleted.

It is our hope that you will find these comments and those of the attachment useful in finalizing the proposed technical criteria for geologic disposal of high-level radioactive waste. Should you have any further questions on this important matter, I would be pleased to provide the assistance of my staff.

Very truly yours,

Ashton J. O'Donnell
Vice President

AJO/tf
Attachment

cc: John F. Ahearne

DETAILED COMMENTS ON NRC PROPOSED TECHNICAL CRITERIA FOR 10 CFR PART 60

Technical Criteria for Regulating Geologic Disposal of High-Level Radioactive Waste as published in Federal Register, Vol. 45, No. 94 - Tuesday, May 13, 1980.

Supplementary Information

1. The discussion contained in this section approaches the development of a HLW repository from a very negative point of view. The section portrays a lack of confidence on the part of the NRC to deal with uncertainties, and emphasizes potential shortcomings of geologic repositories by statements like "such disposal of HLW is separable into five distinct problem areas" when not all of the areas identified may be problems, "waste undoubtedly will have a significant interaction with the rock" which we would not expect to be true over the time frames of interest, "no way to reasonably limit the variety of human activities which might compromise a forgotten repository", "engineering against human intrusion is impossible practically", "the site should be geologically simple... so that the site can be easily understood", "mistakes will occur", and "human intrusion cannot be prevented." Such absolute statements are negatively oriented and could lead to public misunderstanding and lack of confidence. Both overly negative and overly positive statements that tend to prejudge the concept of geologic disposal should be avoided.

Section 60.2 - Definitions

2. The definition of items "important to safety" does not include engineered items which are important for assuring the long term isolation of the waste from the biosphere, e.g., the waste form, container and overpack. Should such items be considered within the definition of important to safety?
3. The definition of "important to safety" uses the words "without undue risk to the health and safety of the public". Due to lack of specificity, this qualitative definition has caused much difficulty in the licensing of reactors. It is recommended that the definition be quantified to specifically apply to items essential to the prevention or mitigation of the consequences of operational accidents that could result in exceeding some defined radiological release or exposure limits.
4. The term "unreasonable risk" is employed in Paragraphs 60.101(b) and 60.171(b). Is this intended to be the same as "undue risk" used in Paragraph 60.2 or to have a different meaning? Please clarify.
5. Paragraphs 60.133(b)(4)(iii) and 60.171(b) use the term "safety related", in one case referring to safety related structures, systems or components, and in the other to functions of structures, systems or components.

Are these intended to be the same as structures, systems and components "important to safety"? In 10 CFR Part 50 the nuclear industry has lived with an ambiguity between these terms for many years. It is recommended that the same conflict not be repeated in Part 60. It would seem that the requirements should consistently refer to functions of structures, systems and components important to safety, or it should be stated that the terms "important to safety" and "safety related" as applied to equipment functions are synonymous.

6. The term "single failure" is used in Paragraph 60.132(b)(8)(i) but is not defined. It is not clear whether this refers to an "active" failure or both "active" and "passive" failures. In nuclear plants, the single failure applies to a single active failure unrelated to the initiating event. Is this intended here? Single failure should be defined in Section 60.2.
7. The definition of "TRU waste" should be more specific since as currently defined spent fuel could be classified as either HLW or TRU waste. Is this overlap intended or are the definitions of TRU waste and HLW meant to be mutually exclusive as is implied by the criteria of Paragraph 60.111 (c)(3)?

Section 60.111 - Performance Objectives

8. 60.111(a)(1) - This paragraph specifies exposure or release limits during normal operation but does not specify limits for operational accidents. Should limits comparable to those of 10 CFR Part 100 apply? It should be noted that, due to the nature of potential releases from repositories under both normal and accident conditions, exposure limits need to be expressed in terms of dose commitments to critical organs for a defined time period.
9. 60.111(a)(3) - We recommend that the retrievability period be shortened to extend for no more than 10 years beyond the waste emplacement date. Such a requirement would appear to be as arbitrary as the proposed 50-year requirement, but would have the advantages of much reduced cost and assuring the continued viability of soft rock media, while still satisfying EPA requirements.
10. 60.111(a)(3) - The basis upon which a decision could be made to retrieve the waste is not clear. Certainly the decision could not be expected to derive from the monitoring program of Paragraph 60.137 in a 50-year period if the system had been found to satisfy regulatory requirements for long-term barrier performance. Rather such a decision to retrieve would have to be based on some other type of data or predicted environmental occurrence. However, in the highly unlikely event that a decision were made to remove the waste, the requirement to provide for retrievability within a time period that is about the same as that in which it was emplaced seems to have little or no justification considering the low probability of having to perform this operation and the

relatively large costs, difficulties, and timeframe associated with having to ship and dispose of the wastes at some other location. Therefore, it is recommended that the requirements for the retrieval timeframe be deleted from the overall retrieval requirement.

11. 60.111(c)(2) - The first paragraph of this section states that waste package integrity must be maintained for the first 1000 years given various water flow conditions including full or partial saturation of the underground facility. Paragraph 60.111(c)(2)(i) then requires that the design environment for the waste packages promotes the 1000-year package integrity without full or partial water saturation required. Thus, if the initial requirement is intended, the requirement of Paragraph 60.111(c)(2)(i) appears superfluous.

Paragraph 60.111(c)(2)(ii) is even more confusing in that it states that the 1000-year integrity requirement must be satisfied (presumably without water saturation) but that some of the waste dissolves soon after decommissioning. The statement is self-contradicting and should be deleted.

12. 60.111(c)(3) - After 1000 years, it should be assumed that the waste packaging (engineered system) has performed its required function and that it is then the function of the remaining barriers in conjunction with the leach rate of the waste material (waste form) to assure that the EPA criteria for radioactivity release to the biosphere are not exceeded. Thus, it is unnecessary and inappropriate to stipulate a maximum leak rate from the engineered system after 1000 years. This type of requirement adds nothing to the reduction of risk to the public since it is not likely to influence the waste package design, but it could cause considerable difficulty and delay in the licensing process assuming demonstration of the criteria is necessary. This same comment applies to the TRU waste packaging where the leak rate criterion is applied starting at decommissioning.

Section 60.121 - Site and Environs Ownership and Control

13. 60.121(c) - Limiting institutional controls to only 100 years is overly conservative. Although the controlling organizations of today may not be the same ones 500 years from now, it is not unreasonable to assume that there will be some controlling authority. Past history has shown that civilized and conscience authority has been present at least since the end of feudalism (1000 to 1200 A.D.). Hence, planned and planning organizations have been present for the past 700 to 900 years.

Section 60.122 - Siting Requirements

14. 60.122(a)(2) - "Geologic" includes "tectonic". If tectonic is segregated out, then other geologic aspects should be segregated also.

15. 60.122(a)(2) - The rule requires investigation and evaluation of "natural conditions" and "human activities" that can affect various repository activities. However, subsequent paragraphs (i), (ii), (iii) seem to be directed toward "natural conditions" only. It is recommended that combining the terms "natural conditions" and "human activities" should be avoided. They are very separate.
16. 60.122(a)(2)(i) - The paragraph requires the conduct of investigations over a radius of 100 km, however, the amount of detail required is not indicated. The investigations should be performed in much less detail beyond the first 2 km.
17. 60.122(a)(3) - The paragraph asks for "representative and bounding values" for "human activities and natural events" for three items. Two of the items, (ii) and (iii), ask for "demonstration" of natural events only, which is not compatible with "representative and bounding". It is recommended that sections (ii) and (iii) be combined and made a separate number, e.g. (4).
18. 60.122(a)(5) - The paragraph requests site investigations be done in such a manner to produce minimal adverse effects on long term performance. Early shafts, particularly on multiple sites as requested by the Commission, could produce significant adverse effects.
19. 60.122(a)(7) - The DOE is required to "continuously" assess and verify changes. An assessment and verification time period should be stipulated.
20. 60.122(a)(8) - The request is made to assess the site within 100 km radius using available literature. However, it is also requested to use geologic and geophysical information to evaluate mineral deposits. Is it the intention of the commission to require geologic or geophysical surveys if none are available? Furthermore, the resource assessment should be in far less detail beyond say the first 10 km from the center of the site.
21. 60.122(a)(9)(i) - The paragraph calls for characterization of fractures, etc., of the "host rock and confining units"; however, in some cases (e.g. granite) there may be no confining unit, and if there is it may not be within the "volume of rock" defined at the beginning of Paragraph (9).
22. 60.122(a)(9)(iii) thru (vi) - Is it intended that the term "in situ" imply a shaft to repository level to acquire data? If so, this intent should be clearly stated. However, we believe that in situ tests in shafts and drifts are necessary only for site validation purposes after site selection. It should be noted that in situ determinations in a host rock will not guarantee that the measured condition exists throughout the repository.

23. 60.122(a)(9) - The last paragraph of this section states that "the Department shall assume that the volume will extend a horizontal distance of 2 km....", whereas the first paragraph of this section indicates the applicant shall determine what volume of rock will be significantly affected by construction of the geologic repository. We believe that determining in situ properties for a volume at least 2 km from the limits of the repository and 1 km deep is excessive for this purpose.
24. 60.122(b) - The statement "the presence of any of the potential adverse human activities or natural conditions will give rise to a presumption that the geologic repository will not meet the performance objectives" is extreme and could rule out many excellent sites. There is no basis for this presumption from the presence of such activities or conditions.
25. 60.122(b)(2)(i) - The word "extreme" should be defined.
26. 60.122(b)(2)(ii) - "Karst features", "breccia pipes" and especially "insoluble residues" are not necessarily "extreme" bedrock incisions.
27. 60.122(b)(2)(iii) - Such evidences are often not extreme bedrock incisions.
28. 60.122(b)(2)(iv) - The term "near field" should be defined.
29. 60.122(b)(2)(v) - Having a "higher seismicity" is certainly not an extreme bedrock incision, and may not even be a potential hazard.
30. 60.122(b)(2)(vii) - A higher than regional geothermal gradient may not be extreme.
31. 60.122(b)(3)(iv) - A length of "a few hundred meters" is too vague and should be defined.
32. 60.122(b) - The section at the end of 60.122(b) that rebuts requirements stated earlier is confusing and should be incorporated in the individual sections.
33. 60.122(c) - Several references are made to a host rock possessing "to the extent practicable" certain characteristics (page 31402, middle column). While one can probably understand what the Commission is suggesting, the meaning is diffused with the use of "practicable". Rocks cannot possess favorable characteristics as practicable.
34. 60.122(c)(1)(i) - Requirement may be too stringent and not attainable.
35. 60.122(c)(1)(ii)(a) - "Long flow paths" should be defined. Does this imply distance or time? Time would be preferable.
36. 60.122(c)(1)(ii)(b) - "Surrounding confining units" need not possess inactive ground water circulation if there is little or no communication to the host rock.

37. 60.122(c)(2)(v) thru (vii) - These sections do not fit in 60.122(c)(2).

Section 60.132 - Design Requirements

38. 60.132(b)(4)(i) - The requirement to "minimize" the release of radioactive materials in effluents during normal operations should be deleted. The requirement to meet the requirements of 10 CFR Part 20 which requires ALARA has already been specified.
39. 60.132(c)(2)(ii) - A regulatory requirement for design optimization is inappropriate. It should only be necessary to demonstrate with reasonable assurance that safety and environmental requirements have been met.
40. 60.132(c)(6)(i) - This requirement should be deleted. The requirement implies that the definition of "important to safety" is not adequate for all components. If this is the case, the definition should be changed. Determining that certain components are important to safety by regulation in advance of design is not defensible.
41. 60.132(c)(6)(ii) - This requirement prejudices the design and prevents the DOE from using more desirable equipment or mitigating devices should they be available. At most, the requirement should specify a no-free-fall characteristic.
42. 60.132(c)(9)(ii) - "Geologic repository operations area" should replace the word "repository". This requirement also implies that water will be allowed to flow into or from the repository operations area. Please clarify.
43. 60.132(d)(3) thru (5) - The portions of these paragraphs that dictate techniques instead of specifying objectives and standards should be deleted. During the licensing review, the NRC can review the techniques or methods developed to meet the standards imposed.
44. 60.132(f)(3)(i) and (ii) - Change the concept of this requirement to one of reducing hazards and potential for errors to acceptable levels. The Department cannot demonstrate that minima have been achieved for these items.

Section 60.133 - Waste Package and Emplacement Environment

45. 60.133(a)(1) - Revise this requirement merely to give acceptable standards. Optima cannot be demonstrated.
46. 60.133(a)(5) - Revise this requirement. Delete the specification for waste package tests to verify performance objectives. This is not possible. Waste package life can be verified only by an analysis based on test data that indicate performance requirements are likely to be met. Delete the reference to 60.133(e)(2). It is not necessary to test waste packages to insure that site functions are not compromised.

Section 60.135 - Retrieval of Waste

47. 60.135 - Revise this requirement to say that the EPA standards covering release shall be met. Whether packages are intact and whether all material is recovered is immaterial. And it is impossible to predict and guarantee compliance. For example, there may be a very small fraction of waste packages that are not intact even at the time they are emplaced.

Section 60.137 - Monitoring Programs

48. 60.137(a) and (c) - Define the terms, "site" and "engineered elements of the geologic repository".
49. 60.137 - Delete the requirement to monitor through the period of institutional controls. This monitoring cannot verify in the short term that EPA standards will be met through millions of years. And in the short term of say, 1000 years, there is no undetected way enough nuclear material can be transported and released to exceed EPA standards. Monitoring prior to decommissioning should be sufficient.

General

50. The criteria requires the avoidance of resources that are economically exploitable, and in Paragraph 60.122(b)(2)(vii) includes as such a resource "... a high and anomalous geothermal gradient relative to the regional geothermal gradient". However, we also should acknowledge that the placement of heat-producing materials in a repository will build up the surrounding temperatures to a level that might be interpreted by a future explorer as just such a high and anomalous geothermal gradient. Thus, we must conclude that we can have administrative controls for longer than 100 years, or we must not entice the explorer by allowing temperatures to rise to the level that he might interpret as being of interest. The term "high" needs to be defined.

In this regard, it is perhaps important to categorize the wastes by a thermal characteristic, as well as the radioactive characteristics, with the distinction being the time period during which the surrounding media temperature will be increasing (due to a heat generation rate that is greater than the heat dissipation rate) and a time period after which the surrounding media will have essentially returned to normal background temperatures. (It always will be somewhat above ambient.)

51. We suggest that the Criteria should provide general guidelines defining technical criteria for a safe HLW repository. To attempt to include every conceivable qualification that may or may not occur or may or may not be important for the suitability of a site will invite never ending challenges from intervenors and a correspondingly unnecessary lengthening of the repository licensing process. For example, statements like "There is a fault or fracture zone, irrespective of age of

last movement, which has a horizontal length of more than a few hundreds of meters" (page 31402, line 28) is unreasonable as a technical criterion and is only a means by which an otherwise adequate site can be disqualified. It would be to the advantage of the program if those working to develop a safe repository could feel confident that the rules outlined in the 10 CFR Part 60 were directed toward licensing a repository, not away from it. Presently the NRC is working toward revising 10 CFR Part 100 to remove some of the specific details which the NRC has found are unrealistic or unnecessary. It seems that this type of problem should be avoided in 10 CFR Part 60.

52. There is need for improving the paragraph and respective subparts numbering system. As it now stands, referencing or finding a particular subpart is very cumbersome.

Atomic Industrial Forum, Inc.
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Telephone: (301) 654-9260
TWX 7108249602 ATOMIC FOR DC

Carl Walske
President

July 11, 1980

DOCKET NUMBER
PROPOSED RULE PR-60
(45 FR 31393)

14

Secretary
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Attention: Docketing and Service Branch

Re: Draft Technical Criteria for 10 CFR Part 60
FR 31398 - 31408, May 13, 1980

Dear Sir:

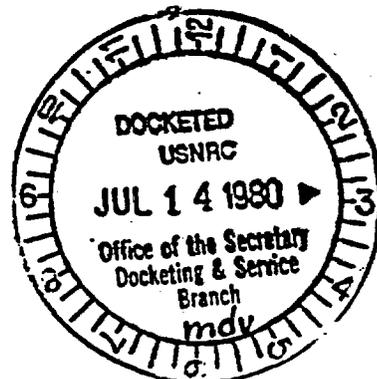
The enclosed comments on the above referenced subject were prepared by the Subcommittee on High Level Radioactive Waste of the AIF's Committee on Nuclear Fuel Cycle Services.

The Subcommittee suggests that the opinions of DOE and other cognizant agencies should be made available for review and that the Advance Notice should be reissued allowing additional time for comment.

Sincerely,

Carl Walske

CW:plg
Enclosure



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Acknowledged by card 7/14/80...mdv...



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Comments of the AIF Subcommittee
on
High-Level Radioactive Waste
on
10 CFR 60 "Technical Criteria for Regulating Geologic
Disposal of High-Level Radioactive Waste"

Advance Notice of Proposed Rulemaking
Federal Register, Vol. 45, No. 94, p. 31393-31407
May 13, 1980

The AIF Subcommittee on High-Level Radioactive Waste offers the following comments on the Advance Notice of Proposed Rulemaking regarding the Technical Criteria for Regulating Geologic Disposal of High-Level Radioactive Waste (10 CFR 60), as published in the Federal Register of May 13, 1980. We recognize the desirability of establishing an appropriate regulatory framework for the timely disposal of high-level wastes in geologic repositories; however, we are concerned by the approach being taken by NRC as well as by the lack of a basis for the quantitative values suggested in the Advance Notice.

While it is noted in the Supplementary Information that bases and rationale are being prepared by the NRC staff, the working draft became available for review only recently. Specific or detailed comments on the suggested numerical criteria cannot be made until a thorough review of this draft is completed. At that time we shall offer additional comments.

Because of the importance of such technical criteria, we suggest that NRC publish their bases and rationale, along with appropriate critiques by DOE and other cognizant agencies, and then reissue the Advance Notice of Proposed Rulemaking for comment and review by the public. A period of 120 days would permit thorough evaluation and comment by all interested reviewers.

Comments

1. The approach being taken by the NRC is not consistent with the objective stated on page 31396 nor with the "systems approach" recommended by the IRG. We believe that the NRC should be establishing appropriate criteria

and standards for the performance of the overall system, rather than defining specific performance values for individual components. The systems designer (DOE) should have the flexibility, for example, to permit optimum trade-offs between the waste form and the container design as long as the overall system meets those criteria that insure public health and safety.

2. We believe that several of the criteria represent extremely conservative numbers that cannot be justified on a cost/benefit basis or comparative risk analysis. We suggest that NRC provide appropriate comparative risk analyses to show that there is a rational basis for all quantitative criteria.

For example, in Paragraph 60.111 Overall Performance: The annual release rate of one part in one hundred thousand, based on the total activity remaining 1,000 years after decommissioning, seems to be an unjustified design constraint. At the baseline time of 1,000 years after decommissioning, the bulk of the non-TRU activity would have undergone 25 to 35 half-lives of decay. This implies an additional DF of the initial activity of about 1×10^9 , bringing the overall required DF for non-TRU to about 1×10^{14} , which seems -- unjustified, particularly when this means release from the underground facility into the surrounding strata, and not release to the biosphere.

The proposed release rate of one part in 100,000 of the activity present is a quantitative variable that appears to have no specific basis. Overall release rates should be based on health and safety considerations.

3. We disagree with the statement under Item 4 on Page 31395 that reads: "First geologic disposal is an entirely new enterprise - no experience exists with geologic disposal".

It appears that NRC is not giving appropriate consideration to the wealth of experience that has accumulated over hundreds of years of mining experience, and geologic research and evaluation. Also, geologic and archaeological studies provide data on entombment as a means of protecting man's arts and treasures over periods of thousands of years.

This large technical base of information has been recognized by many groups in both the U.S. and in other countries which have recommended the use of geologic

disposal for HLW. In addition, DOE's (and AEC's) experience base with geologic disposal research and development extends back over twenty years.

4. On page 31398, the question is asked, "Does the list of considerations above clearly, adequately and fully identify the relevant issues involved in disposal of HLW?". Following are several considerations which we believe need to be more fully addressed:
 - 4.1 No discussion is presented about the criteria that will be used as the bases for a decision to permanently enclose the waste. While it may be premature to develop these criteria on a detailed basis, we believe that a general outline of the decision bases should be developed.
 - 4.2 Criteria or considerations regarding the age of the waste are not presented or discussed.
 - 4.3 We believe that waste form is a very important parameter, as is waste type. This does not appear to be considered.
5. 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.
6. We have also reviewed the recent DOE report regarding the Proposed Rulemaking on the Storage and Disposal of Nuclear Waste, DOE/NE-0007. We agree with the performance objectives noted in that document and presented below:
 - 6.1 Containment should be virtually complete during the period dominated by fission product decay.
 - 6.2 Isolation from the accessible environment should be effective for at least 10,000 years, and reasonably foreseeable events should not produce consequences greater than normal variation in background radiation.

- 6.3 The operational phase of a waste disposal system should be as safe as for other nuclear fuel-cycle facilities.
- 6.4 Environmental impacts should be mitigated to the extent reasonably achievable.
- 6.5 Conservative design and evaluation should be applied to waste disposal systems to compensate for any residual uncertainties.
- 6.6 Acceptable performance should be based on methods reasonably available and should not depend upon continued maintenance or surveillance for unreasonable times into the future.
- 6.7 Concepts selected for implementation should be independent of nuclear industry trends and compatible with national policies.

We suggest that regulatory criteria consistent with these objectives would provide the bases necessary for a practical and safe repository.

It would appear appropriate to reserve our additional comments until after we have had an opportunity to review the bases and rationale.

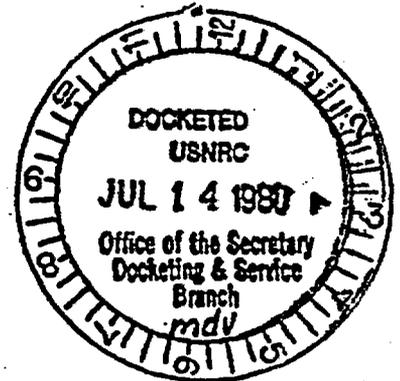
EXXON NUCLEAR COMPANY, Inc.

777 - 106th Avenue N.E., C-00777, Bellevue, Washington 98009, Telephone (206) 453-4300

RAY K. ROBINSON
Vice President

DOCKET NUMBER
PROPOSED RULE **PR-60** (15)
(45 FR 31393)

11 July 1980



Secretary of the Commission
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Attention: Docketing & Service Branch

Subject: Comments on 10 CFR 60 "Technical Criteria for
Regulating Geologic Disposal High-Level
Radioactive Waste" (Federal Register 5-13-80)

Dear Sir:

Exxon Nuclear Company has reviewed the referenced proposed criteria and we are pleased to submit our comments. We are concerned that the bases and rationale documents supporting the proposed criteria are not available at this time and thus preclude our evaluation of the public health and safety bases for the proposed guidelines. Our comments on this Advanced Notice of Proposed Rulemaking contemplate a future opportunity to review in further detail the proposed criteria subsequent to the release of the rationale documents. We anticipate we may desire to comment in further detail on the proposed criteria at a later time.

Comments

The approach taken by the NRC does not appear to be consistent with the "systems approach" recommended by the IRG and as noted as an objective of the NRC: "the Commission staff believes that it is reasonable to couple a prudently and cautiously selected geologic setting (natural barriers) with a set of engineered barriers capable of performing or assisting the performance . . . (containment and isolation)." We believe that the NRC should establish appropriate criteria and standards for the performance of the overall system, rather than defining specific performance values for individual components. The systems designer (DOE) should have the flexibility, for example, to permit optimum trade-offs between the waste form, the container design, and the overpack as long as the overall system meets those criteria that insure public health and safety.

Acknowledged by NRC. 7/14/80 mdv

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While the rationale are not available for an independent evaluation of the quantitative criteria, we believe that several of the criteria represent extremely conservative numbers that cannot be justified as desirable on a cost/benefit basis, or justified by any sort of a comparative risk analysis.

We suggest that the NRC provide appropriate comparative systems risk analyses to show that there is a rational basis for all specific quantitative criteria.

There are certainly some desirable features in the philosophy regarding "Human Intrusions," i.e., site suitability criteria which would lead toward uninteresting sites having little or no resources. These criteria would appear to preclude the disposal of any significant quantity of spent fuel, since a large repository filled with spent fuel would contain an energy source equivalent to a major oil field, i.e., greater than the North Slope. As energy resources become increasingly more limited in the next several decades, and if advanced reactors operating on other than a throwaway cycle are deployed in large numbers, such a resource would be very attractive and could lead to purposeful human intrusion.

Following are several considerations which we believe need to be more fully addressed:

- No discussion is presented about the bases for a decision to permanently enclose the waste. While it may be premature to develop these bases or criteria in detail, we believe that a general outline of the decision bases should be developed.
- Criteria or considerations regarding the age of the waste prior to the burial are not presented or discussed.
- We believe that waste form is a very important parameter, as is waste type. This does not appear to be considered. For example, the release rates noted in 60.111, C.3.c., as may be required for wastes contained in spent fuel could be considerably different than that required for solidified wastes after fuel reprocessing.
- Although it is true that the geologic disposal of HLW per se is an entirely new enterprise, we believe it is misleading to omit the mention at this point of the wealth of relevant geologic, engineering and hydrologic data which are available.

 
Secretary of the Commission

USNRC

Page 3

Finally, we would like to briefly address the questions raised on page 31398: 1) it is difficult to comment on the list of considerations until the rationale documents have been made available. One issue that appears to have not been considered is the extent to which disposal of reprocessed high level wastes would alter the approach to defining criteria; 2) it is inappropriate for us to comment on the scope of the rule without reviewing the rationale documents; 3) as indicated in our above comments, we feel that the NRC's EIS and technical criteria should concentrate on the systems approach and its relevance to protecting the public health and safety in a manner comparable to other nuclear activities which the NRC regulates; and 4) the environmental impacts of criteria constructed with the principles noted cannot realistically be assessed without an evaluation of the rationale upon which they are based.

Very truly yours,

EXXON NUCLEAR COMPANY, INC.

RK Robinson

RK Robinson

Vice President, Projects

RKR:d1



AMERICAN INSTITUTE OF CHEMICAL ENGINEERS

July 11, 1980

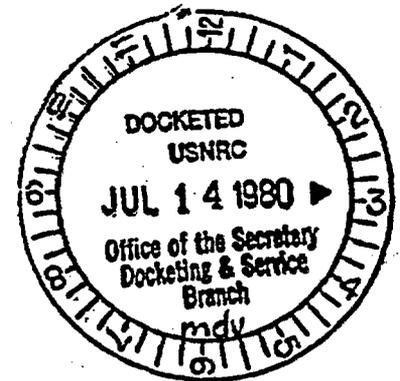
DOCKET NUMBER

PROPOSED RULE

PR-60

16

(45 FR 31393)



Mr. Samuel J. Chilk, Secretary
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Subject: Comments on Proposed Subpart E to 10 CFR Part 60

Dear Mr. Chilk:

The Nuclear Engineering Division of the American Institute of Chemical Engineers welcomes this opportunity to comment on the proposed Subpart E to 10 CFR Part 60, "Technical Criteria for Regulating Geologic Disposal of High-Level Radioactive Waste." The Institute has over 47,000 members, many of whom are involved in various aspects of the nuclear industry and are members of the Nuclear Engineering Division. As chairman of the Division, I would like to state our strong support of this effort by NRC to define quantitative requirements for disposal of high-level radioactive waste. We have the following few comments on the proposed criteria.

Basic Objectives

We endorse the usage in the criteria of the principle of "as well as reasonably achievable" with respect to the degree of containment required. There are many who would wish for "absolute containment" without realizing that this is an unattainable goal. In whatever changes are made to these criteria, we urge that this principle be maintained. To do otherwise would bring about lengthy delays and introduce excessive costs.

Requirement for Retrievability

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, mining specialists are dubious

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Mr. Samuel J. Chilk
July 11, 1980
Page 2

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 2050, 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 contrast, 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 retrieved.

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.

Definition of High-Level Waste

The definition of "high-level radioactive waste" given in the criteria document includes "irradiated reactor fuel" along with the customary HLW from reprocessing. Although either political considerations or lack of storage space for spent fuel might require disposal of unprocessed spent fuel, we do not consider this material as a "waste" by any provident definition. As you know, most nations using nuclear power view spent fuel as a valuable material, particularly for the breeder reactors that they have built and are continuing to build. Even the United States government must view spent fuel as having appreciable value, in a defensive sense, because of the extreme security and protection required to prevent its diversion to other uses.

Therefore, we recommend that "irradiated reactor fuel" not be included in the definition of high level radioactive waste. Instead, the usage could be

Mr. Samuel J. Chilk
July 11, 1980
Page 3

something like "--emplacement of high-level waste or spent fuel in--."

Definition of Transuranic Waste

The criteria document defines transuranic waste as material having alpha activity greater than 10 nanocuries per gram. As you know, this value, equivalent to the alpha activity in many ore bodies, was "pulled out of the air" some time ago for application to shallow land burial and has been often cited, but has no basis in a genuine hazard analysis. In fact, we understand that at least two unpublished analyses by NRC staff show that the number should be about 10 times larger than the above arbitrarily selected, unofficial number. If you publish this value in the criteria document, it becomes official. We urge that first the in-house analyses be checked, approved, and published. A more rationally derived value will, if higher, avoid much unnecessary cost and increase the accuracy of detection; if the same value is arrived at, the analysis will at least help reconcile industry to its necessity.

We will appreciate your consideration of these few points that we have discussed.

Sincerely,



Leslie Burris, Chairman
Nuclear Engineering Division

DOCKET NUMBER

PROPOSED RULE

PR-60 (17)
(45 FR 31393)

2202 N. Beachwood
Los Angeles
90068 - zip
July 8 1980

Secretary
U. S. Nuclear Regulatory Commission
Washington D. C. 20055

Attn: Docketing and Service
Branch

Dear Mr. Secretary:

I saw your Federal Register Notice regarding the Geologic Disposal of High Level Radioactive Waste (10 CFR 60) while riding Washington's Metro. I sat on a piece of gum which someone left on the seat and I picked up the Federal Register from the floor to clean my pants. Your regulation really hit me. It was the greatest! I am glad to see that the government is doing something about radioactive waste. There is no concern for the environment these days. I am so glad that the NRC is right on top of the problem. There's just too much waste these days. People are leaving things everywhere--even gum on the Metro seats and they're littering the trains with used Federal Registers.

Getting back to your regulation, I have several thoughts which I think should be patented. However they are so good that I have decided to give them to our government (the best! Three cheers for the red, white, and blue) for free! Here they are. Maybe they can be put in your regulation.

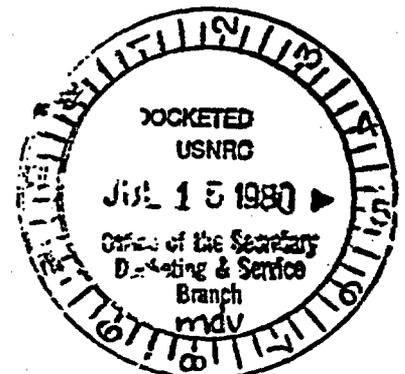
10 CFR 60

60.122 Siting

Since radioactive waste gives off heat and we have an energy problem your repositories should be under our cities. That way we could save on heating in the winter. Also you wouldn't need salt on icy streets or snow removal equipment.

I read in the newspaper that someone is thinking of putting that waste on Pacific Islands. That wouldn't be a good idea. We ought to keep it in the good old USA (the Best!). We don't want to let those Commies get it. I am sure you have heard about Continental Drift. Well those Russians invented it. They are just waiting for us to put the waste on an island and it will drift over to them and get it for themselves. I bet those Japs would be happy also to see us put the waste on a Pacific Island. They'd sure like to get their hands on it. We all know that it will leak into the sea water. The tuna will eat it and the Japs will catch all the tuna and then keep the waste for themselves.

(over)



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60.132 Repository Design

I guess you know Mr. Secretary, that radioactive waste gives off heat. So why not put some of it in the middle of very elastic balloons. They ought to be very large. The waste will heat the air making the balloons rise. Our repositories can then float high above the earth on the fringes of space. As they rise the air in them will become less dense. If we plan it right the density will be so low that they'll be just like giant neon tubes. We can then use them to send messages or to advertise. That would make the best use of the capitalist system. We could make money on this!

60.133 Waste Form

The best solution to the waste form problem is to use the good old American system of GELT (Good Engineering Long Term). GELT can make us a lot of money. We ought to package the waste in clear lucite blocks and gift box them. We can sell it in all our Department stores. If you get on the ball Mr. Secretary you can get it into the stores by Christmas.

Mr. Secretary, I know you have been getting a lot of criticism for the way the government has been avoiding the waste problem. Just remember Mr. Secretary, "names can never hurt you".* I know that you are on the ball and you are doing your best to solve the problem. I hope that my comments (free!) are of use to you. Any time you need more please call on me.

Sincerely,

Lazlo Toth

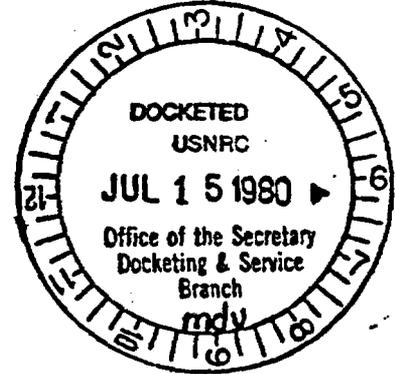
*from the poem Sticks and Stones
author unknown



DOCKET NUMBER **PR-60** (18)
 PROPOSED RULE **(45 FR 31393)**

Department of Energy
 Washington, D.C. 20545

JUL 15 1980



MEMORANDUM FOR Mr. Samuel Chilk
 Secretary, Nuclear Regulatory Commission
 Attention: Docketing and Service Branch
 Washington, D.C. 20555

The Department of Energy (DOE) is pleased to submit comments on the 10 CFR 60. "Technical Criteria for Regulating Geologic Disposal (of) High-Level Radioactive Waste" which were published as an Advance Notice of Proposed Rulemaking in the Federal Register on May 13, 1980, 45FR94, pages 31393 through 31408. Our comments are provided as three enclosures as follow:

1. Enclosure 1 provides the Departments' response to the four specific questions raised on page 31398 of the Federal Register Notice.
2. Enclosure 2 addresses major concerns identified in the course of our review and which we feel merit detailed consideration by the staff.
3. Enclosure 3 is a listing of specific comments and recommended revisions, many of which are editorial in nature or would improve the clarity of the regulation.

The enclosed comments represent the consensus of technical opinion available to the Department. In addition to the consolidated comments noted above, we are transmitting, verbatim, input we have received from a number of recognized experts which we recommend for your consideration. These experts are R. Ellison of D'Appolonia, I. Remson of Stanford University, H. Ross of the University of Utah Research Institute, G. Pinder of Princeton University, F. Parker of Vanderbilt University, N. Cook of the University of California and J. Bird of Cornell University.

During our review of the draft technical criteria it became apparent that the staff has expended significant effort in developing the proposed regulation. Consequently, our review has been chiefly directed towards identifying those areas where technical or interpretative ambiguities exist; where requirements appear excessive without an associated benefit to the public health and safety; where numerical criteria are suggested which have no supportive basis that we are aware of; or where implementation of the criteria would be difficult or impossible due to conflicting requirements or state-of-the-art limitations. Additionally, there are a number of instances in the draft technical criteria where we believed that design details and other limiting specifications (for example, hoist design) are being considered by the Commission when detailed design considerations are more appropriately within the purview of the Department for ultimate review by the Nuclear Regulatory Commission (NRC) staff.

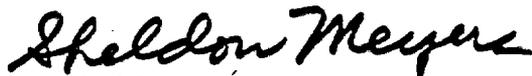
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The considerations addressed in the draft technical criteria are in general compatible with those currently being applied by the Department in its site evaluation and preliminary design activities although the application of the criteria causes some concern. The Department's approach has been extensively documented in its Statement of Position (DOE/NE-0007) submitted in support of the Waste Confidence Rulemaking. The licensing process to which the Department will be subject, including SAR/ER submittal and review, should provide an acceptable forum for evaluation of the Department's approach to overall repository safety. Consequently, we feel it necessary to take exception in those cases where the Department's responsibility to demonstrate safety would appear to be preempted by the NRC staff or where adequate flexibility is not allowed. These concerns are more specifically discussed in Enclosure 2.

We will be pleased to discuss the enclosed comments with the NRC staff at your convenience.

Sincerely,



Sheldon Meyers
Deputy Assistant Secretary
for Nuclear Waste Management

3 Enclosures

RESPONSES TO FOUR PARTICULAR QUESTIONS
(Page 31398)

Question 1:

Does the list of considerations above clearly, adequately, and fully identify the relevant issues involved in disposal on HLW?

Response:

The list of considerations does identify many key issues, but does not address them with sufficient clarity. There was an apparent emphasis on exhaustively listing items believed to be important by the staff. The actual importance of meeting the criteria, relative to safety, was not explained. For example 60.122(b) lists what the staff perceives to be "potentially adverse" conditions with no parallel attempt to explain why each item was stated.

Clarity suffers from both the organization and the writing style.

The "Nature of the Problem" is defined by listing five problem areas and six underlying principles. Seven considerations are then listed and comments requested on four questions. The draft technical criteria include eight active sections which do not appear to relate to the considerations introduced in the preamble.

The connection between the subtitles of the discussion of "Considerations" and the material discussed is difficult to understand. Subsection (1) "Systems Approach" is the basic "defense-in-depth" concept with which many are more familiar; Subsection (2) reads like design-basis events; Subsection (3) is an enlargement of (1) and might better be a part of it. Subsections (4) and (5) are ambiguous as written. We assume that under (4) Commission staff was trying to comment on whether one could identify "fatal flaws" that would exclude sites from consideration and, conversely, whether one could identify inclusionary attributes. It seems the issue of siting criteria remains open and is not yet to be specifically addressed. In fact, however, the technical criteria do include siting criteria. In (5), Codification of Models, the staff appears to be attempting to come to grips with how much weight is to be given to the use of predictive models and whether specific models should be specified. The treatment given this subject does not clarify the issue. The codification of specific models at this stage of development for both models and criteria is premature.

The supplementary Information section is not worded clearly. The following is quoted from discussion on "Codification of Models" (p. 31397) as an example:

"If one views the realization of our understanding in geologic disposal from successively more nearly complete and accurate qualitative descriptions of the observed phenomena in question through more precise and semiquantitative and quantitative approximations where uncertainties are better understood and can be treated mathematically, to an elegant theory embodied in a mathematical description which represents a culmination of human thought, the present state of modeling for geologic repositories is closer to qualitative than quantitative."

The major problem with the Supplementary Information is the apparent inadequacy of the treatment relative to the criteria themselves. More importantly, the background section does not provide support for the criteria. For example, the numerical requirements in the Performance Objectives (60.111) are totally unsupported. Prior to issuing a proposed rule, it is imperative that the bases and rationale be fully illuminated. Also, as noted above, there is little or no correlation between the organization of this section and the criteria themselves.

Question 2:

Would a rule structured along the lines of the referenced draft rule reasonably deal with issues in an appropriate manner?

Response:

The basic structure of Subparts E-I is appropriate, however, many changes to the contents are needed. More importantly the bases and rationale should be structured in a manner consistent with the structure of the rule.

Question 3:

In light of the fact that EPA has the responsibility and authority to set the generally applicable environmental standard for radiation in the environment from the disposal of HLW, with what factors/issues should an NRC environmental impact statement on technical criteria deal?

Response:

The NRC EIS should address alternative approaches to regulating repositories (e.g., no requirements on individual elements of the system, qualitative requirements instead of quantitative requirements, etc.), environmental impacts of complying with the rule as presented compared to the alternatives, and cost benefit analyses of complying with the rule compared to the alternatives. It should also address the trade off between potential decreases in long term impacts versus the actual increases in present day impacts resulting from the extensive site characterization requirements.

Question 4:

What are the environmental impacts of criteria constructed in accordance with the above cited principles? What alternative criteria exist and what are their impacts?

Response:

Environmental and cost impacts will be associated with the requirement to characterize multiple sites at depth (44FR70410), the requirement to design to preserve the option to retrieve for 50 years after emplacement, and the requirement to utilize a 1000-year waste package. Alternative criteria are proposed in the ONWI 33(1) through 33(4) series and in the Department's Statement of Position for the NRC Waste Confidence Rulemaking.

MAJOR ISSUES

A. STANDARD OF PROOF

The staff apparently recognizes in 60.111, Performance Objectives, that it is impossible to prove with certainty that the performance objectives will be met in the far future. Thus the phrase "reasonable assurance" is used in conjunction with several of these criteria. It would be useful to provide, possibly in the statement of considerations, a discussion of the standard of proof implied by "reasonable assurance". The Commission should also provide guidance relative to the time over which reasonable assurance of isolation must be provided. The Department has proposed an objective of 10,000 years as indicated in its Statement of Position on the Confidence Rulemaking. We propose that a 10,000 year requirement be set by the Commission in this regulation as a performance objective for the repository.

B. TRANSURANIC WASTES

Although this document is titled "Technical Criteria for Regulating Geologic Disposal High-Level Radioactive Waste", there are references to TRU wastes. It is assumed that the references are included to address the disposal of TRU waste in a HLW repository. However, we believe this point should be addressed to eliminate the potential inference that these criteria would be applicable to a repository containing only TRU waste. In addition, with the exception of the footnote on page 31400, it is not clearly stated whether the criteria apply to HLW, to TRU waste, or to both.

It might be appropriate that all references to TRU waste requirements be deleted from 10 CFR 60 and made the subject of a separate regulation.

C. CONTAINMENT FOR 1000 YEARS

Paragraph 60.111(c) - Performance of Required Barriers and Engineered Systems requires that both the waste package and the underground facility be designed to provide reasonable assurance that radionuclides will be contained for at least 1,000 years after decommissioning. There is no basis given in the criteria or in the Supplementary Information to support the selection of 1,000 years. The discussion under "1. Lifetime of the Repository" discusses a period which "begins following closure of the repository, and will persist for the time that the relatively short-lived fission products dominate the hazard". The Department agrees with the concept of containment during this fission product period as reflected in the "Statement of Position of the United States Department of Energy, DOE/NE-0007, April 15, 1980, in the Proposed Rulemaking on the Storage and Disposal of Nuclear Waste. In that document, the Department identifies as Performance Objectives 1 (p.II-7):

"Waste containment within the immediate vicinity of initial placement should be virtually complete during the period when radiation and thermal output are dominated by fission product decay. Any loss of containment should be a gradual process which results in very small fractional waste inventory release rates extending over very long release times, i.e., catastrophic losses of containment should not occur".

However, if 1,000 years is intended to represent this period where the hazard is dominated by the fission products, we believe that it is excessive. Several organizations have developed curves of the relative contributions of actinides and fission products to the radioactivity, decay heat or hazard index of radioactive waste. For example, EPA 520/4-79-007A, "Technical Support of Standards for High-Level Radioactive Waste Management, Volume A, Source Term Characterization" Figures A-4 through A-23 present curves of radioactivity, decay heat generation and untreated dilution index for the cases of a PWR throwaway cycle, PWR UO₂ cycle and mixed oxide cycle. The following table was derived from Figures A-4, A-5, and A-6 of that report.

Fraction of Total Contributed by Fission Products
in PWR throwaway cycle

<u>Decay Time in Years From Discharge</u>	<u>Relative Value of Radioactivity</u>	<u>Relative Value of Decay Heat</u>	<u>Untreated Dilution Index ("Hazard")</u>
100	0.5	0.286	1.0
300	0.18	0.02	8.3 x 10 ⁻³
500	1.5 x 10 ⁻³	9.0 x 10 ⁻⁴	3.8 x 10 ⁻³
1000	1.0 x 10 ⁻³	3.5 x 10 ⁻⁴	1.4 x 10 ⁻³

Based on this table it can be seen that whether the concern is radioactivity, decay heat, or hazard, the fission products no longer dominate at 300 years. It is recognized that other studies have produced varying results due to the input parameters assumed (burn up, etc.). We are not aware, however, of any calculations that indicate that the hazard is dominated by fission products beyond 300-500 years, let alone 1000 years. Even using the assumption that fission products have decayed to insignificant levels (less than 0.001 of original value) after 10 half-lives, and that cesium-137 and strontium-90 (both having half lives of about 30 years) are the dominant fission products, 300 years containment would appear to be more supportable than 1000 years.

The bases assumed by the staff for assigning the apparently arbitrary 1000-year containment period are not clear and we recommend that this question be reexamined in the light of the potential benefits that could accrue.

D. ONE PART IN ONE HUNDRED THOUSAND ANNUAL RELEASE RATE

Paragraph 60.111(c)(3)(i) specifies the annual release rate from the repository but does not provide any basis or justification for the value given. Since this release rate will be a direct contributor to the release to the biosphere, it should be related to the EPA criteria and to the state-of-the-art rather than stated as an a priori number. Also, it is not clear how long that release rate must be maintained (100,000 years?) or where the boundary of the "underground facility", at which the release is to be evaluated, is located. It must be noted that compliance with this criterion, as well as the other performance objectives, must be demonstrated by predictive calculations and cannot be "proven".

E. RETRIEVABILITY

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 they 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 that would need to be removed from the repository if backfilling were permitted 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.

F. TREATMENT OF UNCERTAINTIES (P. 31395)

While we agree that there are many uncertainties associated with the geologic disposal of high-level radioactive waste, this section fails to put them into perspective. Too little recognition is given to the ability to bound the issues or problems. The end result is the impression of very little confidence in the conclusion that the geologic repository concept is viable. We believe the situation in regard to treatment of uncertainties is as noted in the following quotation from the Department's Statement of Position on in the Waste Confidence Rulemaking (p. II-299):

"The conservative approach adopted by the Department is based upon a step-wise approach to system development and implementation, a multibarrier system for radionuclide containment and isolation, and appropriate design and operating margins to compensate for uncertainties.

Proceeding in a cautious, step-wise manner in the development and implementation of waste disposal systems adds assurance that the best available information is considered in reaching decisions and irreversible impacts are minimized. The use of multiple independent natural and man-made barriers against waste release minimizes the impacts of potential disruptive forces by avoiding undue reliance on any given barrier. The use of appropriate design and operating margins provides assurance that residual uncertainties inherent in disposal systems are compensated for. Integration of scientific peer review into the program adds further assurance that the waste disposal objectives will be met. The Department's approach insures that the best available pertinent information will be considered in reaching decisions and that a high confidence in safety will be attained in spite of residual uncertainties in data, modeling, or future conditions."

G. HUMAN INTRUSION

This discussion of human intrusion (p. 31398) identifies many problems and their lack of resolution. The rule should provide incentives for developing measures to decrease the probability or consequences of future human intrusion. It should clearly differentiate between active (institutional) controls and passive measures (e.g., markers, tell-tales, etc.). It should also recognize that avoidance of resources is a weak argument against future intrusion. Resources are largely determined by technology, i.e., our ability to use the resources. We do not know what future technological needs may be. The emphasis should be on communicating knowledge of the repository's existence to future generations such that inadvertent intrusion is avoided. Merely avoiding present resources provides little or no assurance. We intend to develop a position paper on this subject to use to initiate a dialog with the Commission staff.

H. SITING REQUIREMENTS

The overall tone of the background material contained as "Supplementary Information" seems to indicate that geology, or the characterization of geology, will be insufficient to provide confidence that isolation can be achieved without additional engineered barriers. The extreme emphasis on "uncertainties" seems to indicate a negative approach to the problem of site selection and characterization.

The siting requirements themselves are structured in a negative way. There is an extensive list of adverse conditions, the presence of which means presumption of unacceptability. This is followed by a section saying that the presumption can be rebutted by demonstrating a number of things including the presence of favorable characteristics. A later section lists some of these favorable characteristics.

The regulation should be focused on repository performance. Each criterion should have a safety or environmental basis which is broadly applicable. Also, criteria must be compatible. These conditions seem to be lacking through the present draft. For example, literal interpretation of §60.122(g) would appear to require that the repository buffer zone be permeated by tunnels for in situ testing and to require shafts and a tunnel 1 km below the repository for the same purpose. Not only is such information of questionable value and very costly to obtain, but the act of obtaining the information could likely render the proposed formation unsuitable.

I. GEOLOGIC SIMPLICITY

The entire Supplemental Information section stresses geologic simplicity as a very important characteristic of a site without clearly explaining what is meant by the term. While we agree that geologic simplicity is a desirable characteristic, it is not the most important attribute of a site. The most important attribute of a natural barrier is that it works, not that it is mechanistically or descriptively simple. The prime purpose of the geologic setting is to contain the waste, and not to facilitate the licensing process. The geologic complexity of a site is based on two factors: (1) the real geologic system and (2) the apparent complexity created by our own inability to comprehend the system. As we learn about these systems the perceived complexity will change. In addressing this problem in the development of criteria, it is critical that the capability of the geologic setting to contain the waste be given a higher priority than the simplicity of the system.

The requirement in 60.122(a)(1) does put geologic simplicity in its proper perspective and that approach should be reflected in the supplemental information.

J. DESIGN SPECIFICATIONS VERSUS PERFORMANCE CRITERIA

In some sections of the document, specific design solutions to problems rather than technical criteria or performance objectives are stated. Specific examples of this are 60.132(c)(9)(v) which states "If aquifers or water-bearing structures

are encountered during construction then the Department must use pregrouting in advance of excavation", and 60.132(c)(6)(ii) which states "The Department shall design hoists with mechanically geared lowering devices that preclude cage free fall". While these may be appropriate designs in some cases, they are not the only solutions to the anticipated problem and may not be the best solutions. The regulation should state criteria not designs. The Department will design to meet the criteria and the NRC staff will have the opportunity to review the design and discuss, with the Department, alternative designs and their relative merits.

SPECIFIC RECOMMENDED CHANGES

A. 60.2 DEFINITIONS1. NRC Proposed Wording:

"Aquifer" - means a distinct hydrogeologic unit that readily transmits water and yields significant quantities of waste to wells or springs.

Recommended Revision:

"Aquifer" - means a layer of rock or soil which is relatively more permeable than the nearby layers above or below and through which water flows. In an aquifer, the yield to wells is generally considered to be more than 1/3 gallon per minute.

Rationale:

Words like "significant" can lead to endless debate in the licensing process.

2. NRC Proposed Wording:

"Container" - means the first major sealed enclosure that holds the waste form.

Recommended Revision:

"Canister" - means the innermost sealed enclosure that holds the waste form.

Rationale:

Canister is the more commonly used term. The term "first" is unclear depending on whether one is counting from the outside or the inside.

3. NRC Proposed Wording:

"Decommissioning" - means final backfilling of subsurface facilities, sealing of shafts, and decontamination and dismantlement of surface facilities.

Recommended Revision:

"Decommissioning" - means removal from active operational usage including decontamination and/or dismantlement.

Rationale:

Decommissioning should be differentiated from isolation.

4. NRC Proposed Wording:

"Disposal" - means permanent emplacement within a storage space with no intent to retrieve for resource values.

Recommended Revision:

Delete "for resource values".

Rationale:

The term "permanent emplacement" earlier in the definition implies no intent to retrieve for any reason. If there is intent to retrieve, the term "storage" rather than "disposal" would apply, and emplacement would not necessarily be "permanent". Although the capability to retrieve will be maintained through the operational phase, there is no intent to retrieve unless required for safety.

5. NRC Proposed Wording:

"Expected processes and events" - means those natural processes or events that are likely to degrade the engineered elements of the geologic repository during a given period after decommissioning. As used in this part, expected processes and events do not include human intrusion.

Recommended Revision:

Change "degrade" to "occur and act upon".

Rationale:

The definition of "expected processes and events" is limited to these processes or events" that are likely to degrade the engineered elements..." Since this is a much narrower definition than would normally be ascribed to the term "expected processes and events", either the term should be made more specific and descriptive, or its definition should be more general for consistency with normal usage.

6. NRC Proposed Wording:

"Floodplain" - means the lowland and relatively flat areas adjoining inland and coastal waters including flood prone areas of offshore islands including, at a minimum, that area subject to a one percent or greater chance of flooding in any given year.

Recommended Revision:

Use a different word than floodplain.

Rationale:

This definition does not correspond with the standard meaning of "floodplain" as used by other government agencies (EPA). Suggest another term covering all areas susceptible to flooding, e.g., "floodprone".

7. NRC Proposed Wording:

"Geologic repository operations area" - means a HLW facility that is part of a geologic repository, including both surface and subsurface areas, where waste handling and emplacement activities are conducted.

Recommended Revision:

Redefine to address TRU disposal also, if appropriate.

Rationale:

See major comments.

8. NRC Proposed Wording:

"Important to safety" with reference to structures, systems, and components, means those structures, systems, and components that provide reasonable assurance that radioactive waste can be received, handled, and stored without undue risk to the health and safety of the public.

Recommended Revision:

"Important..." means those structures, systems, and components that prevent or mitigate events that could cause unreasonable risk to the health and safety of the public due to release of radioactive material.

Rationale:

To be consistent with 60.171(b).

9. NRC Proposed Wording:

"Stability" - means the rate of natural processes affecting the site during the recent geologic past are relatively low and will not significantly change during the next 10,000 years.

Recommended Revision:

"Stability" is a relative term indicating that the rates of natural processes such as erosion and faulting are so low that their effect will not jeopardize isolation of the waste. This is determined by measuring the present rates of those processes and, by geologic evidence, deducing the rates in effect during the recent geologic past.

Rationale:

Specifying 10,000 years is useful and reasonable, but the terms above are somewhat subjective. It is also recommended that the regulation stipulate the first 10,000 years as the period over which reasonable assurance of isolation be provided (i.e., consistent with DOE's proposed objectives as set forth in its Statement of Position in the Confidence Rulemaking).

10. NRC Proposed Wording:

"Transuranic wastes" or "TRU wastes" - means radioactive waste containing alpha emitting transuranic elements, with radioactive half-lives greater than one year, in excess of 10 nanocuries per gram.

Recommended Revision:

- a. Insert "other than PLU" after "radioactive waste .
- b. Delete numerical definition of 10 nanocuries per gram.

Rationale:

- a. Clarity
- b. Numerical definitions for TRU wastes are being formulated by EPA and NRC regulations would more appropriately reflect the EPA definition. While DOE regulations use 10 nanocuries per gram to define the level above which TRU-contaminated wastes will not be emplaced in shallow land burial, a more precise evaluation of this limit is underway which may lead to a redefinition.

11. NRC Proposed Wording:

"Underground facility" - means the civil engineered structure, including backfill materials, but not including seals, in which waste is emplaced.

Recommended Revision:

Change "civil" to "subsurface".

Rationale:

Clarity.

12. Definitions should be added for the following terms which were used in the regulation:

- a. "Institutional Control"
- b. "Long Term"
- c. "Module"
- d. "Saturated Media"
- e. "Site Suitability", (Contrast with "Site/Facility Acceptability")
- f. "Quaternary" (provide specific length of time)
- g. "Vadose Zone"

E. 60.101 PURPOSE

1. 60.101(e)

NRC Proposed Wording:

(e) The requirements and conditions in subsequent sections assume that disposal will be in saturated media. The Commission does not intend to exclude disposal in the vadose zone or any other method by promulgating these criteria; however, different criteria may need to be developed to license other disposal methods.

Recommended Revision:

Rewrite or delete.

Rationale:

This seems unduly restrictive and raises questions as to what actually constitutes a saturated medium and as to whether these criteria apply to salt deposits.

C. 60.111 PERFORMANCE OBJECTIVES

1. 60.111(c) Performance of Required Barriers and Engineered Systems

NRC Proposed Wording:(1) Waste Package

The Department shall design waste packages so that there is reasonable assurance that radionuclides will be contained for at least the first 1,000 years after decommissioning and for as long thereafter as is reasonably achievable given expected processes and events as well as various water flow conditions including full or partial saturation of the underground facility.

(2) Underground Facility

The Department shall design the underground facility to provide reasonable assurance of the following:

- (i) An environment for the waste packages that promotes the achievement of Paragraph 60.111(c)(1) above under conditions resulting from expected processes and events.
- (ii) Containment of all radionuclides for the first 1,000 years after decommissioning of the geologic repository operations and for as long thereafter as is reasonably achievable, assuming expected events and processes and that some of the waste dissolves soon after decommissioning.

(3) Overall Performance of the Engineered System After Containment

The Department shall design the engineered system to provide reasonable assurance that:

- (i) Starting 1,000 years after decommissioning of the geologic repository operations area, the radionuclides present in HLW will be released from the underground facility at an annual rate that is as low as reasonably achievable and is in no case greater than an annual rate of one part in one hundred thousand of the total activity present in HLW within the underground facility 1,000 years after decommissioning assuming expected processes and events.
- (ii) Starting at decommissioning radionuclides present in TRU waste will be released at a rate that is as low as reasonably achievable and is in no case greater than one part in one hundred thousand of the total activity present in TRU waste within the underground facility at the time of decommissioning assuming expected processes and events.

Recommended Revision:

- a. Throughout, change "1,000 years after emplacement" to a value which can be more readily supported by technical analysis. (As noted in general comments, 300 years seems to represent a more appropriate period.)
- b. In (2)(ii) delete all after "processes".
- c. In (3)(ii) add "annual" before "rate".
- d. In (3)(i) and (ii) indicate the time frame over which the release rate should be maintained.
- e. In (3)(i) and (ii) the "one part in one hundred thousand" should either be substantiated with a technical basis, replaced with a value which can be substantiated, or left qualitative. Clarification should be provided as to the boundary across which the release is measured (e.g., entry into aquifer) and how compliance can be proven.

Rationale:

- a. (i) The rationale for a different value is discussed under Major Comments.
- (ii) As noted in 60.111(a)(3) the option exists not to close the repository for 60 years after termination of waste emplacement operations. This makes the time of decommissioning very uncertain when the first waste is emplaced.

- b. The last phrase is too vague to be useful in a regulation.
- c. Consistency with (3)(i). The time frame is not stated. Such rates are likely to vary with time.
- d. DOE knows of no basis for either promulgating that rate in terms of safety gained or for believing that compliance with that rate could be proven in a licensing proceeding.

2. 60.111(c)(4) Performance of the Geologic Environment

NRC Proposed Wording:

- (i) The Department shall provide reasonable assurance that the degree of stability exhibited by the geologic environment at present will not significantly decrease over the long term.
- (ii) The Department shall provide reasonable assurance that the site exhibits properties which promote isolation and that their capability to inhibit the migration of radionuclides will not significantly decrease over the long term.
- (iii) The Department shall provide reasonable assurance that the hydrologic and geochemical properties of the host rock and surrounding confining units will provide radionuclide travel times to the accessible environment of at least 1,000 years assuming expected processes and events.

Recommended Revision:

- a. In (c)(4)(i) change "decrease" to "degrade". Replace "over the long term" with "for the first 10,000 years".
- b. Delete (c)(4)(iii).

Rationale:

- a. Clarity. Additionally, references in this proposed 10CFR60 to changes in ambient conditions as "unfavorable" need to be considered in terms of some favorable, static ambient reference condition. That is, degradation per se is not relevant, performance degradation beyond some critical value is relevant. Clarity would be enhanced by using 10,000 years (consistent with §60.2 definition of "stability") in place of the more subjective "long term".
- b. This item notes that the host rock will provide radionuclide travel time to the accessible environment of at least 1,000 years assuming expected events. Why a time restriction of 1,000 years? The principal point of waste isolation is missed here. The effectiveness of isolation must be related to risk criteria and dose to man predictions.

D. 60.121 SITE AND ENVIRONS OWNERSHIP AND CONTROL

General:

This section appears to recognize that permanent markers and records will last longer than the 100 year institutional control period. There needs to be a clear definition of what credit can be taken for markers and records, but we agree that it is not appropriate to do it at this time.

E. 60.122 SITING REQUIREMENTS

1. 60.122(a)(2)

NRC Proposed Wording:

The Department shall investigate and evaluate the natural conditions and human activities that can reasonably be expected to affect the design, construction, operation, and decommissioning of the geologic repository operations area. The natural conditions include geologic, tectonic, hydrologic, and climatic process. The Department shall evaluate the stability of the geologic repository and the isolation of radionuclides after decommissioning.

- (i) The Department shall conduct investigations on the order of 100 kilometers horizontal radius from the geologic repository operations area,
- (ii) The Department shall emphasize those natural conditions active anytime since the start of the Quaternary Period in their investigations.
- (iii) The department shall emphasize the first 10,000 years following decommissioning in their prediction of changes in natural conditions and the performance of the geologic repository.

Recommended Revision:

- a. Change (i) to: "The Department shall conduct investigations throughout the area and volume of the geologic and hydrologic environment which may affect or be affected by the geologic repository to assure that the local site conditions are compatible with the regional setting. The level of detail investigated at each distance from the geologic operations area shall be commensurate with the importance of data at that location."

- b. Change (ii) to: "The Department shall document those natural processes active during the Quarternary Period in their investigations.
- c. In (iii) insert "and extrapolation" after "prediction". Subsection (iii) is a very significant principle and should be elevated to a major performance objective.

Rationale:

- a. The area to be investigated is site dependent. Clearly there is no need to do investigations beyond a defined connection to the accessible environment. Also the level of detail at the outer limits of the investigation does not necessarily have to be as intense as at the site itself.
- b. Clarity. Conditions are not active.
- c. Completeness. Also, the principle of 10,000 years being the most significant time of interest is very important and should be emphasized.

2. 60.122(a)(3)(ii) and (iii)

NRC Proposed Wording:

- (ii) Demonstration of the stability of the geologic repository after decommissioning.
- (iii) Demonstration of the isolation of radionuclides from the accessible environment after decommissioning.

Recommended Revision:

Replace the word "Demonstration" in each sentence with "Prediction," and add the phrase "based upon the state-of-the-art," to the end of each sentence.

Rationale:

One cannot demonstrate the future, but one can predict future processes to varying degrees based upon state-of-the-art techniques.

3. 60.122(a)(4)

NRC Proposed Wording:

The Department shall evaluate reasonably likely future variations in the site characteristics which may result from natural processes, human activities, construction of the repository, or waste/rock/water interactions.

Recommended Revision:

Insert "thermomechanical and physicochemical" before "waste/rock/water".

Rationale:

Clarity.

4. 60.122(a)(6)

NRC Proposed Wording:

The Department shall validate analyses and modeling of future conditions and changes in site characteristics using field tests, in situ tests, field-verified laboratory tests, monitoring data, or natural analog studies.

Recommended Revision:

- a. Insert "to the extent practicable" after "characteristics".
- b. Delete "field-verified"

Rationale:

- a. The Supplementary Information section recognized the difficulties encountered in validation.
- b. Meaningful field verifications of laboratory tests are not always possible within a "real-time" period.

5. 60.122(a)(7)

NRC Proposed Wording:

The Department shall continuously verify and assess any changes in site conditions which pertain to whether the performance objectives will be met.

Recommended Revision:

Change "continuously" to "continue to".

Rationale:

Continuously means without interruption.

6. 60.122(a)(8)

NRC Proposed Wording:

The Department shall perform a resource assessment for the region within 100 km of the site using available information. The Department shall include estimates of both known and undiscovered deposits of all resources that (1) have been or are being exploited or (2) have not been exploited but are exploitable under present technology and market conditions. The Department shall estimate undiscovered deposits by reasonable inference based on geologic and geophysical information. The Department shall estimate both gross and net value of resource deposits. The estimate of net value shall take into account development, extraction and marketing costs.

Recommended Revision:

- a. Change "undiscovered deposits" to "potential reserves".
- b. Delete "both gross and".
- c. Change "net" to "fair market".

Rationale:

- a. It is impossible to assess undiscovered deposits, but is common to estimate potential reserves.
- b. Gross value is irrelevant if extraction or marketing costs make it impractical to develop.
- c. Fair market is a more useful term than net value in this case.

7. 60.122(a)(9)

NRC Proposed Wording:

The Department shall determine by appropriate analyses the extent of the volume of rock within which the geologic framework, ground water flow, ground water chemistry, or geomechanical properties are anticipated to be significantly affected by construction of the geologic repository or by the presence of the emplaced wastes, with emphasis on the thermal loading of the latter. In order to do the analyses required in this paragraph, the Department shall at a minimum conduct investigations and tests to provide the following input data:

- (i) The pattern, distribution, and origin of fractures, discontinuities, and heterogeneities in the host rock and surrounding confining units;
- (ii) The presence of potential pathways such as fractures, discontinuities, solution features, unsealed faults, breccia pipes, and other permeable anomalies in the host rock and surrounding confining units;
- (iii) The in situ determination of the bulk geomechanical properties, pore pressures and ambient stress conditions of the host rock and surrounding confining units;
- (iv) The in situ determination of the bulk hydrogeologic properties of the host rock and surrounding confining units;
- (v) The in situ determination of the bulk geochemical conditions, particularly the redox potential, of the host rock and surrounding confining units;
- (vi) The in situ determination of the bulk response of the host rock and surrounding confining units to the anticipated thermal loading given the pattern of fractures and other discontinuities and the heat transfer properties of the rock mass.

As a minimum, the Department shall assume that the volume will extend a horizontal distance of 2 kilometers from the limits of the repository excavation and a vertical distance from the surface to a depth of 1 kilometer below the limits of the repository excavation.

Recommended Revision:

- a. Delete the last paragraph.
- b. In (i) add "statistical" in front of "distribution".
- c. In (i), (ii), and (vi) change the discussion of fractures to permeability.
- d. In (ii) delete "such as...anomalies".
- e. In (iii), (iv), (v), and (vi) delete "in situ" and add at the end "by in situ, laboratory, and field tests and/or calculation as practicable".
- f. In (v) change "redox potential" to "equilibrium solubility sorption data for the waste package and radionuclides".

Rationale:

- a. If the volume of rock defined at the end of this section is the volume referred to in the first paragraph, it is impossible to assess all of these features throughout the volume (e.g., how can fracture patterns one km below the repository horizon be evaluated). Also, stating a minimum volume, without considering a site, is unrealistic. A detailed in situ determination of the properties discussed in (i) through (vi) of this subsection, to a depth of one km below the repository horizon could possibly compromise the integrity of the system by introducing potential pathways for fluid migration where none existed previously. What is pertinent to determine, by whatever means are available, is whether extensive confined aquifers occur below the repository level at depths which could be significantly affected by the waste repository. The depth of investigation should be determined by the regional geology.
- b. Mapping the entire volume is impossible.
- c. The term "fracture" tells nothing about the ability of the rock medium to affect waste transport, while permeability does.
- d. Some of the features mentioned such as breccia pipes and solution features may be less permeable than the surrounding rock.
- e. These items all specify in situ determination of properties. This is appropriate for many properties but some geomechanical (iii) and most geochemical (v) properties cannot practically be subject to "in situ determination". However, the "in situ properties" may be determined in the laboratory. The language needs to be clarified to allow this.

In addition, the type of testing and depth of data should be a function of parameter sensitivity (how much is warranted), uncertainty (is more data required), and ramifications (is data collection compatible with maintaining a sound structure).

By requiring in situ determinations in both host rock and surrounding confining units, NRC is requiring at least two, and perhaps many, test facilities to be constructed at each site. One facility will not be able to propagate thermal effects to surrounding rock units in a reasonable time frame. This appears to be an unreasonable requirement.

There should be some clarification here about ambient stress conditions. In situ determination is hard to do for the host rock, but impossible for the surrounding confining units. This should refer to calculational determination of ambient stress conditions.

Response of surrounding confining units to anticipated thermal loading cannot be measured, it can only be calculated. The time required for heat to reach surrounding confining units is very long and therefore it cannot be measured.

- f. Redox potential is not a unique property of the rock but is dependent on the geochemistry, the volume of fluid and the behavior of the waste package.

F. 60.122(b) POTENTIALLY ADVERSE CONDITIONS

1. NRC Proposed Wording:

The following paragraphs describe human activities or natural conditions which can adversely affect the stability of the repository site, increase the migration of radionuclides from the repository, or provide pathways to the accessible environment. The Department shall demonstrate whether any of the potentially adverse human activities or natural conditions are present. The Department shall document all investigations.

The presence of any of the potentially adverse human activities or natural conditions will give rise to a presumption that the geologic repository will not meet the performance objectives. The conditions and activities in this section apply, unless otherwise stated, to the volume of rock determined by the Department in Paragraph 60.122(a)(E) above.

Recommended Revision:

Replace "can adversely" with "may have the potential to".
Delete second paragraph.

Rationale:

Whether or not the stated conditions are actually of importance is a matter of speculation. The statement as written is without basis.

These conditions should not give rise to the stated presumption. The last paragraph of the section identifies ways to show how they may be acceptable. Also, 60.122(a)(E) is an incorrect reference as it refers to the entire area with a 100 km radius. Presumably (a)(9) is meant.

2. 60.122(b)(1)

NRC Proposed Wording:

Potentially Adverse Human Activities

- (i) There is or has been conventional or in situ subsurface mining for resources.

- (ii) Except holes drilled for investigations of the geologic repository, there is or has been drilling for whatever purpose to depths below the lower limit of the accessible environment.
- (iii) There are resources which are economically exploitable using existing technology under present market conditions.
- (iv) Based on a resource assessment, there are resources that have either higher gross or net value than the average for other areas of similar size in the region in which the geologic repository is located.
- (v) There is reasonable potential that failure of human-made impoundments could cause flooding of the geologic repository operations area prior to decommissioning.
- (vi) There is reasonable potential based on existing geologic and hydrologic conditions and methods of construction for construction of large-scale impoundments which may affect the regional ground water flow system.
- (vii) There is indication that present or reasonably anticipatable human activities can significantly affect the hydrogeologic framework. Human activities include ground water withdrawals, extensive irrigation, subsurface injection of fluids, underground pumped storage facilities or underground military activities.

Recommended Revisions:

- a. In (ii) delete everything after "purpose" and add "at depths which would adversely affect the subsurface repository volume".
- b. Delete (iv).
- c. In (vii) change to read "...activities that would alter the hydrogeologic framework in an unacceptable manner".

Rationale:

- a. Mines and boreholes which would not adversely affect the repository volume should not preclude the use of a site. Past drilling to above the repository horizon or outside

the horizontal extent of the subsurface workings does not impact the ability of the repository to isolate wastes. Known holes can be sealed and unknown holes are not known and therefore would not be considered.

- b. This philosophy places too much importance on resources which, as indicated in the general comments, results in a weak argument for proving safety. The nature of future resource needs is not readily predictable and constantly changes.
- c. Referring to 60.122(b)(1)(vii), it is conceivable that some future human activities can have little effect or actually improve the repository hydrologic framework. Ground water withdrawals from closed basins could eliminate a potential water transport capability. Of importance is the significance of the change to safety.

3. 60.122(b)(2)

NRC Proposed Wording:

- (i) There is evidence of extreme bedrock incision since the state of the Quaternary Period.
- (ii) There is evidence of dissolutioning, such as karst features, breccia pipes, or insoluble residues.
- (iii) There is evidence of processes in the candidate area which could result in structural deformation in the volume of rock such as uplift, diapirism, subsidence, folding, faulting, or fracture zones.
- (iv) The geologic repository operations area lies within the near field of a fault that has been active since the start of the Quaternary Period.
- (v) There is an area characterized by higher seismicity than that of the surrounding region or there is an area in which there are indications, based on correlations of earthquakes with tectonic processes and features, that seismicity may increase in the future.
- (vi) There is evidence of intrusive igneous activity since the start of the Quaternary Period.

- (vii) There is a high and anomalous geothermal gradient relative to the regional geothermal gradient.

Recommended Revision:

- a. General; these features mentioned are merely an inventory of natural processes going on almost everywhere. Whether or not they matter is part of the site selection procedure and the presumption that they do is a judgement made with bias. They should be deleted or a technical basis provided to support each.
- b. Clarify the meaning of "extreme" in (i).
- c. In (ii) replace "dissolutioning" with "dissolution". Insert "Quaternary" before "dissolution".
- d. In (iii) insert "Quaternary tectonic" before processes.
- e. In (iv) define "near field".
- f. Delete (v) or put an absolute level on seismicity.
- g. In (vi) delete "intrusive".

Rationale:

- b. The meaning of "extreme" is subject to wide-ranging interpretations. Moreover, this requirement rules out investigation into the source of the entrenchment and its present and anticipated state of activity. The requirement ought to allow the Department to demonstrate by analysis whether ground-surface lowering could adversely affect the repository during the required containment period.
- c. The presence of dissolution features does not necessarily discredit a candidate site. In the case of salt domes the cap rock is a by-product of dissolution that may have occurred much earlier in geologic history and may presently be acting as an effective impermeable seal.

Evidence of dissolution, collapse, or similar features which resulted from Pre-Quaternary geologic processes that have since been inactive, should not by itself disqualify a site. Reasonable proof of stability during the Quaternary should be required and adequate.

- d. A time frame for these processes must be listed - otherwise all areas of the earth are "adverse".

- e. "Near field", in contemporary usage, applies to earthquakes. It is not meaningful to refer to the "near field of a fault". This criterion is important, and it should be addressed more clearly and directly.
- f. Increased seismicity is identified as a potentially adverse natural condition. Seismic activity can range from minor crustal adjustments to major disruptive events. Therefore, by simply noting that an increase in seismicity (with no qualification as to magnitude) is potentially a disruptive event involves faulty logic. In any case, seismicity effects on a repository must be considered in two time frames - during operation and after decommissioning. Effects on a repository vary greatly depending on the time frame. After decommissioning, seismicity may or may not be significant.
- g. Any igneous activity since the start of the Quaternary Period is more disqualifying than many factors listed in this section.

4. 60.122(b)(3)

NRC Proposed Wording:

- (i) There is potential for significant changes in hydrologic conditions including hydraulic gradient, average pore velocity, storativity, permeability, natural recharge, piezometric level, and discharge points. Evaluation techniques include paleohydrologic analysis.
- (ii) The geologic repository operations area is located where there would be long term and short term adverse impacts associated with the occupancy and modification of floodplains. (executive Order 11988).
- (iii) There is reasonable potential for natural phenomena such as landslides, subsidence, or volcanic activity to create large-scale impoundments that may affect the regional ground water flow system.
- (iv) There is a fault or fracture zone, irrespective of age of last movement, which has a horizontal length of more than a few hundreds of meters.

Recommended Revisions:

a. General:

The criteria listed are stated to be "technical" against which a license application can be reviewed. However, few criteria (and here hydrologic criteria are principally addressed) can possibly be called technical. The regulations heavily rely on qualified terms such as low hydraulic gradient, little hydraulic communication, long ground water residence time, long flow paths, or such phrases as "may effect the regional ground water flow system". Instead of (or perhaps in addition to) emphasizing these terms, the regulations should stress end products of waste isolation rather than a descriptive hydrogeologic narrative. For example, important products should be (a) estimates of acceptable risk afforded by specific radionuclide retention in a given geologic medium or comparisons between media, and (b) dose calculations under natural flow conditions and reasonable scenario variations. To understand these items, it is necessary to evaluate ground water flow paths and travel times plus radionuclide concentrations and distributions to the biosphere. The difference being the former is the end product while the latter are intermediate steps. Waste isolation is not assured by high or low gradients or long or short flow paths but rather by the response of the entire hydrogeologic and hydrochemical system of the host medium.

- b. In part (i) delete "average pore velocity" or change it to "seepage velocity". Also insert "adverse" before "changes".
- c. Delete part (iv) as written and replace with a criterion that addresses ground water conductivity.

Rationale:

- a. Pore velocity is not a uniquely defined term. Potential for change to improve the isolation capability is not adverse.
- b. No site is likely to be free of this sort of feature. If such "old" features exist, they should require detailed investigation to determine whether it functions as a ground water barrier or conductor, where in the ground water system it occurs, and how it may perturb the system.

- c. It is the existing hydrologic environment that will be the prime factor in assessing transport. The scenarios for change should not be considered more important than the existing conditions.

5. 60.122(b)(4)

NRC Proposed Wording:

The rock units between the repository and the accessible environment exhibit low retardation for most of the radionuclides contained in the radioactive waste.

Recommended Revision:

Delete this paragraph.

Rationale:

Unspecific terms such as "low retardation" and "most" make this useless as an adverse characteristic.

6. Textual Material Following 60.122(b)(4)

NRC Proposed Wording:

A presumption that the geologic repository will not meet the performance objectives can be rebutted upon showing that the presence of the potentially adverse condition does not adversely affect the performance of the geologic repository. In order to make this showing, the Department shall first demonstrate that--

- (1) The potentially adverse human activity or natural condition has been adequately characterized, including the extent to which the particular feature may be present and still be undetected taking into account the degree of resolution achieved by the investigations;
- (2) The effect of the potentially adverse human activity or natural condition on the geologic framework, ground water flow, ground water chemistry and geomechanical integrity has been adequately evaluated using conservative analyses and assumptions, and the evaluation used is sensitive to the adverse human activity or natural condition;
- (3) The effect of the potentially adverse human activity or natural condition is compensated by the presence of favorable characteristics in Paragraph 60.122(c) of this Section; and

- (4) The potentially adverse human activity or natural condition can be remedied during construction, operation, or decommissioning of the repository.

Recommended Revision:

Change the first paragraph to:

In order to make a showing that any potentially adverse condition does not adversely affect the performance of the geologic repository, the Department shall first demonstrate that--; and put all of this material before 60.122(b)(1).

Rationale:

See Major Comments.

G. 60.122(c) FAVORABLE CHARACTERISTICS

1. General comment: This section should precede Potentially Adverse Characteristics and a basis for each characteristic should be provided.

2. NRC Proposed Wording:

Each of the following characteristics represents conditions which enhance the ability of the geologic repository to meet the performance objectives. Candidate areas and sites which exhibit as many favorable characteristics as practicable are preferred.

Recommended Revision:

Delete "Candidate areas and". Add "may" before "enhance".

Rationale:

The definition of candidate area (44FR60415) does not indicate the size of an area. DCE uses the term to describe an area on the order of 1000 square miles. It is not known whether or not the characteristics mentioned would enhance isolation in actual cases.

3. 60.122(c)(1)(i)

NRC Proposed Wording:

- (i) Exhibits demonstrable surface and subsurface geologic, geochemical, tectonic, and hydrologic stability since the beginning of the Quaternary Period; and

Recommended Revision:

Provide more guidance on what is meant by this criterion.

Rationale:

These are extremely vague terms. As stated, all areas affected by Pleistocene glaciation (including the periglacial zone) would be unsuitable for siting. That is not reasonable, and its probably is not the intent. Also, tectonically stable, meaning zero, does not exist.

Surface "stability" and near-surface hydrologic "stability" according to the definition in 60.2 are certainly not demonstrable since the beginning of the Quaternary Period. What is a more reasonable approach to surface geology and near-surface hydrology is the concept of acceptable ranges and rates of change. The surface and near-surface is the zone where rapid changes in earth processes take place. The changes which have occurred during the Quaternary Period can be evaluated and future changes predicted within limiting values. If it can be shown that changes which occur within these limiting values have no effect on repository safety, then "stability" of the processes need not be demonstrated.

We believe a revision of this item (i) should separate surface geology and near-surface hydrology from subsurface characteristics. Stability of subsurface geologic characteristics should be demonstrated. Surface characteristics and processes need to have limits or limiting ranges defined and evaluated. Hydrologic attributes need to be evaluated separately for the near-surface and for the deeper subsurface.

4. 60.122(c)(1)(ii)

NRC Proposed Wording:

- (ii) contains a host rock and surrounding confining units that provide:
- (a) long ground water residence times and long flow paths between the repository and the accessible environment;
 - (b) inactive ground water circulation within the host rock and surrounding confining units, and little hydraulic communication with adjacent hydrogeologic units due to ground water characteristics such as low intrinsic permeability and low fracture permeability of the rock mass; and

- (c) geochemical properties, such as reducing conditions which result in low solubility of radionuclides, and near-normal pH, or a lack of complexing agents.

Recommended Revision:

- a. In (b) change "inactive" to "negligible deep".
 b. Change (c) to "favorable geochemical properties".

Rationale:

- a. The term "inactive" requires an absolute lack of movement, and it implies that there must once have been movement. We are hopeful that candidate areas and sites will show evidence of there never having been significant ground water circulation in the vicinity of the host rock.
 b. It would be preferable to state the characteristics in terms of net geochemical performance, rather than specifying which part of the redox, pH, and complexing spectra is desirable. This could also include such items as low leachability and mobility of radionuclides.

It is not clear what is meant by "near-normal pH". Whatever conditions exist at the site prior to disturbance are, by definition, normal. If the authors mean "neutral pH", that is neither possible nor beneficial in rocks whose usual environment is acidic or basic. Furthermore, "neutral" pH contradicts "reducing conditions".

5. 60.122(c)(2)(iii)

NRC Proposed Wording:

- (iii) possesses ground water flow characteristics that--
- (a) result in a host rock with very low water content;
 - (b) prevent ground water intrusion or circulation of ground water in the host rock;
 - (c) prevent significant upward ground water flow between hydrogeologic units or along shafts, drifts, and boreholes;
 - (d) result in low hydraulic gradients in the host rock and surrounding confining units;

- (e) result in horizontal or downward hydraulic gradients in the host rock and surrounding confining units; and
- (f) result in ground water residence times under ambient conditions, between the repository and the accessible environment, that exceed 1000 years.

Recommended Revision:

- a. Delete (a).
- b. In (b) delete "ground water intrusion or". Add "rapid" before "circulation".

Rationale:

- a. Water content is not relevant, permeability and water movement are.
 - b. By definition ground water will be intruded into the rock. Also, some ground water movement, albeit slow, would be expected. Ground water movement at a rate which would result in insufficient isolation times are to be avoided.
6. 60.122(c)(2)(v)

NRC Proposed Wording:

"possess a low population density";

Recommended Revision:

Specify and explain why a low population density is necessary.

Rationale:

Low population density means different things to different people. As written this could lead to endless debate in a hearing. Note that population density and meteorological characteristics (vi) are not properties of the volume of rock as stated.

H. 60.132(a) GENERAL DESIGN REQUIREMENTS

1. 60.132(a)(1) Compliance with Mining Regulations

NRC Proposed Wording:

The Department shall design, construct and operate the surface and subsurface facilities to comply with all applicable Federal and state mining regulations including Subchapters D, E, and K of 30 CFR Part 57 as applicable.

Revision:

Delete

Rationale:

This paragraph is not appropriate in an NRC regulation. There is some question whether an underground civil structure is a mine. This regulation refers to it as a "civil engineered structure". This question will be resolved by DOE and MSHA. If it is determined that MSHA rules are applicable, they will be enforced by MSHA and the NRC paragraph adds nothing. If MSHA determines that their rules are not applicable, the NRC would be in the position of enforcing another agency's rules which that agency says are not applicable.

It should also be noted that mine safety regulations may, in some cases, be incompatible with safe repository operation. For example, reversing air flow direction in the case of a fire would bypass the ventilation exhaust filters. These cases need to be worked out among the applicable regulatory agencies to avoid conflicting objectives.

2. 60.132(a)(1)(i)(a)

NRC Proposed Wording:

Prevent the accumulation of radioactive material in those systems to which access by personnel is required.

Recommended Revision:

Change "Prevent" to "minimize"

Rationale:

In general it is impossible to prevent slight accumulation of radioactive material, but proper design can minimize it.

I. 60.132(b) ADDITIONAL DESIGN REQUIREMENTS FOR SURFACE FACILITIES

1. 60.132(b)(2)

NRC Proposed Wording:

The Department shall design and construct surface facilities to facilitate safe and prompt retrieval of wastes including facilities to inspect, repair, decontaminate, and store retrieved wastes prior to their shipment off site. Surface storage capacity of all enclosed waste is not required, but must be sufficient to handle waste backlogs prior to shipment offsite.

Recommended Revision:

Delete "and construct"

Rationale:

We agree that designs should exist for facilities required to retrieve waste to assure that they are properly integrated into the overall design. However, the actual construction of facilities that will not be used for several years and in all probability may never be used.

J. 60.132(c) ADDITIONAL DESIGN REQUIREMENTS FOR SUBSURFACE FACILITIES

1. 60.132(c)(1)

NRC Proposed Wording:

The Department shall design the underground facility as an underground civil engineered structure that satisfies requirements for structural performance, control of groundwater movement and control of radionuclide transport. The Department shall design the facility to provide for safe operation during construction, emplacement, and retrieval of waste and to assure compliance with 60.111 (Performance Objectives).

Recommended Revision:

This paragraph should be revised to indicate what is meant by an underground civil engineered structure and reference the requirements for structural performance that are mentioned.

Rationale:

Clarity.

2. 60.132(c)(2)(iv)(a)

NRC Proposed Wording:

The shafts and boreholes are sealed along their entire length as soon after they have served their operational purpose as is practicable.

Recommended Revision:

Delete

Rationale:

This paragraph would seem to contradict 60.111(a)(3) which indicates that the option must exist to leave the shafts open for 50 years after they have served their operational purpose. The time at which boreholes and shafts are to be sealed should be determined as part of the licensing process between issuance of the License and Decommissioning.

3. 60.132(c)(2)(iv)(b)

NRC Proposed Wording:

The sealed shafts and boreholes provide a barrier to radionuclide migration which is at least equivalent to the barrier provided by the undisturbed rock.

Recommended Revision:

The sealed penetrations such as boreholes and shafts provide a barrier such that radionuclide migration from all penetrations is sufficiently low so that acceptable consequences are not exceeded when penetration migration potentials are added to all other repository release potentials. The margin of safety applied to determine acceptable seal performance shall be determined on a site-by-site basis.

Rationale:

The criteria should relate to repository performance, not the undisturbed rock properties. This criterion could, in the extreme, lead to rejection of rock with very low permeability because seals could not be developed to match the rock.

4. 60.132(c)(2)(vi)(c)

NRC Proposed Wording:

The Department shall design the underground facility to include engineered barriers which protect the waste package from (1) natural events and processes, (2) in situ stresses, (3) chemical attack, and (4) groundwater contact. The Department shall determine the location of the barriers by proper engineering analysis and in situ testing. The Department shall include in the design--

Recommended Revision:

Delete

Rationale:

This section calls for reduced creep deformation in the host rock and consequent reduced deformation in the waste package. This implies that reduced deformation would enhance long term isolation which probably is not true. Highly plastic materials, such as salt, possess excellent long term isolation capabilities precisely because they do creep at a high rate, thus closing the voids in the repository that would otherwise act as preferential pathways for the radionuclides to reach the accessible environment. Creep must be accommodated for in the design, not simply "reduced" as this section stipulates.

5. 60.132(c)(3)

NRC Proposed Wording:

The Department shall design the underground facility to facilitate retrieval of waste in accordance with §60.111(a)(3). To accomplish this the Department shall design the underground facility to assure structural stability of openings and minimize ground water contact with the waste packages and design an emplacement environment that otherwise promotes waste recovery without compromising the ability of the geologic repository to meet the performance objectives.

Recommended Revision:

Delete second sentence.

Rationale:

This requirement to assure structural stability of openings appears to assume no backfill during the retrieval period. See major comment on retrievability. The regulation should state the requirement (first sentence). The Department will design to meet it and NRC should review the design for adequacy.

6. 60.132(c)(4)(i)

NRC Proposed Wording:

The Department shall design subsurface openings to assure stability throughout the construction, operation, and retrieval periods. If support systems and structures are required for stability, the Department shall design them to be compatible with long-term deformation characteristics of the rock and to allow for subsequent placement of backfill.

Recommended Revision:

Delete retrieval periods.

Rationale:

See previous comment.

7. 60.132(c)(5)

NRC Proposed Wording:

Lining of Subsurface Excavations

The Department shall line subsurface excavations in areas that require:

- (i) A positive control of water or gas inflow from aquifers or other porous zones;
- (ii) Support for zones of weak or fractured rock;
- (iii) Anchorage for equipment or hardware.

Recommended Revision:

Delete

Rationale:

This paragraph would, presumably, eliminate alternate technologies to lining, even when alternatives may prove suitable and cost effective. In some cases, lining may be particularly undesirable. For example, adequate anchorage is possible in competent rock without lining. Further, this criterion should consider any consequences of lining or requirements for sealing. If the statement is required at all, it should simply state that: "Engineered control procedures should be used in any areas that require..."

8. 60.132(c)(6)

NRC Proposed Wording:

Shaft conveyances used in waste handling

- (i) The Department shall consider shaft conveyances as a system important to safety.
- (ii) The Department shall design hoists with mechanical geared lowering devices that preclude cage free fall.
- (iii) The Department shall design hoists with a reliable cage location system that provides direct signals from all levels in the shaft. The Department shall design and construct final unload points which are controlled and verified by local position detectors.

- (iv) The Department shall design shaft loading and unloading systems with a reliable system of interlocks that will fail safely upon malfunction. The Department shall include in the design two independent indicators to indicate whether waste packages are in place, grappled, and ready for transfer.

Recommended Revision:

- a. Insert "Radioactive" before "waste" in the title.
- b. Insert "used to transport radioactive wastes" before "as" in (i).
- c. Delete "with mechanically geared lowering devices" in (ii).

Rationale:

- a3c. It should be clear that these requirements do not apply to the waste rock hoists.
 - c. Although the prevention of free fall is an important design goal, there is no reason at this time to restrict the technology method for achieving it.
9. 60.132(c)(7)(ii)

NRC Proposed Wording:

The Department shall insure that the contact between lining and the rock surrounding subsurface excavations does not jeopardize repository containment by providing a preferential pathway for ground water or radionuclide migration.

Recommended Revision:

Delete all after "containment".

Rationale:

A preferential pathway may or may not jeopardize repository containment.

10. 60.132(c)(9)

NRC Proposed Wording:

Compacted Backfill Test Section

To verify performance requirements intended in the design the Department shall establish, before any backfill placement is

initiated, a program for placement, sampling, and testing of the backfill section. If the result of testing and observations made at the test section are different from the original design intent, then the Department must analyze the need for changes and report the recommended changes to the Commission.

Recommended Revision:

Delete "Compacted" from the title.

Rationale:

It presupposes that compaction is the best method. One might want to use material that would expand upon being wetted. Most backfill may not be compacted.

11. 60.132(c)(9)(v)

NRC Proposed Wording:

If aquifers or water-bearing structures are encountered during construction then the Department must use pregrouting in advance of excavation.

Recommended Revision:

Delete

Rationale:

Pregrouting in advance of excavation is only one of several engineering solutions to water inflow problems. Others include freezing and lining and temporary dewatering with short boreholes from within the excavation. In the case of repositories, pregrouting may be particularly unattractive because the grout may eventually reduce the effectiveness of backfilling and repository sealing. This paragraph should be removed from the regulations entirely. The method for handling water is a normal design consideration.

K. 60.132(d) GENERAL DESIGN REQUIREMENTS FOR CONSTRUCTION

1. 60.132(d)(1)(ii)

NRC Proposed Wording:

The Department shall coordinate the design of the geologic repository with site characterization activities to assure that

boreholes necessary for site characterization are located at future positions of shafts or large unexcavated pillars.

Recommended Revision:

Delete

Rationale:

Requiring boreholes for site characterization to be located at positions of future shafts or pillars is desirable but too restrictive for all cases. This restriction may cause important geologic information to be missed during investigation. For example, (1) it may be desirable to drill a boring away from the shaft area to further examine anomalous conditions in a geophysical survey or (2) inclined boreholes may provide significant geologic information but tunnels or shafts may not be constructed around these boreholes. Also a deep borehole cannot be controlled well enough to provide this assurance.

In any event, it should be made clear that this section deals only with deep boreholes that penetrate the host rock or other rocks important to isolation. It does not necessarily apply to shallow hydrologic boreholes.

2. 60.132(d)(1)(iii)

NRC Proposed Wording:

If critical host rock and other site specific design assumptions cannot be verified from boreholes, geophysical measurements, and/or an exploratory shaft and initial excavation, then the Department must establish a pilot program to further characterize the entire volume to be occupied by the underground facility and to verify critical host rock and site specific design assumptions prior to design finalization and waste emplacement.

Recommended Revision:

Clarify the timing of this pilot program.

Rationale:

We assume that this additional characterization is to be performed following the CA, concurrent with repository development.

3. 60.132(d)(3)NRC Proposed Wording:Excavation Techniques

The Department shall assure that methods used for excavation will neither create a preferential pathway for ground water or radioactive waste migration, nor increase the potential for migration through existing pathway. The Department shall use to the extent practicable mechanical excavators, boring machines and other non-blasting methods. If blasting is required for excavation, the Department must use methods specifically designed for each phase of the work that minimize fracturing of the surrounding rock. In this program the Department may include the use of pilot bores and tunnels and delay systems designed to minimize the amount of explosives detonated simultaneously. If blasting is utilized the Department must utilize controlled perimeter blasting such as the smooth blasting or preshearing techniques and cushion.

Recommended Revision:

Delete all after the first sentence.

Rationale:

The regulation should only state the criterion not the techniques used to meet it.

L. 60.132(e) RECORDS AND REPORTING REQUIREMENTS1. 10 CFR 60.132(e)(3) Retention of Cores and LogsNRC Proposed Wording:

The Department shall retain on site, until decommissioning, all cores from all exploratory borings drilled during site selection, site characterization, construction, and operation. The Department shall store the cores in durable boxes housed in weather-proof building. The Department shall arrange the cores to be readily available for inspection. The Department shall store in the same area logs of the borings, including geophysical logs.

Recommended Revision:

Change first sentence to: The Department shall retain until decommissioning, representative cores from exploratory

borings drilled at the site during site characterization, construction, and operation.

Rationale:

The requirement, as written, is unrealistic. During the course of the national site characterization and selection program, tens of miles of cores will be generated from all over the United States. There is no obvious utility in storing a core from a salt dome in Mississippi at a basalt repository in Washington, or vice versa. If a regional repository program were to be initiated, it would be impossible to store all cores at all repositories. In addition, it is common, and necessary, to send portions of cores to laboratories for testing. Such testing may be destructive and therefore that portion of the core cannot be stored in accordance with the requirement. The staff should review this paragraph to determine what is really required.

M. 60.133 WASTE PACKAGE AND EMPLACEMENT ENVIRONMENT

1. 60.133(a)

NRC Proposed Wording:

General Requirements. The Department shall insure...

Recommended Revision:

General Requirements. The requirements of this section are applicable only to H.W. The Department shall insure...

2. 60.133(a)(2)

NRC Proposed Wording:

Provide reasonable assurance that the in situ chemical, physical, and/or nuclear properties of the waste package and/or its interactions with the emplacement environment will not compromise the function of the waste packages. Supporting analyses shall include, but not be limited to, evaluation of the following factors: solubility, chemical reactions, corrosion, gas generation, thermal effects, mechanical strength, mechanical stresses, radiolysis, radiation damage, nuclide retardation, leaching, fire and explosion hazards, thermal loads, and synergistic interactions.

Recommended Revision:

Change "synergistic" to "adverse".

Rationale:

Synergistic interactions may not always be unfavorable.

3. 60.133(b)(3) Free Liquids

NRC Proposed Wording:

The waste package must contain no free liquids.

Recommended Revision:

Change "must not contain free liquids in amounts that could 1) impair the structural integrity of waste package components due to chemical interactions or formation of pressurized vapor, or 2) result in spillage and the spread of contamination in the event of package perforation".

Rationale:

In the case of spent fuel, it is not apparent how the presence of free liquids could be detected, how they could be removed, or what harm they could cause. In any case, an indication of what must be protected against should be provided.

4. 60.133(c)(1)

NRC Proposed Wording:

Physical Dimensions and Weight. Each container has been designed and fabricated to permit safe handling at the repository during operations and if necessary, during retrieval prior to repository decommissioning.

Recommended Revision:

Change "has been" to "shall be"

Rationale:

Editorial.

N. 60.137 MONITORING PROGRAMS1. NRC Proposed Wording:

The Department shall initiate a system of monitors during site characterization. The Department shall maintain and supplement these monitors, as appropriate, throughout the period of institutional control. The Department shall design the monitoring systems to verify that the performance objectives of Section 60.111 are being achieved.

Recommended Revision:

Change "throughout the period of institutional control" to "until repository closure".

Rationale:

Most of the monitoring performed during repository operation is not appropriate after closure (e.g., 60.132(c)(2)(vii)(b)). Post closure monitoring is a different subject altogether and should be treated separately from preclosure monitoring. Perhaps it is too early to develop a regulatory requirement for post closure monitoring.

2. 60.137(b)NRC Proposed Wording:

They provide baseline information on those parameters and natural processes pertaining to the safety of a candidate site that may be caused by site characterization activities.

Recommended Revision:

Clarify

Rationale:

The meaning of this item is not clear. Is it the intent to measure base line information on parameters and processes which may be disturbed by characterization activities?

Since NRC is requiring multiple sites be characterized, these monitoring requirements are excessive. At best, monitoring of key parameters should continue on a site selected for the repository and not on all "banked" sites.

D'APPOLONIA

CONSULTING ENGINEERS, INC.

RECEIVED

JUN 19 1980

LYNN E. MYERS

Richard D. Ellison
EXECUTIVE VICE PRESIDENT

June 18, 1980

Mr. L. B. Myers
Office of Nuclear Waste Isolation
505 King Avenue
Columbus, Ohio 43201

Dear Mr. Myers:

Enclosed are our Priority I comments (listed on Table I) to the draft NRC regulations for HLW repositories. Priority I means that we feel that the issue is very important and that it will be very important that changes be made.

Tomorrow, we will mail our Priority 2 comments. Those comments are also important and should be considered. However, if changes in Priority 2 items are not accomplished, the impact will not be nearly as severe.

We would be pleased to provide any clarifications to our comments that you may request.

Very truly yours,



Richard D. Ellison

RDE:se
Enclosures

TABLE I

Priority I Comments

General

60.111(a)(2)

60.111(a)(3)

60.111(c)(2)(ii)

60.111(c)(3)(i)

60.111(c)(3)(ii)

60.111(c)(4)(iii)

60.122(b)

60.122(b)(1)(ii)

60.122(b)(1)(iii)

60.132(a)(3)(ii)

60.132(c)(2)(iv)(a)

60.132(c)(2)(iv)(b)

60.132(c)(3)

60.132(c)(7)(iii)

60.132(c)(9)(v)

60.135

PRIORITY I ISSUE
[GENERAL]

Subject of Comment:

General--The entire Draft of 10CFR60.

Comment:

The document represents a comprehensive effort with consideration of the multiple geoscience, health safety and engineering disciplines involved. It emphasizes the need of overall public safety concerns regarding radioactive waste disposal, while generally recognizing the realistic fact that absolute isolation may not be assured or necessary. The document attempts to address fairly comprehensively major criteria for siting, design and decommissioning of repositories. A few significant reservations on the overall document are expressed below, while comments on specific sections are discussed separately.

The statement of overall performance objectives is an essential first step in the development of any design criteria. However, the draft tends to intermix the overall objectives with delineation of specific methods on how to achieve these objectives. Such specifications are not necessary at this time and will inhibit the development of alternative design approaches based upon extensive R&D activities and site specific investigations. For instance, requirement of minimum 1,000 year migration period through a geologic media [60.111(c)(4)(iii)], probably would not affect most repository sites. However, there may be sites which have extremely low potential for any release to occur that would not completely meet the 1,000-year criterion. Each site should be judged on its total merits. Another example relates to the designation that the waste package contain radionuclides for at least the first 1,000 years. This could be stated as a general goal, but allowance should be made for consideration of a shorter period if the Department can show some repository sites to have geologic barrier conditions that can confidently be relied upon during the first 1,000 years. If the NRC feels that

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example specifications must be included, there should be clear designations that alternatives will be acceptable if the Department demonstrates that overall performance objectives are met.

In summary, it is recommended that all quantitative specifications related to radionuclide release be eliminated or qualified as being goals only. The final acceptance or rejection should always be based on a comparison of predicted release rates with established EPA radiation standards.

Also, comment is appropriate for absolute or extreme terms such as "all," "optimum," "minimum," "maximum," "most severe," and "too complex" that are used in many locations in the draft. It is suggested that use of these terms be reexamined to make sure that an unnecessarily rigid position is not taken that will lead to future controversies in design development and licensing. For instance, the requirement to design against "most severe" geologic event [60.132(a)(3)(ii)] is impossible to meet, since literally the absolute most severe geologic event possible at any site would be eruption of a volcano or displacement due to faulting. In reality, however, the probability of occurrence of these events is so small as to make them unimportant to overall objectives.

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PRIORITY I ISSUE
[60.111(a)(2)]

Subject of Comment:

60.111(a)(2) Releases after decommissioning. "The Department of Energy shall provide reasonable assurance that after decommissioning the geologic repository will isolate radioactive wastes to such a degree that quantities and concentrations of radioactive waste in the accessible environment will conform to such generally applicable environmental standards as may have been established by the Environmental Protection Agency."

Comment:

This statement is very reasonable and discussions at meetings with many scientific contributors indicate general concurrence that releases should conform to generally applicable environmental standards.

It is noted here, that this same approach should also be taken relative to determination of the adequacy of penetration seals [Section 60.132(c)(2)(iv)(b)]. At the recent International Meeting on Penetration Sealing (May 7-9, 1980 in Columbus, Ohio) it was a consensus that required performance of seals should be measured in terms of potential nuclide release rates vs allowable standards; as opposed to relating potential seal behavior to undisturbed rock behavior.

INTERNATIONAL

PRIORITY I ISSUE
[60.111(a)(3)]

Subject of Comment:

60.111(a)(3) Retrievability. "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, if the geologic repository operations area has not been decommissioned. If during this period a decision is made to retrieve the wastes the Department shall insure that wastes could be retrieved in compliance with Part 20 of this Chapter and in about the same period of time as that during which they were emplaced."

Comment:

As an initial comment, the above statement about retrievability can be confusing. It states fairly positively that the waste must be retrievable for 50 years after termination of operations if the area has not been decommissioned. However, the statement does not address retrievability if the area is decommissioned. Also, what are the conditions which can lead to decommissioning of an area? This confusion should be resolved in the final regulations.

Possibly of even greater importance, the period of 50 years after termination of operations appears to be very excessive. It is reasonable that the Department and the Commission have some time after waste placement to determine by monitoring that conditions are acceptable for decommissioning without providing special efforts to permit future retrieval. However, the major effort during backfilling and decommissioning should be to maximize long term adequacy of the repository. Trying to maintain a retrievable condition for the operating life plus 50 years could in-and-of-itself reduce the safety of the repository by causing undesirable rock stresses and movements. This will be important in salt because of natural creep closure. It also may be very important in other rocks which will crack, causing additional potential flow paths, if the voids are not backfilled in a reasonable period.

DEPARTMENT OF ENERGY

The actual time required for retrieval should be set on a site by site basis depending on conditions at that site and the overall repository design. It would be reasonable to request a minimum retrievable period for the first several years of operation when monitoring is being accomplished. A reasonable time frame would be 5 to 10 years for the first portion of a repository. Then at that time, the Department and Commission should develop a final decommissioning plan for all future areas of the repository.

It is worthy to note that the regulations are requiring engineered waste packages which will last for many more than 50 years. On that basis, retrievability would always be possible for at least 50 years if some extreme condition occurred. The cost would be very high, but that very small risk is justified by having a decommissioned system that tends to maximize long term storage safety.

In closing, the Commission is urged to not close on this issue with an extreme 50 year position until all of the ramifications of such a decision are understood.

INTERNATIONAL

PRIORITY I ISSUE
[60.111(c)(2)(ii)]

Subject of Comment:

60.111(c)(2)(ii) "Containment of all radionuclides for the first 1,000 years after decommissioning of the geologic repository operations area and as long thereafter as is reasonably achievable, assuming expected events and processes and that some of the waste dissolves soon after decommissioning."

Comment:

On the basis of Section 60.111(a)(2) the geologic system should not have to contain all radionuclides under all possible conditions. Instead, the level of escape should be within an acceptable standard. Also, it does not appear appropriate to consider "expected" geologic events in this connotation.* Instead, one should consider the probability of events occurring during this relatively short geologic period and the consequences of the events. The resulting risk (determined by considering the probability of the event, the probability of waste dissolution, and the probability of intersection of the event and dissolved waste) should be less than the acceptable standard.

*Note: If expected means the probability of event that could occur, or only those events with a high probability of occurrence for a given period, this definition should be incorporated into the Definitions section.

PRIORITY I ISSUE
[60.111(c)(3)(i)]

Subject of Comment:

60.111(c)(3)(i) "Starting 1,000 years after decommissioning of the geologic repository operations area, the radionuclides present in HLW will be released from the underground facility at an annual rate that is as low as reasonably achievable and is in no case greater than an annual rate of one part in one hundred thousand of the total activity present in HLW within the underground facility 1,000 years after decommissioning assuming expected processes and events."

Comment:

Relating the allowable release rates to the total activity in the repository is inappropriate. Using the arbitrary $\frac{1}{100,000}$ ratio could be either conservative or unconservative depending on the size of the site and repository conditions. Instead, the allowable release rate should be determined by the consequence or risk of the indicated release in relation to an acceptable standard. The consequence depends on the mode of potential release, concentration of contaminants, type of radioactive source, etc., in addition to the activity release rate. Risk will depend on the probability of potential events occurring. (Note: It is not appropriate to discuss "expected" geologic events in this situation.*)

*See footnote for Section 60.111(c)(2)(ii).

DEPARTMENT OF ENERGY

PRIORITY I ISSUE
[60.111(c)(3)(ii)]

Subject of Comment:

60.111(c)(3)(ii) "Starting at decommissioning radionuclides present in TRU waste will be released at a rate that is as low as reasonably achievable and is in no case greater than one part in one hundred thousand of the total activity present in TRU waste within the underground facility at the time of decommissioning assuming expected processes and events."

Comment:

[See the comments to Section 60.111(c)(3)(i).] The Commission should always limit releases so that consequences or risks are within acceptable standards. Arbitrary quantitative designations can not be appropriate for all repositories and all conditions. Also, geologic events are not "expected."* Instead, there is a probability of their occurrence during any designated time period.

*See footnote for Section 60.111(c)(2)(ii).

PRIORITY 1 ISSUE
[60.111(c)(4)(iii)]

Subject of Comment:

60.111(c)(4)(iii) "The Department shall provide reasonable assurance that the hydrologic and geochemical properties of the host rock and surrounding confining units will provide radionuclide travel times to the accessible environment of at least 1,000 years assuming expected processes and events."

Comment:

This objective is technically impractical. The travel time alone is only one consideration in determining the influence of nuclear waste release on public health. Other considerations include type, rate, concentration, total quantity of release, entry point to biosphere, mans use of biosphere, etc. As noted in comments on Sections 60.111(c)(3)(i) and (ii), the Commission should be consistent in limiting the consequence on risk of any release to accepted standards. Arbitrary quantitative designations without consideration of site specific conditions just do not make sense and can not be rationally defended. An appropriately designed repository will have varying requirements on engineered and geologic barriers, such that the net release to accessible environment is acceptable. Imposing an arbitrary travel time requirement could lead to discarding of some otherwise very attractive sites.

DISCONTINUED

PRIORITY I ISSUE
[60.122(b)]

Subject of Comment:

60.122 (b) Potentially Adverse Conditions. "The following paragraphs describe human activities or natural conditions which can adversely affect the stability of the repository site, increase the migration of radionuclides from the repository, or provide pathways to the accessible environment. The Department shall demonstrate whether any of the potentially adverse human activities or natural conditions are present. The Department shall document all investigations. The presence of any of the potentially adverse human activities or natural conditions will give rise to a presumption that the geologic repository will not meet the performance objectives. The conditions and activities in this section apply, unless otherwise stated, to the volume of rock determined by the Department in Section 60.112(a)(6) above."

Comment:

The impact of potentially adverse conditions is very much overstated by the statement that "the presence of any of the potentially adverseconditions will give rise to a presumption that the geologic repository will not meet the performance objectives." That statement is qualified at the end of Section 60.122(b) by allowing a rebuttal if it can be shown that the potentially adverse conditions does not adversely affect performance of the geologic repository. It is strongly recommended that this latter position be taken at the beginning of this section to avoid the process of first "disqualifying" and the "requalifying" sites. This could be accomplished by changing the above wording to state "The presence of any of the potentially adverse human activities or natural conditions will require demonstration by the Department that the conditions do not adversely affect repository performance within acceptable standards if the site is to be considered as a viable option." Example methods of demonstrations are included at the end of this section. (Another way to accomplish this would be to leave the

DISPROPORTION

adverse list out of the regulations entirely and state that it is the Department's obligation to show that the repository will perform adequately for all site conditions. This process will give better potential for selection of the best candidate sites in the United States.)

Finally, the volume considered for evaluation cannot possibly be the 100 km distance stated in Section 60.122(a)(8). It is assumed that this was a typographic error in the draft regulations. The correct reference for volume would appear to be Section 60.122(a)(9).

DISAPPROVED

PRIORITY I ISSUE
[60.122(b)(1)(ii)]

Subject of Comment:

60.122(b)(1)(ii) "Except holes drilled for investigations of the geologic repository, there is or has been drilling for whatever purpose to depths below the lower limit of the accessible environment."

Comment:

The requirement to consider all drilled holes as an "adverse" condition as defined in the draft regulations is unnecessarily restrictive. Certainly, borings several km from the site do not necessarily pose extreme problems in all cases. A primary example would be a salt dome where the boring is completely away from the dome.

Further, borings nearer to the site may be separated from the repository by an adequate barrier or they may be sealed--and all open borings can be reentered for cleaning and sealing. This statement should be eliminated entirely or restated to include only borings at locations which could adversely affect containment and if the boring is not accessible for sealing.

DDA/PD/DNLA

PRIORITY I ISSUE
[60.122(b)(1)(iii)]

Subject of Comment:

60.122(b)(1)(iii) "There are resources which are economically exploitable using existing technology under present market conditions."

Comment:

This item should refer to resource demands and alternate supplies and not just to its exploitability. For example, salt is a resource which could be exploited economically from many salt domes and bedded salt areas. However, that resource will not be exploited because of the abundance of salt. Therefore, use of a particular dome for waste disposal is a preferable use of that resource.

DEMPPIDINIA

PRIORITY I ISSUE
[60.132(a)(3)(ii)]

Subject of Comment:

60.132(a)(3)(ii) "The Department shall design and locate structures, systems and components important to safety to withstand the most severe of natural phenomena that are likely to occur at the site including seismic, meteorologic and hydrologic events without loss of capability to perform their safety function."

Comment:

It is assumed that this section deals with support facilities during the operations and not related to the repository after decommissioning. In that event, it is noted that the issue of designing nuclear facilities for natural events such as earthquakes has been debated for two decades. The proposed wording is sufficiently subjective to initiate a new series of debates to define "most severe," "likely to occur," and "safety function." It appears more logical for the Commission to adopt the "operating basis" and "safe shut down basis" events presently used for nuclear power plants as given in 10CFR100 Appendix A. The analyses procedures are understood and accepted. Also, they should not be highly controversial for repositories because they usually will not be sited in high risk areas and/or the number of safety related facilities are relatively limited.

EDWARDS

PRIORITY I ISSUE
[60.132(c)(2)(iv)(a)]

Subject of Comment:

60.132(c)(2)(iv)(a) "The shafts and boreholes are sealed along their entire length as soon after they have served their operational purpose as is practicable;"

Comment:

Justification for not initially sealing the entire length could include:

- Only certain locations along penetrations are critical to seal performance. Sealing of one or several critical locations could be satisfactory for interim sealing if reentry at a later time to complete the seal is assured.
- Partial seals in boreholes for a temporary period would allow for some monitoring or testing of the seal before the entire penetration is filled.
- Possibly of greatest importance, by only partially sealing a penetration initially it will be possible to complete the seal at a later time (possibly at the time of decommissioning) using the best techniques available at that time. Improved techniques will be developed by ongoing R and D programs and/or by sealing activities of other repositories.
- In the case of shafts and tunnels, it may be desirable to temporarily leave a condition which permits reentry if desirable for future overall operational changes.

ONWI and the BWIP programs are both sponsoring major multiyear contracts to develop acceptable criteria for the materials, installation, and performance of penetration seals. Preliminary results (ONWI-55 and ONWI-90), show the potential benefits stated above for only partial sealing initially. The desirability and technical requirements for temporary partial sealing will be extended to firm, fully justified recommendations during the next several years of these ongoing investigations.

IDENTIFICATION

To account for the Commission's objective to assure that penetrations are sealed and yet leave room for improved procedures resulting from extensive generic and site-specific design efforts, the following wording is recommended for this section.

"Penetrations such as boreholes, shafts, and access tunnels shall be sealed along their entire length as soon as practicable after they have served their operational purpose, unless the Department provides procedures for only partially sealing any penetration initially, and has acceptable procedures for completing the seal prior to decommissioning. Justification for partial sealing will only be if there is a real potential for reentry into the penetration or if a substantial benefit from future advanced sealing technology is anticipated. In all cases where partial sealing is planned, the Department must demonstrate that the unsealed portion of the penetration will be preserved in an accessible condition and that all sealing will be completed at the time of decommissioning."

It is recommended that the extent and timing and extent of sealing be incorporated in repository and seal designs and that the NRC criteria reflect this recommendation.

PRIORITY 1 ISSUE
[60.132(c)(2)(iv)(b)]

Subject of Comment:

60.132(c)(2)(iv)(b) "The sealed shafts and boreholes provide a barrier to radionuclide migration which is at least equivalent to the barrier provided by the undisturbed rock."

Comment:

The report ONWI-55 (Office of Nuclear Waste Isolation, "Repository Sealing Design Approach - 1979") discussed the following alternative design goals for penetration seals.

1. Flow of permeant through the seal zone should be no greater than the flow through a similar area of undisturbed host material.
2. Flow of permeant through the seal zone is small compared with the total flow over the entire repository area.
3. The concentration of any radionuclide escape is within an acceptable limit.
4. The radionuclide migration rate through the seal zone is always less by a specified factor of safety than an acceptable level determined by a consequence analysis.

The proposed draft regulation is similar to the first of these alternatives except that the seal function is related to blockage of radionuclide migration as opposed to permeant flow. ONWI-55 also concludes that radionuclide flow is the appropriate measure for evaluation of seal adequacy.

Arguments against either the proposed draft criterion as well as the first two ONWI-55 design goal alternatives are:

- They are not quantitatively related to the most fundamental objective of the repository, i.e., to mitigate the consequences of the stored waste to the biosphere.

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- With them it will not be possible to conclusively prove that the objective of the goal is ever met, except perhaps after long-term monitoring of the performance of the seals.
- The goal does not recognize time variations of the repository conditions and of the seal materials.

To these, one could add that the goal could result in the best host rock not being acceptable because it's very low permeability condition makes it much more difficult to satisfy sealing requirements according to the draft. In the limit, a very good repository could be disqualified even if extremely tight seals could be placed--if one could not demonstrate that the seal was exactly equivalent to the host rock in terms of radionuclide blockage.

ONR-55 recommends that the fourth design goal (see above) be accepted as a criterion for sealing. This goal is the most flexible and workable considering:

- The goal relates to acceptable release rates, thus requiring consideration of all site-specific conditions and institutional standards.
- It is expected that sealing investigations will show that sealing can be accomplished so that potential escape rates are very low. However, it may not be possible to positively conclude that escape rates at and near to a seal positively will be equal to or less than through a very good host material. Thus, the recommended goal does not unduly penalize (and possibly eliminate) the best host rock environments by requiring extreme sealing requirements, while much reduced sealing is required for less ideal host conditions.
- The use of a factor of safety (or some other similar reducing factor) permits the acceptable release level to be reduced as appropriate to account for the total number of penetrations, other potential release paths, any uncertainties in seal behavior or future events, and potential future reductions in institutional standards.

DAVIDSON

- The use of the factor of safety concept can permit consideration of time changes in repository and seal conditions, by assigning different factors for different time considerations.

Recognizing that the concepts of penetration sealing requirements will be greatly enhanced during the next several years, it is recommended that the draft regulations at this time be revised to permit the Commission and Department to agree upon the best solution when actual seal designs are being developed. The following wording is suggested.

"The sealed penetrations such as boreholes and shafts provide a barrier such that radionuclide migration from all penetrations is sufficiently low so that acceptable consequences are not exceeded when penetration migration potentials are added to all other repository release potentials. The margin of safety applied to determine acceptable seal performance shall be determined on a site-by-site basis."

DEPARTMENT OF ENERGY

PRIORITY I ISSUE
[60.132(c)(3)]

Subject of Comment:

60.132(c)(3) "Design to facilitate retrieval of waste. The Department shall design the underground facility to facilitate retrieval of waste in accordance with Section 60.111(a)(3). To accomplish this, the Department shall design the underground facility to assure structural stability of openings and minimize groundwater contact with the waste packages and design an emplacement environment that otherwise promotes waste recovery without compromising the ability of the geologic repository to meet the performance objectives."

Comment:

[See comments to Section 60.111(a)(3).] It is apparent that much additional discussion and evaluation is required before the Commission can give an absolute quantitative requirement for retrievability. It may be that there are several types of retrievability; i.e., "with direct access" before backfilling which would apply for a short period; and "technically feasible but with remining" for some longer period after backfilling. However, the backfilling would be accomplished using procedures aimed primarily at the long term isolation goal. It does not make sense to jeopardize long term isolation of an entire repository simply to achieve an excessive period for "direct access" retrievability.

PRIORITY I ISSUE
[60.132(c)(7)(iii)]

Subject of Comment:

60.132(c)(7)(iii) "During repository construction and operation the Department shall conduct a continued program of surveillance, testing, measurement, and geologic mapping to ensure that design parameters are verified and to provide additional data to confirm the isolation and containment characteristics of the seals and the underground facility. The Department shall measure and monitor changes in subsurface conditions on a regular basis."

Comment:

As with all underground construction activities, it must be anticipated that changed conditions will be encountered from time to time that may require that revisions be made to design parameters and construction techniques. It will be of major benefit to repository schedules and costs if the regulations include a mechanism for making the changes that will not change the overall intent of the repository without disrupting operations. Section 60.132(c)(7)(iii) appears to be an appropriate location to introduce this concept. A suggestion is to modify the wording as follows: ".....that design parameters are verified or appropriate changes made to suit actual field conditions, and to provide data....."

IDENTIFICATION

PRIORITY I ISSUE
[60.132(c)(9)(v)]

Subject of Comment:

60.132(c)(9)(v) "If aquifers or water bearing structures are encountered during construction then the Department must use pregrouting in advance of excavation."

Comment:

Pregrouting in advance of excavation is only one of several engineering solutions to water inflow problems. Others include freezing and lining and temporary dewatering with short boreholes from within the excavation. In the case of repositories, pregrouting may be particularly unattractive because the grout may eventually reduce the effectiveness of backfilling and repository sealing. This paragraph should be removed from the regulations entirely. The method for handling water is a normal design consideration.

PRIORITY I ISSUE
(60.135)

Subject of Comment:

60.135 "The Department shall design and construct the geologic repository operations area to permit retrieval of all waste packages, mechanically intact, if retrieval operations begin within 50 years after all of the waste has been emplaced and if the geologic repository has not been decommissioned. The design of the geologic repository operations area shall provide for retrievability of the waste within a period of time that is about the same as that in which it was emplaced."

Comment:

It is again noted that the retrieval/decommissioning situation in the draft regulations is confusing and probably not appropriate. [See comments to Sections 60.111(a)(3) and 60.132(c)(3).]

D'APPOLONIA

CONSULTING ENGINEERS, INC.

RECEIVED

JUN 20 1980

LYNN B. MYERS

Richard D. Ellison
EXECUTIVE VICE PRESIDENT

June 19, 1980

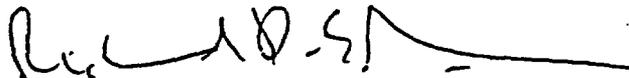
Mr. L. B. Myers
Office of Nuclear Waste Isolation
505 King Avenue
Columbus, Ohio 43201

Dear Mr. Myers:

Enclosed are our Priority II comments (listed on Table II) to the draft NRC regulations for HLW repositories. We do not want to diminish their value because we hope that these changes are made. However, the Priority I issues sent to you yesterday appear to be most critical.

Our review comments resulted from a variety of our personnel working for ONWI and for other repository activities. Accordingly, I am going to bind our comments so that each of our people will have a copy for review and their files. I will send you one of those bound copies so that you will have a complete record of D'Appolonia suggestions.

Very truly yours,



Richard D. Ellison

RDE:se
Enclosures

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TABLE II
Priority II Comments

Pg. 31396 Considerations

60.2 Definitions

60.101(e)

60.111(c)(1)

60.122(a)(2)(i)

60.122(a)(6)

60.122(a)(9)

60.122(a)(9)(v)

60.122(b)(1)(ii)

60.122(b)(2)(v)

60.122(b)(3)(i)

60.122(b)(3)(ii)

60.122(c)(1)(ii)(c)

60.132(c)(2)(i)

60.132(c)(2)(ii)

60.132(c)(2)(v)

60.132(c)(4)(ii)

60.132(c)(5)

60.132(c)(6)(ii)

60.132(d)(1)(ii)

PRIORITY II ISSUE
[CONSIDERATIONS (1)]

Subject of Comment:

Pg. 31396 Considerations (1) Systems Approach. "The term.....decision bases.

"It is evident that for a geologic repository, the geologic setting must be one barrier. In considering whether there should be other barriers, a key question which needs to be answered is whether it is prudent, in view of the nature of the problems and the uncertainties involved; to rely on the geologic setting alone to accomplish the functions stated above. The state-of-the-art in the earth sciences is such that all of the uncertainties associated with these functions cannot be resolved through consideration of the geologic setting.

"It is appropriate.....medium and site."

Comment:

This comment may not require any action by the NRC, but is made to possibly avoid future confusion. The thought presented in this paragraph indicates that the geologic setting can provide only one barrier. At the same time, however, ONWI is performing studies to see if sites can be located which have multiple natural barriers--i.e., where the geologic setting provides more than one barrier. It would appear to be potentially beneficial for the Department and Commission to concur on this concept. That concurrence should also have some effects on how the Commission treats undesirable quantitative specifications which presently cover all sites.

PRIORITY II ISSUE
(60.2)

Subject of Comment:

60.2 Definitions.

Comment:

Definitions of the terms "saturated media", "site", "institutional control", and "module" should be added.

Subject of Comment:

60.2 "Decommissioning--means final backfilling of subsurface facilities, sealing of shafts, and decontamination and dismantlement of surface facilities."

Comment:

Change of "...sealing of shafts..." to "...sealing of penetrations such as shafts..." is recommended.

PRIORITY II ISSUE
[60.101(e)]

Subject of Comment:

60.101(e) "The requirements and conditions in subsequent sections assume that disposal will be in saturated media. The Commission does not intend to exclude disposal in the vadose zone or any other method by promulgating these criteria; however, different criteria may need to be developed to license other disposal methods."

Comment:

Without a definition of saturated media, the statement is not very precise and will have different meanings to different persons. For example, does the term "saturated media" mean that the host is within a continuous water table condition or does it simply imply "below the water table."

PRIORITY II ISSUE
[60.111(c)(1)]

Subject of Comment:

60.111(c)(1) Waste Packages. "The Department shall design waste packages so that there is reasonable assurance that radionuclides will be contained for at least the first 1,000 years after decommissioning and for as long thereafter as is reasonably achievable given expected processes and events as well as various water flow conditions including full or partial saturation of the underground facility."

Comment:

The general purpose of the 1,000 year designation appears reasonable based upon radionuclide decay rates and desired redundancy with the isolation provided by the geologic system. However, it seems premature at this time to absolutely conclude that 1,000 years is the correct number for all repository sites. For example, if a site is determined to provide extremely good natural isolation, but waste packages can be assured for only 700 years because of a chemical condition or waste package costs, the site may still present a very attractive alternative. It is strongly recommended that this section be qualified to permit shorter periods, if the Department can demonstrate that the combined geologic barriers and engineered barriers satisfy the intent of a HLW repository.

PRIORITY II ISSUE
[60.122(a)(2)(i)]

Subject of Comment:

60.122(a)(2)(i) "The Department shall conduct investigations on the order of 100 kilometers horizontal radius from the geologic repository operations area."

Comment:

For some sites 100 km may be too small, while for others, such as salt domes, 100 km may be too large. It is recommended that this section eliminate the strict use of a "quantitative designation" and replace it with "the investigation of each geologic tectonic, hydrologic and climatic factor important to repository functioning should be conducted over that area required to fully describe and analyze that feature." At some sites and for some factors, the distance could be 100 km or more. The level of detail investigated at all distances from the repository site shall be determined to suit the type and importance of data at that location.

PRIORITY 11 ISSUE
[60.122(a)(6)]

Subject of Comment:

60.122(a)(6) "The Department shall validate analyses and modeling of future conditions and changes in site characteristics using field tests, in situ tests, field-verified laboratory tests, monitoring data, or natural analog studies."

Comment:

It is always difficult to envision every scientific procedure that may be used to verify and/or validate a finding, particularly in an area with major R&D efforts. It is recommended that the following statement be added to the end of this section: ". . .or other method demonstrated to be appropriate by the Department."

PRIORITY 11 ISSUE
[60.122(a)(9)]

Subject of Comment:

60.122(a)(9) "The Department shall determine by appropriate analyses the extent of the volume of rock within which the geologic framework, ground-water flow, ground-water chemistry, or geomechanical properties are anticipated to be significantly affected by construction of the geologic repository or by the presence of the emplaced wastes, with emphasis on the thermal loading of the latter. In order to do the analyses required in this paragraph, the Department shall at a minimum conduct investigations and tests to provide the following input data...

"As a minimum, the Department shall assume that the volume will extend a horizontal distance of 2 kilometers from the limits of the repository excavation and a vertical distance from the surface to a depth of 1 kilometer below the limits of the repository excavation."

Comment:

In some cases, such as a salt dome, a distance of 2 km from the repository may be excessive. This can be handled without excessive effort, if all parties recognize the level of detail actually needed as distance may vary from site-to-site. Possibly of greater importance, the 1 km depth below the repository as an unqualified requirement may not always be desirable. For example, if there are several aquifers within 1 km distance, it will be desirable that borings below the repository be limited to only the absolute minimum required--and their locations should be very carefully selected. It is recommended that this section be changed to say that the volume extends to 1 km, but that the extent of data required between 300 m and 1 km below the repository will be determined on a site-by-site basis.

PRIORITY II ISSUE
[60.122(a)(9)(v)]

Subject of Comment:

60.122(a)(9)(v) "The in situ determination of the bulk geochemical conditions, particularly the redox potential, of the host rock and surrounding confining units."

Comment:

This statement implies that the most important geochemical characterization is likely to be redox potential (or eH). First, it may not be; pH or trace element/mineral geochemistry may be far more important. Second, this is a very difficult measurement to make accurately under good in situ conditions. Finally, unless the location of in situ measurements is exceptionally clean of foreign matters (drilling mud, oxygen, etc.), the measurement may be meaningless. More important and practical than in situ measurement may be good laboratory work using simulated host rock and fluids.

PRIORITY II ISSUE
[60.122(b)(1)(ii)]

Subject of Comment:

60.122(b)(1)(ii) "Except holes drilled for investigations of the geologic repository, there is or has been drilling for whatever purpose to depths below the lower limit of the accessible environment."

Comment:

This requirement is unnecessarily restrictive. Borings may be separated from the Repository by an adequate barrier or they may be sealed. The statement should include the qualifier, "if it is probable that the boring could adversely affect isolation and if complete sealing may not be accomplished."

PRIORITY II ISSUE
[60.122(b)(2)(v)]

Subject of Comment:

60.122(b)(2)(v) "There is an area characterized by higher seismicity than that of the surrounding region or there is an area in which there are indications based on correlations of earthquakes with tectonic processes and features that seismicity may increase in the future."

Comment:

This factor is not needed as special adverse condition. The seismicity of an area will always be one of the important site selection and design factors. The importance of seismicity will be decided on a site-by-site basis.

PRIORITY II ISSUE
[60.122(b)(3)(i)]

Subject of Comment:

60.122(b)(3)(i) "There is potential for significant changes in hydrologic conditions including hydraulic gradient, average pore velocity, storativity, permeability, natural recharge, piezometric level, and discharge joints. Evaluation techniques include paleohydrologic analysis."

Comment:

What is "average pore velocity?" Also, if required at all, this section should apply only if the change would reduce the isolating capability of the repository.

PRIORITY II ISSUE
[60.122(b)(3)(ii)]

Subject of Comment:

60.122(b)(3)(ii) "The geologic repository operations area is located where there would be long term and short term adverse impacts associated with the occupancy and modification of floodplains. (Executive Order 11988)."

Comment:

The intent of this condition is not clear. Apparently, it deals only with surface facilities. It is premature at this time to rule out underground spaces on the basis of surface hydrologic and hydraulic conditions. Future studies may show that surface facility designs can be changed at less cost than required to improve less suitable underground conditions.

PRIORITY II ISSUE
[60.122(c)(1)(ii)(c)]

Subject of Comment:

60.122(c)(1)(ii)(c) "Geochemical properties, such as reducing conditions which result in low solubility or radionuclides, and near-normal pH, or a lack of complexing agents."

Comment:

It would be preferable to state the characteristics in terms of net geochemical performance, rather than specifying which part of the redox, pH, and complexing spectra is desirable. This could also include such items as low leachability and mobility of radionuclides.

PRIORITY II ISSUE
[60.132(c)(2)(i)]

Subject of Comment:

60.132(c)(2)(i) "The Department shall demonstrate that the underground facility includes those engineered features that are needed to limit radioactive releases after decommissioning to levels that are as low as reasonably achievable. The Department shall include an identification and a comparative evaluation of alternatives to the major design features that are provided to enhance radionuclide retardation and containment."

Comment:

As low as reasonably achievable could be stated as a goal. However, the requirement should be related to the acceptable standard.

PRIORITY II ISSUE
[60.132(c)(2)(ii)]

Subject of Comment:

60.132(c)(2)(ii) "The Department shall design the underground facility such that the orientation, geometry, layout, and depth of the underground excavation in addition to any engineered barriers provided as part of the underground facility are optimized for that site. The Department shall use as optimization criteria the performance objectives in Section 60.111(c)(2), (c)(3)."

Comment:

This paragraph requires that the underground facility be optimized (presumably with respect to performance objectives, although this is not clear) for a given site. First, optimization is a normal design function and does not need to be stated in a regulation. More importantly, the section specifies the optimization criteria. It is impossible for anyone to state today all of the factors that should be considered in the design process. These factors and their relative importance for different site conditions will be finalized during the next few years as site investigations, designs and R&D programs are completed. The last sentence of this section should be eliminated as a minimum.

PRIORITY II ISSUE
[60.132(c)(2)(v)]

Subject of Comment:

60.132(c)(2)(v) "The Department shall place emphasis on multicomponent borehole and shaft and seals and use materials that are compatible with the rock properties and other in situ conditions."

Comment:

Consideration should be given toward better qualification of the term "compatible." Compatibility incorporates a spectrum of material properties, including geochemical, thermal response, mechanical response, and must consider host conditions, under a range of physiochemical conditions. It is not necessary for the seal properties to be the same as the rock for compatibility requirements to be completely satisfied. For example, it often will be desirable for the seal material to be more ductile/flexible than the host rock so that the seal will not crack under thermally or mechanically induced movements.

PRIORITY II ISSUE
[60.132(c)(4)(ii)]

Subject of Comment:

60.132(c)(4)(ii) "The Department shall design openings to minimize the potential for deleterious rock movement or fracturing of overlying or surrounding rock. The Department shall optimize opening design, including shape, size orientation, spacing and support materials with respect to natural stress conditions, deformation characteristics of the host rock under thermal loading, and the nature of weaknesses or structural discontinuities present at the location of the opening."

Comment:

See comment to Section 60.132(c)(2)(ii).

PRIORITY II ISSUE
[60.132(c)(5)]

Subject of Comment:

60.132(c)(5) Lining of subsurface excavations. "The Department shall line subsurface excavations in areas that require:

- (i) A positive control of water or gas inflow from aquifers or other porous zones;
- (ii) Support for zones of weak or fractured rock;
- (iii) Anchorage for equipment or hardware."

Comment:

This paragraph would, presumably, eliminate alternate technologies to lining, even when alternatives may prove suitable and cost effective. In some cases, lining may be particularly undesirable. For example, adequate anchorage is possible in competent rock without lining. Further, this criteria should consider any consequences of lining on sealing requirements. If the statement is required at all, it should simply state that: "Engineered control procedures should be in any areas that require:...."

PRIORITY II ISSUE
[60.132(c)(6)(ii)]

Subject of Comment:

60.132(c)(6)(ii) "The Department shall design hoists with mechanical geared lowering devices that preclude cage free fall."

Comment:

Although the prevention of free fall is an important design goal, there is no reason at this time to restrict the technology method for achieving it.

PRIORITY II ISSUE
[60.132(d)(1)(ii)]

Subject of Comment:

60.132(d)(1)(ii) "The Department shall coordinate the design of the geologic repository with site characterization activities to assure that boreholes necessary for site characterization are located at future positions of shafts or large unexcavated pillars."

Comment:

Requiring boreholes for site characterization to be located at positions of future shafts or pillars is desirable but too restrictive for all cases. This restriction may cause important geologic information to be missed during investigation. For example, (1) it may be desirable to drill a boring away from the shaft area to further examine anomalous conditions in a geophysical survey or (2) inclined boreholes may provide significant geologic information but tunnels or shafts may not be constructed around these boreholes. This section could state that boreholes for site investigation that will not be at a shaft and will require sealing should be minimized, and that they will be permitted only if the Department demonstrates their need and how the seal will be successfully placed.

In any event, it should be made clear that this section deals only with deep boreholes that penetrate the host rock or other rocks important to isolation. It does not necessarily apply to shallow hydrologic boreholes.

RECEIVED

DEPARTMENT OF APPLIED EARTH SCIENCES
School of Earth Sciences

Phone: (415) 497-0847
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JUN 23 1980

LYNN E. MYERS

June 18, 1980

Mr. L.B. Myers
ONWI
Battelle
505 King Avenue
Columbus, Ohio 43201

Dear Mr. Myers:

Some very serious hydrologic errors in the "Technical Support Documentation for the Siting Requirements in USNRC 10 CFR Part 60 - Disposal of High-Level Radioactive Wastes in Geologic Repositories" overshadow all other aspects of the document. These errors have resulted in the preparation of an "Advance Notice of Proposed Rulemaking" that sets up unnecessary requirements and misses the essential requirements.

It should be emphasized that this erroneous information did not come from the regular refereed hydrologic literature. Rather, it came from inexcusable verbiage that has been allowed to creep into print in sources other than the regular refereed hydrologic literature as referenced on page 3-6.

First let me describe the erroneous information and erroneous thought trends in these documents:

Page 6-9 discusses "permeability" values as low as 10^{-10} cm/sec. I have seen even lower values in non-refereed literature. First of all, if the units are cm/sec, the correct terminology should be "hydraulic conductivity". When such numbers are substituted into the flow equations at normal groundwater gradients over very long periods of time, they can predict objectionable radionuclide transport to the biosphere. Therefore, it appears to the uninitiated that "Regardless of host rock permeability and depth, there is sufficient time for groundwater to penetrate the repository and return biologically significant radionuclides to the accessible environment." (Page 1-4). As a consequence, groundwater containment cannot be counted on and "Performance studies and sensitivity analyses indicate, over the long term under reasonable conditions, it is primarily the geochemical system that will determine the rate of release of radionuclides to the accessible environment, . . ." (Page 3-6). Because of uncertainties about the geochemical system, it is therefore essentially impossible to prove containment. The result has been the specification of unnecessary testing and requirements while the truly important ones are not mentioned. Fortunately, this is completely wrong!

ell

When there is a linear relationship between groundwater discharge and gradient, the flow regime is said to be "Darcian". Hydraulic conductivity is the constant of proportionality, and the relationship is Darcy's Law. Darcy's Law and the commonly-used transport equations apply only when the flow is Darcian. In the case of a nuclear repository site, the fluid flow regime will be non-Darcian because of the low permeabilities of the host rocks. In fact, if Darcian flow can occur in a geologic material, that material is too permeable for use as a repository host rock.

As mentioned, "hydraulic conductivity" values of 10^{-10} cm/sec and smaller are reported from studies of potential repository host rocks. If very large time frames are used, solution of the transport equations may predict objectionable radionuclide transport to the biosphere even for these low values of "hydraulic conductivity." However, such low values of "hydraulic conductivity" indicate the presence of materials sufficiently impermeable to preclude Darcian flow. Therefore, these computations are completely without meaning. They are not even approximations. They are totally worthless.

I have read of laboratory experiments in which the ends of cores of dense unfractured granite or salt are subjected to pressure differences of 250,000 psi. After some time, water is driven through the core. Using Darcy's law, "hydraulic gradients" of 10^{-10} cm/sec or there about are computed and reported. Subsequently, people use such "hydraulic conductivities" under normal groundwater gradients of say 0.001 to predict significant groundwater transport over long periods of time. Again, this is completely wrong.

The water that passed through the core was not subject to Darcian flow. A value of 10^{-10} cm/sec is not hydraulic conductivity. Because Darcy's law does not apply, there is no linear relationship between flow and gradient. Therefore, that number can only be used at the experimental head gradient of 250,000 psi per core length. If it takes 250,000 psi differential to move water through the core, the water is not moving through capillary cores. It must be moving through spaces of subcapillary size and against tremendous adsorptive force fields. Almost certainly, a large threshold gradient is needed to move water molecules against such forces. In short, it is likely that a rock that tests at 10^{-10} cm/sec under such huge gradients will have a zero transport rate under a field gradient of 0.001.

The other problem with the laboratory core is that it is likely to miss joints and faults. Thus, for fractured impermeable rocks, the laboratory tests can seriously underestimate transport. Fortunately, the answer to this is simple. Before emplacement of canisters in repository cored holes, the cored holes can be pressure tested at non-destructive pressures. If a test results in a "hydraulic conductivity" of say 10^{-10} cm/sec, two things are apparent. First, there are no open fractures that are conducting significant amounts of fluid. Second, the transport to the biosphere under normal field gradients over the 1,000 year specified transport period is zero because the flow is "sub-Darcian".

Mr. L.B. Mayers

-3-

June 18, 1980

In conclusion, the hydrology can do the containment job especially for a period as short as 1,000 years. Second, with the geochemistry as a backup, the transport problem is tractable over the short design periods now specified.

Sincerely yours,

Irwin Remson

Irwin Remson
Professor

IR:rh

cc: Dr. R.B. Laughan
Mr. Thomas Nicholson
GRG Committee
Professor Krauskopf

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JUN 23 1980

LYNN B. MYERS

UNIVERSITY OF UTAH RESEARCH INSTITUTE

UURI

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TELEPHONE 801-581-5283

June 17, 1980

Mr. L. B. Myers
Office of Nuclear Waste Isolation
505 King Avenue
Columbus, Ohio 43201

Dear Mr. Myers:

I am pleased to submit the following comments regarding the Nuclear Regulatory Commission document 10 CFR 60, Subparts E, G as published in the May 13 Federal Register. I understand these comments will be forwarded to NRC as an attachment to the ONWI developed review.

General Comments

The Supplementary Information developed as Background, Nature of the Problem, Underlying Principles, and Considerations would appear to adequately identify the key issues involved in the disposal of HLW. The underlying conservative evaluation of repository sites is appropriate to the importance of the problem, but should not be so rigidly applied that reasonably acceptable sites are eliminated without full consideration of offsetting favorable factors. Predictions of future site stability for the long term (i.e. 10,000 years or more) will be impossible to demonstrate. Thus well reasoned, competent judgement based on the geologic record of the last millions of years must be an acceptable substitute for demonstrated future stability. One point not adequately addressed is that the risk and economics of timely geologic storage must ultimately be compared with the risk and economics of no geologic storage -- the alternative which could result from the ultimate in conservative site evaluations.

Specific Comments

Subpart E - Technical Criteria

*60.2 Definitions. The definitions are adequate and sufficient.

*60.101 Purpose. No comment.

OK

*60.111 Performance Objectives

- (3) Retrievability - The requirement of 50 year retrievability should not exclude backfilling of the mined areas; to do so may place unnecessary thermal and mechanical stress on the repository site.
- Is the waste package requirement of radionuclide containment for 1,000 years feasible with current state-of-the-art? If there is some uncertainty in this, the specific (1,000 years) time requirement should be modified.
- (4) Performance of the geologic stability - Reasonable assurance of geologic stability for 10,000 years seems reasonable and achievable.

*60.121 Site and Environs Ownership and Control - No comment.

*60.122 Siting Requirements

- (a)(2)(i) Geologic investigations completed for a radius of 100 km from the repository area is a reasonable requirement, but the level of detail of these investigations is not specified. It is probably best this way, with the level of detail being a judgement rather than specified regulatory consideration.
- (a)(2)(iii) A 10,000 year period for prediction of changes in natural conditions and the performance of the geologic repository is reasonable and appropriate.
- (a)(5) A reasonable trade-off must be made between drill hole testing to reduce geologic uncertainty and the intent to minimize drilling to preserve the integrity of the reservoir.
- (a)(9)+ Knowledge of the geologic and physical properties of the repository host for a distance of 2 km from the limits of excavation is reasonable and prudent. A similar knowledge for depths of 1 km below the repository excavation must either
- a) admit and accept considerable uncertainty and rely largely upon geologic judgement and geophysical measurement, or
 - b) provide for several drill holes within and surrounding the repository, to depths 1 km below excavation levels.

A reasonable trade-off between the two possibilities must be accepted and acknowledged as a clarification of statements within this section.

- (b)(1) Potentially adverse human activities.
Items (i) through (vii) provide an adequate and reasonable listing of potentially adverse human activities.
- (b)(2) Potentially adverse natural conditions - geologic and tectonic.
Items (i), (iii), (iv), (v), (vi), (vii) are reasonable and prudent.

(b)(2)(ii) Evidence of dissolution, collapse, or similar features which resulted from Pre-Quaternary geologic processes that have since been inactive, should not by itself disqualify a site. Reasonable proof of stability during the Quaternary should be required and adequate.

(b)(3) Potentially adverse natural conditions - hydrologic.

(iv) Presence of a fault or fracture zone with a horizontal length of more than a few hundreds of meters should not by itself disqualify a site. Countless examples may be cited of fractures tightly sealed with quartz, calcite or clays which show no evidence of movement or fluid flow for 10's of millions of years. The requirement as stated may be unnecessarily restrictive.

(c) Favorable characteristics.

The intent of this section is clear and reasonable. However the degree to which many characteristics can be measured or demonstrated is questionable. The entire section should be qualified by "consistent with the state-of-the-art" and "in-so-far as possible with acceptable drilling limitations".

*60.132 Design Requirements - No comment.

*60.133 Waste package and Emplacement Environment - No comment.

*60.134, 60.136 Missing in Federal Register??

*60.135 No comment.

*60.137 No comment.

Subpart G - Quality Assurance

*60.171 Quality Assurance Program

The need for a quality assurance program to maintain quality control for studies and data gathering associated with siting a geologic repository is recognized. Nevertheless many geological, geophysical, geochemical and hydrologic studies are not readily amenable to tightly specified field procedures, measurement procedures, etc. The nature of geoscience exploration activities is that step 3 depends upon the results of steps 1 and 2, upon terrain and earth conditions, etc. The implementation of a quality control program for these activities implies substantial increases in cost, perhaps less data for the same budgeted expenditures, and increased delays in receiving data and survey results. Thus I urge recognition of the unique aspects of geoscience exploration in the detailed statement of the quality assurance program, and I encourage the use of reasoned judgement and flexibility instead of rigid specifications normally associated with quality assurance programs.

I hope these comments are useful in your evaluation of the current form of 10 CRF Part 60.

Sincerely,

Howard P. Ross

Howard P. Ross
Geophysicist; ONWI Geologic Review Group
Senior Geophysicist/Project Manager, ESL/UURI

PROGRAMS OF STUDY

UNDERGRADUATE

Architecture/Engineering
Basic Engineering
Civil Engineering
Geological Engineering

GRADUATE

Structures/Mechanics
Transportation
Water Resources

Princeton University

SCHOOL OF ENGINEERING/APPLIED SCIENCES

PRINCETON, NEW JERSEY 08544 609-452-4600

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JUN 18 1980

LYNN B. MYERS

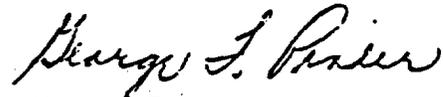
June 17, 1980

Mr. L.B. Myers
Office of Nuclear Waste Isolation
505 King Avenue
Columbus, Ohio 43201

Dear Mr. Myers:

Please find enclosed my comments on "Nuclear Regulatory Commission 10 CFR Part 60, Technical Criteria for Regulating Geologic Disposal (of) High Level Radioactive Waste" as requested.

Sincerely yours,



George F. Pinder
Director
Water Resources Program

GFP:ksw
Enclosure

OK
C.A.H.

COMMENTS ON "Nuclear Regulatory Commission 10 CFR Part 60
Technical Criteria for Regulating Geologic
Disposal (of) High Level Radioactive Waste"
by George F. Pinder

1.0 PREAMBLE

The technical aspects of the geologic disposal of high level radioactive waste (HLW) are cosmopolitan in scope. This attribute of the problem is reflected in the broad spectrum of related yet separate topics covered in this document. In the remarks to follow I have elected to focus only on those elements of the document that are within my primary area of expertise--the physical description and analysis of mass transport in the subsurface.

2.0 GENERAL COMMENTS

2.1 "Indelible concepts" and "golden numbers"

While the proposed document can, and indeed should, be viewed as a preliminary statement of the Commission's position regarding the technical criteria for regulating geologic disposal of HLW, it is very important to examine the most fundamental concepts presented therein so that the more general ideas as well as the technical details of the presentation are properly evaluated. In this spirit I feel one must beware of what I shall call "indelible concepts" and "golden numbers". Indelible concepts are those ideas introduced early in the formulation of a problem which become inviolate as the analysis of the problem proceeds. The inertia against change in these concepts often arises because the evolving document is inextricably tied to them. Thus a complete revision of the conceptual

model underlying the analysis would be required should they change.

Golden numbers are similar. These are numbers introduced into an analysis without careful deliberation or scientific justification. They are generally considered a working estimate, but often become cast in concrete as the analysis proceeds. I feel this document contains both "indelible concepts" and "golden numbers".

An example of an "indelible concept" is found on page 31394 of the Federal Register Vol. 45, No. 94. There the problem of the disposal of HLW is decomposed into five subproblems 1) lifetime of the repository, 2) physical extent of the repository 3) waste/rock interaction, 4) treatment of uncertainties, and 5) problems of human intrusion. These subproblems are further subdivided into appropriate sub-subproblems. For example 1) lifetime of the repository is broken into a) site selection, b) construction and emplacement of wastes, c) post closure of the repository. The first of these, site selection, is further broken down into two sub-subdivisions I) site suitability criteria, II) site acceptability criteria. It is evident that this hierarchical structure, which essentially dictates the fundamental form of the final criteria, is built upon the original five subdivisions. These original subdivisions, however, are selected without documented consideration of alternatives. Because of the impact each step in this problem decomposition has on the final analysis, I feel it is imperative that each procedural step be properly justified.

Golden numbers are at least as insidious as "indelible concepts" in inadvertently dictating long range decisions. Consider, for example, page 31401. Permissible travel time to the environment is given a lower bound of 1000 years; the lower bound on waste package containment, is also given to be 1000 years. The annual rate of release from the facility is required to be no greater than 1/100,000 of the total activity present in HLW. The siting investigations shall extend on the order of 100 kilometers. No justification or rationale is given for selecting these four numbers which, in my opinion, play an important role in the final selection of appropriate criteria. Because the reasons for choosing these figures are not presented, they are not subject to scrutiny commensurate with their importance.

2.2 The Role of Models

The proposed rules recognize the irreducible residual uncertainty inherent in forecasts of environmentally related processes. Radio-nuclide transport is, of course, such a process. However the concomitant deductions regarding modelling which appear to have arisen out of this recognition warrant additional consideration.

Models, whether they be mathematical, physical or electrical, assist the hydrologist in predicting the behavior of hydrologic systems under new or existing stresses. They play a particularly important role when a system is so complex that hydrologic insight and experience are inadequate to provide an accurate determination of system behavior. In systems which respond very slowly one cannot rely on observed behavior to predict the future and models are

essential in providing meaningful forecasts. The radionuclide transport problem certainly qualifies as a candidate for modelling when viewed from this perspective (this is consistent with the discussion of "fundamental difficulties" on page 31395).

While it is evident to most hydrologists that modelling is an important tool in forecasting the movement of contaminants in the subsurface, one may argue that our knowledge of the HLW disposal site is so inadequate that such models are fraught with fundamental irreducible uncertainty. Recall, however, that a model is simply the physical or mathematical realization of our conceptual understanding of the problem. In other words the accuracy of a model is a direct reflection of the accuracy of our conceptual model. All field investigations are designed to enhance our conceptual and, by inference, mathematical (or physical) model of the system. If the inherent uncertainty in our mathematical model is so great as to preclude its utility as a forecasting tool then, inasmuch as our conceptual model exhibits the same uncertainty, there is very little hope that "expert opinion" will provide additional insight. One must then conclude that one of two alternatives remain. 1) additional field experiments or alternative investigations must be performed to reduce the residual uncertainty or 2) the fundamental HLW problem is not amenable to analysis in a classical scientific or engineering sense.

It is the stated position of the Commission staff "not to require modelling to be the primary decision tool to determine the capability of the geologic repository to contain and isolate wastes from the biosphere". I am diametrically opposed to this point of view. I believe

that a model (probably but not necessarily mathematical) is an essential element of the decision making process. It provides the following advantages:

- 1) it presents, unambiguously, to the scientific community and public at large the state of knowledge regarding the behavior of the system
- 2) it provides a clearly defined focus for professional discussions, contributions and criticisms which gradually illuminate our understanding of the behavior of the proposed repository site
- 3) it allows us to evaluate the impact of our lack of knowledge on the acceptability of a particular site. The simplest type of analysis along these lines involves the use of ranges of parameter values in a series of simulations
- 4) it is the only methodology that will provide meaningful information on the time of travel of radionuclides from the disposal site to the biosphere under various breaching scenarios
- 5) carefully orchestrated, the model can be used to demonstrate to public officials and the general population the probable behavior of the repository under a reasonable range of conditions.

In summary, I feel that a representative model of any potential site is a necessary but not sufficient condition for licensing. To attempt anything less would surely jeopardize the credibility of the licensing program in the eyes of the scientific community.

3.0 SPECIFIC COMMENTS

Inasmuch as this document is now part of the public record, I will not point out those typographical errors which have doggedly escaped the editorial staff. They seldom compromise the message of the document.

Pg. 31394, Col. 3, Line 23-31: The difference between the two requirements of technical criteria is too subtle for me to pick up on first reading. Could this be clarified?

Pg. 31394, Col. 3, Line 1b*: While I concur with the observation, I suggest some evidence to substantiate this statement is warranted.

Pg. 31395, Col. 2, Line 31: Considering geologic disposal is an entirely new enterprise and that there will be no opportunity to observe behavior over the long term it seems contradictory to rely on expert opinion which, in turn, relies on past experience.

Pg. 31395, Col. 2, Line 9b-1b: Although I concur with the concept of uncertainty as a major problem with HLW repository siting, I feel the concept of uncertainty described here misses the mark. Perhaps it could be re-examined?

Pg. 31395, Col. 3, Line 13: The meaning of the statement regarding the separation of temporal and spatial elements of geological disposal eludes me. I cannot see how such a separation is possible either physically or mathematically. Moreover, were it possible, I fail to see how it would influence uncertainty.

Pg. 31396, Col. 1, Line 7b: In looking at uncertainty, I feel one must keep in mind the final goal. Is it 1) to make the uncertainty amenable to analysis, 2) to reduce its magnitude, 3) to evaluate its impact? Each objective requires a different course of action. The comment "Such measures..." seems to confound 1) and 2) above.

Pg. 31397, Col. 2, Line 5b: The general discussion of modelling appears naive. The allusion to qualitative models is inaccurate and inappropriate. I strongly recommend reconsideration of this entire section (5). If I were to present all of my concerns about this section it would require another much longer report.

Pg. 31398, Col.1, Line 14b: "A satisfactory if imprecise margin of safety". I have more than a little difficulty accepting an imprecise margin of safety as satisfactory -- perhaps you could substitute another word for satisfactory.

* b indicates lines counted from bottom.

Pg. 31400, Col. 2, Line 14b: Calculation of transport travel times requires transport models -- have you de facto required models in your rules? The same argument can be made for items (iii) top of page 31401, Col. 1 and elsewhere beyond this point.

Pg. 31401, Col. 2, Line 14-Line 18b: I believe this list of (vi) requirements is not now, nor likely to be in the foreseeable future, within the capability of earth scientists or engineers. This strikes me as an unreasonable wish-list devoid of consideration for and of available technology.

Pg. 31402, Col. 1, Line 12: "Storativity" is irrelevant to problems within this time frame.

Pg. 31402, Col. 3, Items a)-f): Many of these items are irrelevant misleading, or misinterpretations of the literature. I think this section requires careful scrutiny by a qualified hydrologist.

Pg. 31405, Col. 2, Line 9b-5b: Why?

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June 18, 1980

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JUN 24 1980

LYNN B. MYERS

Gentlemen:

As agreed, please find enclosed for your information a copy of my comments to ONWI on 10 CFR 60 Subparts E-I, as requested in Wayne Carbiener's letter of May 27.

Best personal wishes.

Sincerely yours,

Frank L. Parker
Frank L. Parker

FLP:bl

Enclosure

of

Nuclear Regulatory Commission Document on
"Technical Criteria for Regulating Geologic Disposal
of High-Level Radioactive Wastes"
10 CFR-Part 60 in the Federal Register of May 13, 1980
pp. 31393-31408

GENERAL COMMENTS
FRANK L. PARKER
Vanderbilt University

The document is, in many ways, admirable, in that it tries as best it can to state forthrightly what the present status of knowledge is in the field of geological disposal of radioactive wastes. However, though the proposed rule-making and the "Technical Support Documentation for the Siting Requirements in 10 CFR-Part 60" (4/7/80 draft) go on for hundreds of pages, the final result is the same generic conclusions as have been regurgitated many times by many other groups in many other forms. The proposed rule-making finally concludes that expert opinion will be required to determine whether or not the site is suitable. Consequently, there is no defense of the specific numbers mentioned in the proposed rules other than generalized comments such as until the end of the effective lives of the fission products and beyond times which it is impossible to even hope to determine what the human population and its characteristics are liable to be. Therefore, it places an enormous burden on the Department of Energy in trying to satisfy criteria which depend so much on expert testimony, when at no place in the document is there any discussion of how expertise will be determined and, possibly more important, who will evaluate the expert opinion and on what basis.

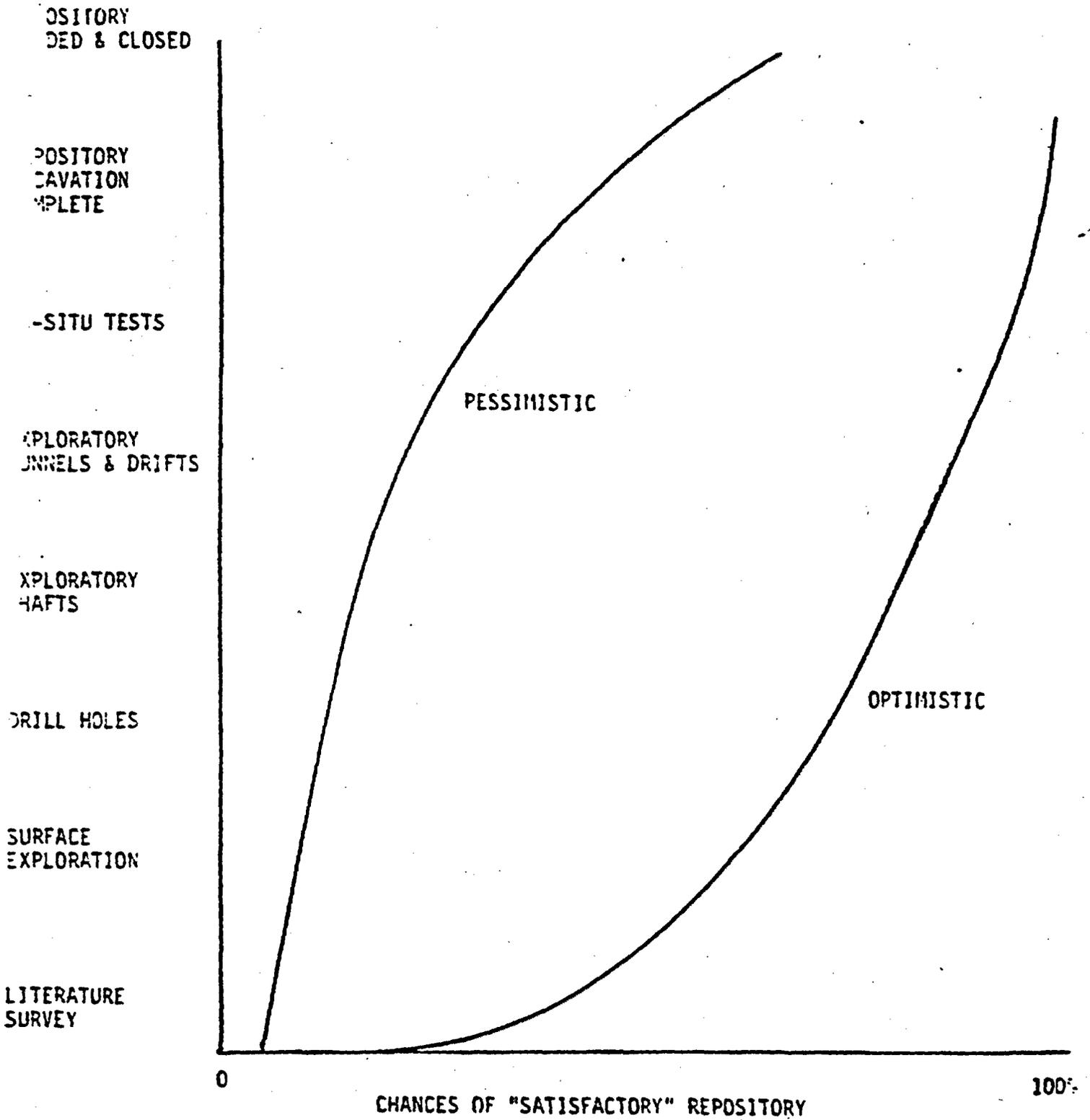
While it is almost impossible in administrative hearing to challenge the qualifications of the expert witness, it is impossible to challenge the qualifications of the hearing authority and the basis on which the hearing authority will be constituted. How can the public be assured that the best interests of the country will be fostered if the quality of the hearing examiners and if the criteria which are of crucial importance are left strictly to the judgement of undefined experts? Consequently, this makes the problem of the proposing agency, The Department of Energy, exceedingly difficult.

Equally crucial in a determination of this sort is the degree of confidence that the hearing authority must have or the expert witnesses must have that the proposed solution will be successful. Will the Nuclear Regulatory Commission be satisfied with a 50% confidence, 90% confidence, 99% confidence, or will it demand 100% confidence that the site will work as planned and at what stage will this confidence be demanded? The attached figure shows the extent to which legitimate expert opinion can differ, depending on their degree of risk-adverseness.

For example, a risk-adverse person might follow only a curve that would be essentially only the abscissa, based on forthcoming Office of Technology Assessment Report on Radioactive Waste Management. That is, he would not have any confidence in the success of a repository until the repository had been in place for 10,000 years or more. At the opposite pole would be a person who, from a cursory glance at the literature, would have 100% belief in the success of a repository. His curve would lie along the ordinate.

These are extreme positions. However, the two positions shown are generalized as the envelope within which most competent geologists, geo-hydrologists and earth science people would find themselves. They would have

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CAH



some confidence from a survey of the literature to eliminate spots that are unlikely to be successful and their confidence would increase as one made further investigations both at the surface and below ground. The pessimistic person (responsible pessimist) would still not have 100% confidence even after the repository itself was closed, whereas a responsible optimist would believe that, after a reasonable amount of underground exploration, he would have high confidence in the development of a 'successful' repository.

There is also insufficient discussion or acknowledgement that each of the individual barriers does not have to be totally satisfactory in itself, but it is the whole system that is of importance. While lip service is given to the systems approach, insufficient attention is paid to the fact that each component of the system can be the regulating step. While one does design the barriers in depth, one would not need to have each component in itself totally capable of attaining all the objectives of the siting requirements. This is certainly not clear in the document. One could think of the system as a series of coupled reservoirs with the final discharge leading to the biosphere. Consequently, a holdup in any one of the reservoirs could be sufficient to reduce the concentrations to the biosphere to acceptable limits. This is a crucial point. Consequently, this would make possible the siting of facilities in locations which may be so diverse that one would have better hydrologic characteristics, one would have better geological characteristics, one might have better man-made barrier characteristics, and these could be tailored and should be tailored to produce a system that gives satisfactory results.

I agree wholeheartedly with the major emphasis that is given to in-situ testing. What is not clear is at what stage in the licensing process this

would be required and what specific tests would have to be held and what would be the go-no go criteria of the tests.

There seems to be no advantage taken of the INFCE studies, where in the long run, it assumes that all the waste materials wind up in the world's oceans. The study, therefore, concludes that one should calculate the dosages both for the naturally-occurring radioactive elements and without the naturally-occurring radioactive elements, because these all would eventually wind up in the world's oceans.

Equally important in such criteria is the assumption that no mitigating measures are possible, though retrieval is, of course, indicated. There are other mitigating measures which could be possible and which should be evaluated. There is no discussion about the projected slow rate of releases of contaminants from the repositories relative to the rate of release of contaminants from reactors if accidents should occur. The enormous differences in release rates are not documented and are not taken into account in the analysis of the requirements.

Finally, in the technical support documentation there are some outrageous statements tucked away in the long, drawn-out narrative. For example, page 5-32, the first full paragraph, first sentence, says "as a minimum, a site is presumed unsuitable if there is past evidence of dissolution within the repository/site interaction zone. . . . What is sought are indications of substantive dissolution as indicated by a layer of insoluble residues." As the writers must be well aware, many of the salt domes have layers of insoluble residues on top of the domes and, frequently, on the sides of the domes which most likely have been left behind by previous dissolutions. However, these layers of insoluble residues now protect the salt domes from further dissolution or reduce dissolution to a very slow rate. Yet by this definition, many of the salt domes would be considered

ineligible. I am sure this is not the intent of the document, but in a document as long as this, it is very possible that many more such outrageous statements are included.

It is also obvious that the process of site approval must be better designed than is given in this document. As is evident in the book edited by Lawrence Tribe, When Values Conflict, attempts to improve benefit/cost analyses finally result in having an open process that is well understood and that develops the trust of all responsible people on various sides of the issue. There is no indication here how the process would be structured so that it would be an open and acceptable process to the majority of the people involved in such a decision.

DETAILED COMMENTS

Federal Register

Page 31395, item 4, the whole sentence states "first, geologic disposal is an entirely new enterprise/no experience with geologic disposal." It may be true that no experience exists with purposeful geologic disposal, but, in fact, one can find in salt mines relics from the Celtic age and one can find in Pompeii and other areas items that have been disposed of in a geologic setting which have remained inviolate over long periods of time. One can certainly obtain some data from these instances. The data base is not quite so bleak as is indicated in the discussion.

Page 31396, item 3, dealing with the conservative analysis, "conservative analysis because of the many uncertainties associated with high-level radioactive waste and geological repositories," reinforces my original comments that unless one is prepared to state what level of confidence one is willing to settle for, then one cannot handle these uncertainties. In carrying out a conservative analysis, one has to be careful that so many conservative assumptions are not made that eventually a less-

conservative solution is found.

Page 31397, item 4, last sentence, "it will be necessary to determine the site-acceptability question on a case-by-case basis." Since there will be so few sites selected, picking them on a site-by-site basis is not such a bad idea, but more substance has to be given so that, in fact, the agency can have some indication whether or not it would be possible to obtain a license prior to going to the expense of developing a full-scale repository.

Further justification needs to be given for the basis upon which models are almost totally excluded except to compare sites and designs. It is not clear at all how the long-term (far future) dosages can be determined except by the use of mathematical models. While the absolute value of the numbers certainly cannot be taken to be very accurate, it is difficult to see other methods that will be superior. Expert opinion leaves the process so open ended that it is difficult to see how one can avoid using models to bound long-term futures. The major advantage of the models is that the assumptions must be documented, whereas expert opinion is based upon internalized models.

Page 31399, definition of expected processes - unfortunately agencies have frequently tried to redefine the English language. It is indicated here that human intrusion is not to be treated as an expected process and event. It should be so treated. Definition of high-level radioactive waste should indicate that spent reactor fuel will be treated as waste if so defined. Should follow the International Atomic Energy Agency's definition of high-level waste.

Page 31402 (C)(2)(iii)(a), normally "result in a host rock with very low water content." This would, in effect, eliminate clay, which I do not

think is the intent.

Page 31403 (4), should be some indication of the use of modular design which does show up later. (5) should also include non-propagation.

Page 31404 (2)(ii), would seem to indicate that if one wants the optimum solution one should extract maximum amount. In fact would like to err on the side of safety so that one would leave a larger amount of media to be sure of providing a margin of safety. The same point is made (iv)(2), optimizing opening design, etc.

Page 31405 (8), presupposes that compaction is the best method. One might want to use material that would expand upon being wetted.

(9)(v) The requirement of using pregrouting is not compatible with mandating performance rather than technique.

Technical Support Documentation

Page 1-4 - Some statements are very difficult to understand, since they are pronounced ex cathedra. For example, in (ii), third sentence, "regardless of the host rock permeability and depth, there is sufficient time for groundwater to penetrate the repository and return biologically significant radionuclides to the accessible environment." Where is the justification for this? One could certainly conceive of host rock permeability such as in salt where there is not time for the groundwater to come through and return any material in significant quantities to the environment.

Page 1-6 - The 100 km distance certainly is an arbitrary value. It might be more useful to talk about the geologic and hydrologic regime that is of interest rather than an arbitrary 100 kilometers.

Page 1-8 - The second to last sentence in the second full paragraph is a very important comment, and yet it receives very little attention throughout the document.

Page 1-9, first sentence, how does one rationalize spent fuel disposal with the indication that "valuable subsurface resources that could encourage activities related to exploration and recovery" would eliminate sites?

(iv) would indicate that "the lack of substantive geochemical properties to significantly retard radionuclide migration to carry with it the presumption of site unsuitability," seems to be overdrawn, since it is only one of the retarding factors. One could easily install man-made barriers.

Page 3-3 - second paragraph, third sentence, the "waste packages provide a means to transport and shield the waste." This should indicate that waste packages are more than that and thus provide containment as well, at least for the short term.

Page 3-4 - third full paragraph - "in order to reasonably demonstrate the sufficient isolation of radioactive waste, each of the three components of the repository system must contribute to:" One can see that, as mentioned earlier, each of the components does not have to, in itself, make the site desirable. It is the sum total that is important, not the individual components.

Page 3-15 - 25 square kilometers and 10 cubic kilometers were previously used. That does not make them ideal for all circumstances.

Page 3-21 - section 3.4.1.3. - item 2 - "each of the site components to provide a margin of safety and it requires . . ." Again the same comments about each.

Page 3-23 - item 3.4.3. - fourth line from the bottom - no definition of "biologically significant."

Page 3-24 - fourth line - "very long travel times." No definition.

Page 3-25 - middle of the first paragraph - "as noted by Heckman and others, . . . radioactive decay has not substantially reduced the hazard." Since, at the end of the time period, the fission products are gone, the toxicity has been substantially reduced, as a matter of fact, by four or five orders of magnitude.

Page 3-26 - first full paragraph - it is very important item and yet it is relegated to the rear. It should be emphasized up front that "this objective through different combinations of site parameters."

Page 4-2 - second paragraph - item 3 - verification. Does not indicate over what period; how it should be done or whether one can do a retrospective type verification in trying to fit the models to natural phenomena that have already occurred.

Page 4-7 - item 3 - should indicate that hydraulic recharge and discharge areas are also critical areas.

Page 4-51 - last complete sentence - makes no sense whatsoever when it says "as such there may be too many factors to permit use of modeling."

That is the reason why one does modeling because there are so many factors that one cannot do a simple hand calculation or determine the outcome intuitively.

Page 4-55 - last full sentence - indicates that the near field is far more important than the far field, because it might be possible to short circuit through the far field by changes in the near field. This is an area that needs further development by the Department of Energy. It should be noted that, in spite of any short circuiting in the near field, there may be sufficient latitude in the far field to absorb short circuiting in the near field. If that is so, it should be stated very explicitly.

Page 4-62 - item 4.5.2.4. - second and third sentences - ignores the work done in Sweden and elsewhere on near field tests to measure the flow of nuclides.

Page 5-3 - item 8 - the final sentence in the first paragraph is very important. Yet in no place does this report say what is the range of latitude in adverse conditions that is acceptable. It needs to be spelled out in very great detail, and yet it is not.

Page 5-6 - last full sentence in the first paragraph - the emphasis seems to be on this "little influence on all the performance objectives." Since it was previously indicated that if the process is rate-limited in a number of the performance objectives, then it is not necessary to show that all of them limit the dose.

Page 5-11 - first paragraph - it is not indicated who will resolve at an early time the definition of "acceptable risk." I agree that it is vitally important but there is nothing indicated here as to how it will be resolved.

Page 5-25 - section 5.2.1.3. - needs to indicate that site is unsuitable if the influences on groundwater are adverse.

Page 6-1 - end of page - needs to indicate volume of water flowing is important, as well as velocity.

Page 6-5 - first line - "required favorable . . ." seems incompatible.

Page 6-6 - last line - same comment.

Page 6-20 - first full sentence - not "dose significant" only accessible.

June 18, 1980

RECEIVED

JUN 16 1980

LYNN E. MYERS

L. B. Myers

Neville G. W. Cook
3261 Rohrer Drive
Lafayette, California 94549
June 11, 1980

Mr. L. B. Myers
Office of Nuclear Waste Isolation
505 King Avenue
Columbus, Ohio 43201

Dear Mr. Myers:

COMMENTS ON NUCLEAR REGULATORY COMMISSION
ADVANCE NOTICE OF PROPOSED RULEMAKING:
Technical Criteria for Regulating Geologic
Disposal High-Level Radioactive Waste
10CFR60 (Subparts E-1)

These comments concerning the technical criteria for regulating geologic disposal of high-level radioactive waste are made in response to a letter from Dr. W. A. Carbiener of ONWI dated May 27, with which were enclosed copies of the May 13 Federal Register and background information from the USNRC Public Document Room.

The latter information on "Technical Support Documentation for the Siting Requirements in USNRC 10CFR Part 60: Disposal of High-Level Radioactive Waste in Geologic Repositories", proved to be of particular assistance, and includes a commendably useful list of references.

The treatment of this question in the Federal Register both in the Supplementary Information and in Subpart E is very uneven, reflecting probably the current state of knowledge. However, a more systematic presentation would likely lead to a clearer identification of the problems, and specifications of the criteria.

For example, under the heading "Nature of the Problem" five distinct areas are identified, namely, (1) Lifetime of the Repository, (2) Physical Extent, (3) Waste/Rock Interaction, (4) Treatment of Uncertainties and (5) Human Intrusions. Although these problems are important, they do not seem to define any hierarchical system.

. . . continued . . .

It has seemed to me always that the foremost motivation for geologic disposal is that it makes radioactive wastes much less accessible to human action and less susceptible to meteorological and geologic changes in the long-term, than can be envisaged for any form of near surface storage. If this is so, the next most important question is: Do there exist rocks at convenient depths and of sufficient extent within which it is practicable to develop a repository of a useful size? Is this question not more pertinent than the discussion on page 31395 under (2) Physical Extent? If rocks within which a useful repository could be developed exist, is the next question not: Do such rocks exist within geologic and hydrologic settings likely to provide assurance of the safety and stability of a repository, in both the short- and the long-term, and of the isolation of radioactive wastes within it? Provided that these two questions can be answered in the affirmative, and to date there does not appear to be any evidence that they cannot, the next level of detail such as waste/rock interactions and the methods by which the performance of a repository can be predicted and assured, must be examined.

The discussion under Considerations, starting on page 31396, includes items which can be commended and others which can be criticized. As examples, a commendable statement is "The two most important attributes of the natural barrier are that the site should be geologically simple and stable so that the site can be easily understood ...". On the other hand, a statement which can be criticized is "... whether the geologic setting at a particular site can fulfill the stated purpose of the geologic barrier relies fundamentally on the predictive power of the particular transport model appropriate to that site". In fact, the transport model may be quite correct but the field data used in it could easily be totally inadequate.

Finally, the statement that "The lack of empirical data on the performance of engineered barriers or the inability to obtain credible data may preclude the development of use of credible quantitative models in the showing that either the uncertainties are addressed properly in the performance standards or the performance standards are met in a particular licensing action." is both clumsy and confusing. The facts are that engineered barriers can be based on geologic analogs, the behavior of which over long periods of time is known and the properties of which have been, or can be, understood well. Such engineered barriers have all the long-term advantages of geologic media but their properties can be understood, determined and controlled for use in achieving assured performance of a repository.

The discussion and examples above indicate that the answer to Question 1 on page 31398 is "No, the list of considerations does not clearly, adequately and fully identify the relevant issues involved in disposal of HLW."

Turning now to Subpart E, itself, at least two of the definitions may lead to confusion. First, " 'Stability' - means the rate of natural processes affecting the site during the recent geologic past are relatively low and will not significantly change during the next 10,000 years". This is neither a

. . . continued . . .

rigorous nor precise statement. Second " 'Underground Facility' - means the civil engineered structure, including backfill materials, but not including seals (emphasis added) in which waste is emplaced"; in some rocks backfills and seals may have to be synonymous.

Under the headings of Performance objectives, Site and environs ownership and control and Siting requirements, the Department of Energy is directed to provide a number of assurances. An important omission seems to exist in that it is not always stated when the Department is to provide these assurances in relation to repository design, development and licensing, how they are to be provided nor how they are to be used. In fact, many of these assurances will have to be a function of the development of the repository, because the data needed to provide them will become available only as the repository is excavated and observations and tests are made underground.

In practice, the selection of a potentially suitable site, the characterization of such a site by surface exploration and, if favorable, further by underground exploration, followed by repository development and sealing is most likely to proceed by a process of elimination. Initially, a number of sites that seem to be potentially suitable as hosts for a repository will be selected, as directed in the Message from the President. Only those, or that, site which undergoes the whole sequence of site screening, characterization, testing and development without revealing any features which disqualify it from providing reasonable assurance that a repository constructed within it will provide isolation of radioactive wastes from the biosphere is likely to be used.

With a few reservations noted below, the discussion under the heading Design requirements is probably the best section of Subpart E. Possibly, the reason for this is that it is closest in character to questions for which precedents exist in licensing of reactors. The first reservation concerns Compliance with mining regulations; a repository is not a mine. To "design and construct" a repository "to comply" with "all applicable Federal and State mining regulations" may not result in the best repository. Certainly, they should be applied where beneficial and this is likely to be the case in the underground operations but not applied indiscriminately elsewhere. Items 7 and 8 under this heading are very important; sufficiently so to warrant a separate discussion.

Items [2] Construction and mapping records and [3] Retention of cores and logs on page 31406 and other vitally important data are identified but no mention is made of how this information should be adduced to confirm or reject the suitability of a site. Such information must be collected, analyzed and adduced on a continuing basis throughout the development of any repository.

Under General design requirements for subsurface operation a highly significant statement concerning the design of a repository in modules is made. This

concept should not be limited to repositories where concurrent excavation and emplacement of wastes are planned; it is not unlikely that even a suitable repository site will not be uniformly satisfactory in its properties. Modular design enhances greatly the opportunity for using those parts of a site which are suitable, without jeopardizing them by including parts found to be less than completely suitable.

In conclusion it is suggested that a systematic, hierarchical approach to the establishment of geologic waste repositories is likely to facilitate the development of defensible regulatory criteria, including those of a specific nature, and that it is important to recognize that the establishment of a repository is likely to be a continuing process of selection based on the absence of any features which would disqualify a site or the repository within it, from providing reasonable assurance that radioactive wastes will be isolated from the biosphere adequately.

Yours sincerely,

Neville G. W. Cook

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Member ONWI Earth Science Review Group

NSWC/em



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Mr. L.B. Myers
Office of Nuclear Waste Isolation
Battelle
505 King Ave.
Columbus, Ohio 43201

26 June 1980

Dear Mr. Myers,

Enclosed are my comments on 10CFR60, sub-parts E-1. I apologize for being tardy with this. My schedule during the past six weeks has been so crowded that I simply have not had enough time to get everything completed in time. I have very carefully studied this document, and chose to be late rather than do a hasty job of it. I have sent copies of these comments to the other members of the Earth Science Review Panel, and to Dr. Carbienier.

Sincerely yours,

John M. Bird
Professor of Geology

COMMENTS ON THE NUCLEAR REGULATORY COMMISSION DOCUMENT 10CFR60, TECHNICAL CRITERIA FOR REGULATING GEOLOGIC DISPOSAL HIGH-LEVEL RADIOACTIVE WASTE, IN THE FEDERAL REGISTER OF 13 MAY 1980, PAGES 31393-31408.

JOHN M. BIRD
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GENERAL COMMENTS

Concern about the safe disposal of radioactive waste has led to the general agreement that high-level wastes might best be buried within rocks of the Earth's crust. This consensus is founded on the knowledge that geologic features can be very old, and that a mined repository could be essentially permanent and isolated from the biosphere during the time required for isolation of the radioactive wastes. Essentially, two main barriers are provided by geologic disposal, containment of the waste in a waste-form and "package" that can be very resistant to leaching, and utilization of rocks, that because of their composition, geometry, and age, could prevent or retard possible migration, via ground water, of the radioactive elements to the biosphere. The various proposals for geologic waste-disposal utilize our knowledge of the behavior of rocks and geologic processes, and our ability to determine the amounts of time during which many various rocks and geologic features in the Earth's crust have persisted.

For many centuries mankind has extracted geological materials from the Earth. Today, we have a highly developed knowledge and technology of mining, and exploration for useful rocks and minerals. To face, the

basis for industrial economics is mineral and fuel extraction from the crust of the Earth. Geologic disposal of radioactive waste involves mining practice, however, with a very significant difference. What is desired, the opposite of a mine, is to put radioactive waste into the Earth so as to completely isolate it from the biosphere for times sufficient to ensure complete safety. Unfortunately, the magnitude and difficulty of this task have been underestimated until a few years ago. Now the magnitude and difficulty are being overestimated, and confused, in the context of the geologic aspects of the task. It is known that many of the various ore bodies and other rock resources mined by humans are hundreds, even thousands of millions of years old. A very sophisticated technology exists for dating these rocks, and a great deal is known about how these rocks have formed and persisted during geologic time. We know a great deal about how to extract mineral resources. What we want to know now is how to return something into the Earth so that it stays there. Therefore, it is my view that, essentially, we must utilize all those aspects of rocks, minerals, and geologic processes that produce "permanent" geologic assemblages, for the design and construction of a geologic repository. Rather than "fight" the geologic environment by constructing an "unnatural" repository that would inexorably be altered by geologic processes, we must construct a repository of materials and within sites that can be demonstrated will remain in geologic "equilibrium" at depth, for a time sufficient to insure complete isolation and immobilization of the waste. Appropriate rocks, analogs of rocks and minerals, and geologic processes can be incorporated in the design and construction in ways that enhance our confidence in the safety and permanence of the repository. For example, the heat generated by the

radioactive waste can be used to drive mineralogic reactions that further seal the host-rocks and retard water-migration; waste canisters can be made of analogs of natural rocks and minerals having properties that provide great inertness and strength. My view is that the underlying philosophy for geologic disposal of radioactive waste should be to utilize all the various geologic materials and processes that lead to chemical stability and permanence as can be demonstrated in natural geologic examples. In a sense, geologic disposal of radioactive waste is the reverse of mining. Certainly there is nothing "new" about mining. However, what we are attempting is to create a long-lasting geologic feature rather than consuming one. The difficulty and magnitude of the task can, I believe, be constrained and well-defined by existing geologic knowledge. Our confidence in our ability to do so, and our confidence in resulting repository designs, will be based on our understanding of geology and geologic time rather than "expert" opinions. It is not enough to satisfy a select group of experts that the design is viable and safe. Although the repository must be evaluated and demonstrated to be safe in the most rigorous ways by our most capable minds, it must also be understandable and acceptable to all concerned. We should be able to explain and predict the behavior of the geologic repository in terms similar to those used to explain a 150 million-year-old dinosaur skeleton to a museum visitor.

It is with these views that I have studied 10CFR60,E-1; I have concentrated on those parts that are within my expertise, geology. This is in many ways a very good document. It provides a great deal of information about various aspects of the endeavor, and tasks that must be completed. However, I find that appreciation of the geologic

aspects of the task is, in places confused or lacking. The document fairly states what the objectives are; however, it does not provide much evidence of a basic understanding of geologic materials and processes, and the opportunities for utilizing this knowledge to enhance the permanence and safety of a mined repository. Rather, the document reflects a lack of confidence and understanding in detail of the geologic aspects of Geologic Disposal.

SPECIFIC COMMENTS

P. 31394, Nature of the Problem, 1st paragraph. It is not clear how these "five distinct problem areas", lifetime of the repository, physical extent, waste/rock interaction, treatment of uncertainties, and human intrusions, supercede other, more fundamental questions pertinent to regulation of geologic disposal. Although they are important, there are other questions of equal or greater importance, eg. the validity of the basic premises of geologic disposal, the existence of appropriate sites, rocks, and limited hydrologic conditions. Also, it can be argued that one or two large repositories present problems that could be avoided by constructing many small repositories. As more waste is concentrated into a single site, the potential dangers increase significantly. A.E. Ringwood (pers. comm. and pre-print, April, 1980) has argued that deep-drill-hole burial in many sites has significant advantages. Has it been shown that large repositories at a few sites are preferable to many small and therefore dispersed, deep repositories?

P. 31395, no. 3, waste/rock interaction. "The chemical and thermal properties of the wastes undoubtedly will have a significant interaction with the rock unit into which they are emplaced". Although significant

heat would be generated by the waste, and would affect the surrounding rock, the statement implies that chemical reactions also would take place between the waste and the rock. One would certainly hope not! The technology exists to matrix the waste in extremely inert materials and to encapsulate the waste-matrix material in containers and overpacks that constitute a package that would prevent chemical reactions between the waste and host-rock. The matrix material and container can be constructed of analogs of minerals and rocks that are extremely inert, resistant to leaching, and of very high mechanical strength. Their behavior in repository conditions can be predicted from examples in the geologic record.

P. 31395, no. 4, Treatment of uncertainties. The statement, "First geologic disposal is an entirely new enterprise -- no experience exists with geologic disposal" is misleading. The endeavor of geologic disposal of radioactive waste is not comparable in difficulty, for example, to landing on the moon. A great deal of experience and technology already exist to facilitate the task. What we want to do is, in a sense, the reverse of mining. What we want to have is great confidence in the permanence and safety of the resulting construction. Also, in the next sentence, "based upon observations of the past" does not make sense. What is intended, I believe, is -- based on observations and interpretations of the geologic record. The discussion of uncertainty is rather complex and confusing. I would argue that a large number of "geologic and hydrologic elements" in itself does not always lead to compounding uncertainty. Would one argue that a detailed map of the rivers of the U.S. is uncertain? We must specify scales when considering uncertainties

in geologic features or processes. Also, the last sentence is certainly wrong. How is it possible to argue that temporal and spatial relations are "separable aspects" of geologic disposal? This sentence supports my earlier view that the document is in places lacking in geologic understanding.

P. 31395, no. 5, Human intrusions. "The only logical recourse, since engineering against human intrusion is impossible practically, is to avoid targets, i.e. sites which may invite such intrusion". If significant amounts of spent fuel are put into a geologic repository, an ore body has been created.

P. 31396, considerations, (1) systems approach. The concept of "natural and engineered barriers" has led to considerable problems in assessing geologic disposal schemes. I consider this section to be one of the best examples in 10CFR part 60 of a lack of basic understanding about the geologic aspects of geologic disposal. If one argues that all of the components of the repository must be made of geologic materials or analogs of geologic materials, including the waste package, then "engineered barriers" are not something comprised of an artificial material for which there is no analog to be studied in the geologic record. In other words, much of the discussion in this section is based on the view that the repository will contain parts made of artificial materials that will change or fail during the lifetime of the repository. It is stated that -- "The state-of-the-art in the Earth sciences is such that all of the uncertainties associated with these functions can not be resolved through consideration of the geologic setting". This is not so. The Earth sciences can explain in great detail how rocks billions of years old

formed and have existed to the present. Given a specific geologic site, many combinations of "engineered barriers" comprised of analogs of geologic materials can be compared and selected in designs to reduce or eliminate uncertainties about the performance of the repository. The statement -- "Engineering can be used to narrow the extent of geologic processes which need to be considered in the rule making and licensing processes; that is, engineering can be used to bound and/or diminish the importance of certain geologic processes" -- does not make much sense. Essentially, this is a philosophy that one "fights" the geologic features. I would argue that the repository must utilize the geology and be comprised of geologic materials of known properties and behavior under the conditions that would prevail in the geologic setting. Finally, the statement -- "Similarly, to the greatest extent possible, the performance of the engineered systems should be insensitive to changes in those characteristics and should provide a high degree of protection by themselves" reflects a lack of understanding about the possibility of introducing ingredients into the repository/waste package that in anticipation of changes such as inflow of water, would be sensitive to the change and react in such a way as to counter the adverse event. Many such analogs of rock/mineral systems could be "engineered" from our understanding of geologic environments and processes. These possible ingredients for specific sites and anticipated processes need to be studied in detail. They promise to greatly increase our confidence about the behavior of a repository during its lifetime.

P. 31397, no. 3. The nature of the major regulatory elements. "The two most important attributes of the natural barrier are that the site should

be geologically simple and stable so that the site can be easily understood and so that there can be confidence that the ability of the site to contain and isolate the wastes will remain viable for long times". I would ask what constitutes "simple and stable". For example, basalt is not a "simple" rock in terms of its composition. What constitutes stability, eg. tectonic stability, chemical stability, thermal stability, and to what limits? In the second paragraph, -- "their insensitivity to any changes in the site characteristics so that there can be confidence in the predictability of their performance over time"; this requirement is wrong. It can be argued that one can engineer a "barrier" that would be sensitive to a change, and would react so as to counter deleterious effects of the change. For example, an overpack containing MgO would react with entering water to produce brucite, $Mg(OH)_2$. The reaction has a significant volume increase and could tend to seal the water pathways and counter the further encroachment of water.

P. 31397, no. 5, Codification of models in licensing process. The first sentence of the second paragraph is too complex. Also, as stated in the next sentence, I am not sure that it is a fact. However, the point that we should not rely solely on quantitative calculations and assessments in developing technical criteria, or licensing, is very important. It is well known that geologic features and processes have many variables. Attempts at quantification can lead to a great deal of effort to solve what might be relatively unimportant or ancillary questions.

P. 31398, 1st column, 17 lines from bottom, -- a satisfactory if imprecise margin of safety for site characteristics and engineering design can be realized". What is an imprecise margin of safety? I do not think it would be satisfactory.

P. 31398, Questions (1). My view, from the preceding is no, the list of considerations does not clearly, adequately and fully identify the relevant issues involved in the disposal of high-level wastes.

P. 31399, Sub-part E, Technical Criteria, definitions. "'Expected processes or events' - means those natural processes or events that are likely to degrade the engineered elements of the geologic repository during a given period after decommissioning." How are these processes or events distinguished as being deleterious? Some might improve an "engineered" barrier, as discussed earlier.

P. 31399, 2nd column, overpack. -- "any additional receptable (sic), wrapper, box or other structure" -- I would suggest adding material to the list because a component of the overpack might not be only structural.

P. 31399, 3rd column, stability. The definition is too imprecise, and does not make clear the distinction between rate of natural processes versus events of short duration during the specified period of the next 10,000 years.

P. 31399, 3rd column, underground facility. Seals might be made of geologic materials and be part of the engineered structure.

P. 31400, Siting requirements, (a) general requirements. It is not clear what -- "not so complex" means. For example, the tectonics of salt domes can be very complex and the petrology of the rock salt relatively simple. The tectonics of plateau basalts is relatively simple whereas the petrology of the basalt is quite complex. This is an important requirement and its intentions must be made quite clear. Under (2) -- "The natural conditions

include geologic, tectonic, hydrologic and climatic process". "Tectonic" and "hydrologic" are part of the geology of a site and should not be distinguished as separate "natural conditions". In (i) following, on what basis was 100 kms selected. The list of objectives of understanding the geology and climate of a site preclude specifying such a distance before-hand. This distance would have to be evaluated on a site-by-site basis.

P. 31401, 1st column, (8). Under (ii) — have not been exploited but are exploitable under present technology and market conditions". This is an important task. However, it is not clear why, in terms of the desire to understand the possibilities of human intrusion, why the resources would be estimated using present market conditions. For example, one hundred years ago, a large copper ore body became uneconomic if the grade of the ore went below approximately 14%. Today, such an ore body would be valuable.

P. 31401, 2nd column, (i)-(vi). At what level would all of these questions and tasks be resolved? I very much doubt that all of the fractures, for example, at a given site could be recorded; how would the "bulk geomechanical properties" be recorded, and at what level of detail, etc? These topics constitute a list of things that, from a geologic point of view, could never be "satisfied" beyond some level of accuracy and description. To present such a list in the way it is here again reflects a lack of judgement and understanding of geologic features, processes, and the ways they are studied.

P. 31401, 3rd column, (1)-(iii). Present market conditions should not be used, as discussed previously.

P. 31401, 3rd column, (2)-(ii). "There is evidence of dissolutioning, such as karst features, breccia pipes, or insoluble residues". Many breccia pipes are not the result of "dissolutioning", such as diatremes. Many sedimentary rocks contain evidence of dissolutioning, such as stylolites in limestone, and clay mineral segregations in rock salt. These features would not necessarily be potentially adverse natural conditions in a site. Also, under (iv) what amount of activity of the fault would be serious? It can be argued that all faults are active, even very ancient and "inactive" ones, because of tidal forces and plate movement. It is very important that (i) through (vii) be re-written and very carefully considered. These statements are based on the premise that any geologic "activity" would be detrimental to the site. One can argue that the converse might be true in the context of using geologic processes to enhance the repository design!

P. 31402, (4) Potentially adverse natural conditions -- geochemical, following to design requirements. This section is confusing and imprecise. It reflects a lack of understanding of potential benefits of ground water on sealing certain kinds of rock. Although it is true that waste-generated heat would tend to increase water flow, it is also possible that such an effect might be utilized to drive mineralogic reactions that would seal fractures and effectively prevent the water from reaching the waste package. This section reflects the general assumption that water in the repository site is always an adverse condition. We are not yet sure that this is so.

P. 31402, Design requirements. I do not have significant comments on this section. I found it to be clear and well thought-out, and the best part of the 10CFR60 document.

Bechtel National, Inc.

Engineers - Constructors

Fifty Beale Street
San Francisco, California

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DOCKET NUMBER

PROPOSED RULE

PR-60 (19)
(45 FR 31393)

Secretary of the Commission
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Docketing and Service Branch

Subject: Advance Notice of Proposed Rulemaking
on Technical Criteria for Regulating
Geologic Disposal of High-Level
Radioactive Waste



Gentlemen:

We appreciate the opportunity to provide comments during this formulative stage of developing technical criteria for regulating geologic disposal of high-level radioactive waste. In general, we are pleased that the NRC is developing such licensing criteria; however, we are disappointed with the unrealistic, arbitrary and imprecise nature of much of the current draft. We hope that the NRC final criteria will recognize the need for flexibility to allow greater realization of the benefits from existing geologic evidence, tested engineering practice, and future scientific innovation. In this regard, we request the NRC to take careful note of the information which will be generated and evaluated during the forthcoming Waste Confidence Rulemaking (44 FR-61372) and not to finalize these proposed technical criteria until that proceeding is complete, and the findings derived therefrom have been carefully considered.

Detailed comments from our review of the proposed technical criteria based on our engineering and construction experience are attached. In addition, we offer the following general comments which are more philosophical in nature and which underlie many of the more detailed comments of the attachment:

- Reasonable Assurance of Conformance to EPA Standards - The most significant of the overall repository performance objectives defined in Section 60.111 of the technical criteria is for the DOE to provide reasonable assurance that, after decommissioning, the isolation of the radioactive waste will conform to the applicable environmental standards established by the EPA. A major portion of this proposed rule deals with what the NRC considers to be necessary to provide this reasonable assurance. In dealing with this question, we believe that the NRC has placed undue emphasis on the nature of the uncertainties associated with transport of the waste through

Acknowledged by cert. 7/17/80 mdu

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the geosphere to the exclusion of other important considerations such as: the extent to which uncertainties can be negated or made inconsequential by bounding analysis and design; the very large costs in both time and effort associated with quantifying and reducing uncertainties; and the incremental magnitude of risks associated with residual uncertainties. The deficiencies in the NRC approach are evidenced not only by the tone of the supplementary information and the excessive conservatism of the proposed criteria, but also by the working draft of the bases and rationale document which was placed in the NRC Public Document Room for inspection. This working draft deals almost exclusively with the uncertainties associated with geologic/hydrologic site characteristics, waste transport models, and supporting data. Little or no information or rationale is provided on the extent to which these uncertainties impact the risk to the public health and safety, or how these uncertainties when found to be safety significant can be reduced in importance by conservative design and analysis. Bechtel believes that the NRC requirements could be greatly simplified and the apparent excessive conservatisms removed if these additional factors in dealing with the question of reasonable assurance are given adequate attention.

- Codification of Models - The staff's position "not to require modeling to be the primary decision tool to determine the capability of the geologic repository to contain and isolate waste from the biosphere", as stated in the Supplementary Information, is unfounded and inappropriate. Models are generally recognized as the primary means for assessment of all complex technological systems where neither direct experience nor recourse to experimental verification exists. They are the means to systematically and logically express the sum of our knowledge (both factual and judgemental) concerning the behavior of a system under a postulated set of conditions. In addition, models can and should be used as a means to unify "expert opinion" so as to eliminate controversy and the imposition of arbitrary and capricious judgements on an ad hoc basis. Qualitative factors and judgements can be readily incorporated into models to assure that they provide conservative predictions of system behavior and adequately bound or account for the uncertainties of our knowledge. Furthermore, requirements can be established that require models to predict acceptable system behavior under a set of initial conditions that are extreme or even incredible. Consequently, the staff's arguments that models cannot accurately predict the behavior of a repository system do not detract from the fact that models can and should be used as the primary decision tool for system assessment.
- 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.

- Waste Package Integrity - The requirement that the waste package integrity be maintained for 1000 years with full or partial water saturation of the repository area is excessively conservative and cannot be justified if the other requirements for siting and design of the repository system have been achieved. Such an occurrence should be incredible if the repository has been properly sited and designed. It should be noted, however, that even if the waste package should fail in considerably less than 1000 years due to hypothetical water intrusion, the consequences to the public health and safety would be negligible unless the geology/hydrology of the repository area also changed drastically in that short geologic time period. If such arbitrary and totally unfounded postulations are to be made, geologic disposal of nuclear waste may be ruled out entirely.
- As Low As Reasonably Achievable (ALARA) - ALARA should not be applied to a new technology where an experience base does not exist and cost-benefit analyses have not been performed. However, if the provision is retained in the regulation, guidance should be given for performing the cost-benefit analysis. An example of this type of guidance is indicated by the following statement from 10CFR50, Appendix I:

"....the applicant shall include in the radwaste system all items of reasonably demonstrated technology that, when added to the system sequentially and in order of diminishing cost-benefit return, can for a favorable cost-benefit ratio effect reduction in dose to the population....As an interim measure and until establishment and adoption of better values (or other appropriate



criteria) the values of \$1,000 per total body man-rem and \$1,000 per man-thyroid-rem (or such less values as may be demonstrated to be suitable in a particular case) shall be used in this cost-benefit analysis."

When the ALARA approach is used, it is generally recognized that a "de minimus" level has not been achieved. For waste repositories, it is expected that for most repository breach scenarios (with the possible exception of human intrusion) it can be shown that de minimus levels of radiation exposure will be achieved. For this reason it is recommended that the ALARA objective be deleted.

It is our hope that you will find these comments and those of the attachment useful in finalizing the proposed technical criteria for geologic disposal of high-level radioactive waste. Should you have any further questions on this important matter, I would be pleased to provide the assistance of my staff.

Very truly yours,

Ashton J. O'Donnell
Vice President

AJO/tf
Attachment

cc: John F. Ahearne

DETAILED COMMENTS ON NRC PROPOSED TECHNICAL CRITERIA FOR 10 CFR PART 60

Technical Criteria for Regulating Geologic Disposal of High-Level Radioactive Waste as published in Federal Register, Vol. 45, No. 94 - Tuesday, May 13, 1980.

Supplementary Information

1. The discussion contained in this section approaches the development of a HLW repository from a very negative point of view. The section portrays a lack of confidence on the part of the NRC to deal with uncertainties, and emphasizes potential shortcomings of geologic repositories by statements like "such disposal of HLW is separable into five distinct problem areas" when not all of the areas identified may be problems, "waste undoubtedly will have a significant interaction with the rock" which we would not expect to be true over the time frames of interest, "no way to reasonably limit the variety of human activities which might compromise a forgotten repository", "engineering against human intrusion is impossible practically", "the site should be geologically simple... so that the site can be easily understood", "mistakes will occur", and "human intrusion cannot be prevented." Such absolute statements are negatively oriented and could lead to public misunderstanding and lack of confidence. Both overly negative and overly positive statements that tend to prejudge the concept of geologic disposal should be avoided.

Section 60.2 - Definitions

2. The definition of items "important to safety" does not include engineered items which are important for assuring the long term isolation of the waste from the biosphere, e.g., the waste form, container and overpack. Should such items be considered within the definition of important to safety?
3. The definition of "important to safety" uses the words "without undue risk to the health and safety of the public". Due to lack of specificity, this qualitative definition has caused much difficulty in the licensing of reactors. It is recommended that the definition be quantified to specifically apply to items essential to the prevention or mitigation of the consequences of operational accidents that could result in exceeding some defined radiological release or exposure limits.
4. The term "unreasonable risk" is employed in Paragraphs 60.101(b) and 60.171(b). Is this intended to be the same as "undue risk" used in Paragraph 60.2 or to have a different meaning? Please clarify.
5. Paragraphs 60.133(b)(4)(iii) and 60.171(b) use the term "safety related", in one case referring to safety related structures, systems or components, and in the other to functions of structures, systems or components.

Are these intended to be the same as structures, systems and components "important to safety"? In 10 CFR Part 50 the nuclear industry has lived with an ambiguity between these terms for many years. It is recommended that the same conflict not be repeated in Part 60. It would seem that the requirements should consistently refer to functions of structures, systems and components important to safety, or it should be stated that the terms "important to safety" and "safety related" as applied to equipment functions are synonymous.

6. The term "single failure" is used in Paragraph 60.132(b)(8)(1) but is not defined. It is not clear whether this refers to an "active" failure or both "active" and "passive" failures. In nuclear plants, the single failure applies to a single active failure unrelated to the initiating event. Is this intended here? Single failure should be defined in Section 60.2.
7. The definition of "TRU waste" should be more specific since as currently defined spent fuel could be classified as either HLW or TRU waste. Is this overlap intended or are the definitions of TRU waste and HLW meant to be mutually exclusive as is implied by the criteria of Paragraph 60.111 (c)(3)?

Section 60.111 - Performance Objectives

8. 60.111(a)(1) - This paragraph specifies exposure or release limits during normal operation but does not specify limits for operational accidents. Should limits comparable to those of 10 CFR Part 100 apply? It should be noted that, due to the nature of potential releases from repositories under both normal and accident conditions, exposure limits need to be expressed in terms of dose commitments to critical organs for a defined time period.
9. 60.111(a)(3) - We recommend that the retrievability period be shortened to extend for no more than 10 years beyond the waste emplacement date. Such a requirement would appear to be as arbitrary as the proposed 50-year requirement, but would have the advantages of much reduced cost and assuring the continued viability of soft rock media, while still satisfying EPA requirements.
10. 60.111(a)(3) - The basis upon which a decision could be made to retrieve the waste is not clear. Certainly the decision could not be expected to derive from the monitoring program of Paragraph 60.137 in a 50-year period if the system had been found to satisfy regulatory requirements for long-term barrier performance. Rather such a decision to retrieve would have to be based on some other type of data or predicted environmental occurrence. However, in the highly unlikely event that a decision were made to remove the waste, the requirement to provide for retrievability within a time period that is about the same as that in which it was emplaced seems to have little or no justification considering the low probability of having to perform this operation and the

relatively large costs, difficulties, and timeframe associated with having to ship and dispose of the wastes at some other location. Therefore, it is recommended that the requirements for the retrieval timeframe be deleted from the overall retrieval requirement.

11. 60.111(c)(2) - The first paragraph of this section states that waste package integrity must be maintained for the first 1000 years given various water flow conditions including full or partial saturation of the underground facility. Paragraph 60.111(c)(2)(i) then requires that the design environment for the waste packages promotes the 1000-year package integrity without full or partial water saturation required. Thus, if the initial requirement is intended, the requirement of Paragraph 60.111(c)(2)(i) appears superfluous.

Paragraph 60.111(c)(2)(ii) is even more confusing in that it states that the 1000-year integrity requirement must be satisfied (presumably without water saturation) but that some of the waste dissolves soon after decommissioning. The statement is self-contradicting and should be deleted.

12. 60.111(c)(3) - After 1000 years, it should be assumed that the waste packaging (engineered system) has performed its required function and that it is then the function of the remaining barriers in conjunction with the leach rate of the waste material (waste form) to assure that the EPA criteria for radioactivity release to the biosphere are not exceeded. Thus, it is unnecessary and inappropriate to stipulate a maximum leak rate from the engineered system after 1000 years. This type of requirement adds nothing to the reduction of risk to the public since it is not likely to influence the waste package design, but it could cause considerable difficulty and delay in the licensing process assuming demonstration of the criteria is necessary. This same comment applies to the TRU waste packaging where the leak rate criterion is applied starting at decommissioning.

Section 60.121 - Site and Environs Ownership and Control

13. 60.121(c) - Limiting institutional controls to only 100 years is overly conservative. Although the controlling organizations of today may not be the same ones 500 years from now, it is not unreasonable to assume that there will be some controlling authority. Past history has shown that civilized and conscience authority has been present at least since the end of feudalism (1000 to 1200 A.D.). Hence, planned and planning organizations have been present for the past 700 to 900 years.

Section 60.122 - Siting Requirements

14. 60.122(a)(2) - "Geologic" includes "tectonic". If tectonic is segregated out, then other geologic aspects should be segregated also.

15. 60.122(a)(2) - The rule requires investigation and evaluation of "natural conditions" and "human activities" that can affect various repository activities. However, subsequent paragraphs (i), (ii), (iii) seem to be directed toward "natural conditions" only. It is recommended that combining the terms "natural conditions" and "human activities" should be avoided. They are very separate.
16. 60.122(a)(2)(i) - The paragraph requires the conduct of investigations over a radius of 100 km, however, the amount of detail required is not indicated. The investigations should be performed in much less detail beyond the first 2 km.
17. 60.122(a)(3) - The paragraph asks for "representative and bounding values" for "human activities and natural events" for three items. Two of the items, (ii) and (iii), ask for "demonstration" of natural events only, which is not compatible with "representative and bounding". It is recommended that sections (ii) and (iii) be combined and made a separate number, e.g. (4).
18. 60.122(a)(5) - The paragraph requests site investigations be done in such a manner to produce minimal adverse effects on long term performance. Early shafts, particularly on multiple sites as requested by the Commission, could produce significant adverse effects.
19. 60.122(a)(7) - The DOE is required to "continuously" assess and verify changes. An assessment and verification time period should be stipulated.
20. 60.122(a)(8) - The request is made to assess the site within 100 km radius using available literature. However, it is also requested to use geologic and geophysical information to evaluate mineral deposits. Is it the intention of the commission to require geologic or geophysical surveys if none are available? Furthermore, the resource assessment should be in far less detail beyond say the first 10 km from the center of the site.
21. 60.122(a)(9)(i) - The paragraph calls for characterization of fractures, etc., of the "host rock and confining units"; however, in some cases (e.g. granite) there may be no confining unit, and if there is it may not be within the "volume of rock" defined at the beginning of Paragraph (9).
22. 60.122(a)(9)(iii) thru (vi) - Is it intended that the term "in situ" imply a shaft to repository level to acquire data? If so, this intent should be clearly stated. However, we believe that in situ tests in shafts and drifts are necessary only for site validation purposes after site selection. It should be noted that in situ determinations in a host rock will not guarantee that the measured condition exists throughout the repository.

23. 60.122(a)(9) - The last paragraph of this section states that "the Department shall assume that the volume will extend a horizontal distance of 2 km....", whereas the first paragraph of this section indicates the applicant shall determine what volume of rock will be significantly affected by construction of the geologic repository. We believe that determining in situ properties for a volume at least 2 km from the limits of the repository and 1 km deep is excessive for this purpose.
24. 60.122(b) - The statement "the presence of any of the potential adverse human activities or natural conditions will give rise to a presumption that the geologic repository will not meet the performance objectives" is extreme and could rule out many excellent sites. There is no basis for this presumption from the presence of such activities or conditions.
25. 60.122(b)(2)(i) - The word "extreme" should be defined.
26. 60.122(b)(2)(ii) - "Karst features", "breccia pipes" and especially "insoluble residues" are not necessarily "extreme" bedrock incisions.
27. 60.122(b)(2)(iii) - Such evidences are often not extreme bedrock incisions.
28. 60.122(b)(2)(iv) - The term "near field" should be defined.
29. 60.122(b)(2)(v) - Having a "higher seismicity" is certainly not an extreme bedrock incision, and may not even be a potential hazard.
30. 60.122(b)(2)(vi) - A higher than regional geothermal gradient may not be extreme.
31. 60.122(b)(3)(iv) - A length of "a few hundred meters" is too vague and should be defined.
32. 60.122(b) - The section at the end of 60.122(b) that rebuts requirements stated earlier is confusing and should be incorporated in the individual sections.
33. 60.122(c) - Several references are made to a host rock possessing "to the extent practicable" certain characteristics (page 31402, middle column). While one can probably understand what the Commission is suggesting, the meaning is diffused with the use of "practicable". Rocks cannot possess favorable characteristics as practicable.
34. 60.122(c)(1)(i) - Requirement may be too stringent and not attainable.
35. 60.122(c)(1)(ii)(a) - "Long flow paths" should be defined. Does this imply distance or time? Time would be preferable.
36. 60.122(c)(1)(ii)(b) - "Surrounding confining units" need not possess inactive ground water circulation if there is little or no communication to the host rock.

37. 60.122(c)(2)(v) thru (vii) - These sections do not fit in 60.122(c)(2).

Section 60.132 - Design Requirements

38. 60.132(b)(4)(i) - The requirement to "minimize" the release of radioactive materials in effluents during normal operations should be deleted. The requirement to meet the requirements of 10 CFR Part 20 which requires ALARA has already been specified.
39. 60.132(c)(2)(ii) - A regulatory requirement for design optimization is inappropriate. It should only be necessary to demonstrate with reasonable assurance that safety and environmental requirements have been met.
40. 60.132(c)(6)(i) - This requirement should be deleted. The requirement implies that the definition of "important to safety" is not adequate for all components. If this is the case, the definition should be changed. Determining that certain components are important to safety by regulation in advance of design is not defensible.
41. 60.132(c)(6)(ii) - This requirement prejudices the design and prevents the DOE from using more desirable equipment or mitigating devices should they be available. At most, the requirement should specify a no-free-fall characteristic.
42. 60.132(c)(9)(ii) - "Geologic repository operations area" should replace the word "repository". This requirement also implies that water will be allowed to flow into or from the repository operations area. Please clarify.
43. 60.132(d)(3) thru (5) - The portions of these paragraphs that dictate techniques instead of specifying objectives and standards should be deleted. During the licensing review, the NRC can review the techniques or methods developed to meet the standards imposed.
44. 60.132(f)(3)(i) and (ii) - Change the concept of this requirement to one of reducing hazards and potential for errors to acceptable levels. The Department cannot demonstrate that minima have been achieved for these items.

Section 60.133 - Waste Package and Emplacement Environment

45. 60.133(a)(1) - Revise this requirement merely to give acceptable standards. Optima cannot be demonstrated.
46. 60.133(a)(5) - Revise this requirement. Delete the specification for waste package tests to verify performance objectives. This is not possible. Waste package life can be verified only by an analysis based on test data that indicate performance requirements are likely to be met. Delete the reference to 60.133(a)(2). It is not necessary to test waste packages to ensure that site functions are not compromised.

Section 60.135 - Retrieval of Waste

47. 60.135 - Revise this requirement to say that the EPA standards covering release shall be met. Whether packages are intact and whether all material is recovered is immaterial. And it is impossible to predict and guarantee compliance. For example, there may be a very small fraction of waste packages that are not intact even at the time they are emplaced.

Section 60.137 - Monitoring Programs

48. 60.137(a) and (c) - Define the terms, "site" and "engineered elements of the geologic repository".
49. 60.137 - Delete the requirement to monitor through the period of institutional controls. This monitoring cannot verify in the short term that EPA standards will be met through millions of years. And in the short term of say, 1000 years, there is no undetected way enough nuclear material can be transported and released to exceed EPA standards. Monitoring prior to decommissioning should be sufficient.

General

50. The criteria requires the avoidance of resources that are economically exploitable, and in Paragraph 60.122(b)(2)(vii) includes as such a resource "... a high and anomalous geothermal gradient relative to the regional geothermal gradient". However, we also should acknowledge that the placement of heat-producing materials in a repository will build up the surrounding temperatures to a level that might be interpreted by a future explorer as just such a high and anomalous geothermal gradient. Thus, we must conclude that we can have administrative controls for longer than 100 years, or we must not entice the explorer by allowing temperatures to rise to the level that he might interpret as being of interest. The term "high" needs to be defined.

In this regard, it is perhaps important to categorize the wastes by a thermal characteristic, as well as the radioactive characteristics, with the distinction being the time period during which the surrounding media temperature will be increasing (due to a heat generation rate that is greater than the heat dissipation rate) and a time period after which the surrounding media will have essentially returned to normal background temperatures. (It always will be somewhat above ambient.)

51. We suggest that the Criteria should provide general guidelines defining technical criteria for a safe HLW repository. To attempt to include every conceivable qualification that may or may not occur or may or may not be important for the suitability of a site will invite never ending challenges from intervenors and a correspondingly unnecessary lengthening of the repository licensing process. For example, statements like "There is a fault or fracture zone, irrespective of age of

last movement, which has a horizontal length of more than a few hundreds of meters" (page 31402, line 28) is unreasonable as a technical criterion and is only a means by which an otherwise adequate site can be disqualified. It would be to the advantage of the program if those working to develop a safe repository could feel confident that the rules outlined in the 10 CFR Part 60 were directed toward licensing a repository, not away from it. Presently the NRC is working toward revising 10 CFR Part 100 to remove some of the specific details which the NRC has found are unrealistic or unnecessary. It seems that this type of problem should be avoided in 10 CFR Part 60.

52. There is need for improving the paragraph and respective subparts numbering system. As it now stands, referencing or finding a particular subpart is very cumbersome.

Westinghouse
Electric Corporation

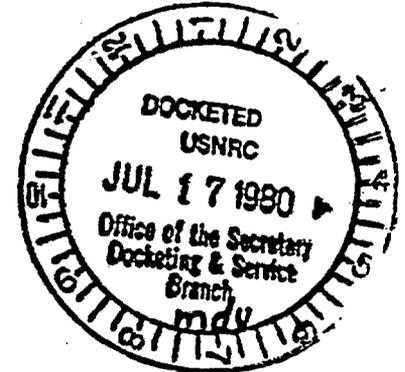
Power Systems
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Box 10864
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M. T. Johnson
General Manager
Advanced Energy Systems Division

July 11, 1980

DOCKET NUMBER **PR-60** (20)
PROPOSED RULE **(45 FR 31393)**



Secretary
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

ATTENTION: Docketing and Service Branch

SUBJECT: Technical Criteria for Regulating Geologic Disposal, High-Level
Radioactive Wastes

Dear Sir:

This is in response to your advance notice of proposed rulemaking 10CFR Part 60, "Technical Criteria for Regulating Geologic Disposal High-Level Radioactive Waste."

Westinghouse has the following general comments on the specific questions raised in the "Supplementary Information" section:

- a. Instead of focusing on performance of the repository system (NRC Consideration 1), the draft criteria specify performance standards for major components of the system (NRC Consideration 2). These component performance standards should be eliminated. We believe it is essential that the criteria focus on performance of the overall system and on protecting current and future generations.
- b. The list of considerations should be expanded to acknowledge that the draft technical criteria apply to a repository which will not be operational before 1997, according to latest Administration schedules. The initial rule should develop performance goals and requirements for the overall system. The current draft criteria incorrectly specify engineering design requirements. Instead, the criteria should provide the future designer and analyst with guidelines that allow the latitude necessary to accommodate repositories in various geologic media, advances in technology, and the influence of complementary regulations such as EPA Standards. We do not believe that these aspects have been thoroughly considered. For instance, paragraph 60.132 "design requirements" are too specific in addressing shaft and borehole sealing, conveyance design, and water control requirements.

acknowledged by 7/17/80 mdy

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In being so specific, they arbitrarily constrain the benefit of future research and development or suitability of a specific site. Paragraph 60.111 refers to as yet unestablished EPA performance standards but is very specific in defining release rates for the repository. Conversely, the technical criteria also contains words like significant, optimized, reasonable, likely, etc. when addressing other issues. These areas must be kept to a minimum to discourage future conflicts in interpretation.

- c. The Commission should consider requiring the Department of Energy to conduct early demonstrations of repository disposal systems in various geologic media such as those proposed in House Bill H.R. 7418. This would allow the Commission to develop the 10CFR60 regulations in conjunction with the design, construction, and operation of the required system demonstrations.
- d. Many of the draft technical criteria are not reasonable or realistic, and as such do not deal with the issues in an appropriate manner. In addition to specifying engineering design requirements (see comment b above), many of the numerical criteria appear to be arbitrarily selected. For example, this sense of arbitrary requirements exist in sections dealing with retrievability and resource assessment. It should also be recognized that numerical criteria apply to unique conditions which may not be generically applicable.
- e. The planned NRC environmental impact statement should justify proposed numerical criteria with cost/benefit analyses as required for such statements.

Additional detailed comments are provided in the attachment. Westinghouse fully recognizes the national importance of nuclear waste management, and is prepared to assist in any way possible in the resolution of our comments.

Very truly yours,

A handwritten signature in cursive script, appearing to read "M. Johnson". The signature is written in dark ink and is positioned below the "Very truly yours," text.

Attachment

ATTACHMENT - DETAILED COMMENTS ON ADVANCE NOTICE
OF PROPOSED RULEMAKING

1. General - As noted in our comment letter, we believe that many of the draft technical criteria are not reasonable or realistic, and as such do not deal with the issues in an appropriate manner. We recommend the following significant changes:
 - a. Component performance standards should be eliminated. Instead, the criteria should focus on the performance of the overall system and on protecting current and future generations.
 - b. The considerations should acknowledge that these draft criteria apply to a repository which will not be operational before 1997. Engineering design requirements should be deleted from the criteria. This is needed to provide the latitude to accommodate advances in technology, and future knowledge gained on various geologic media.
 - c. Numerical criteria should be justified by both technical analyses and by cost/benefit analyses.
2. General - Based on comment 1 above, significant changes will be required in the technical criteria. Our additional comments, listed below, are provided as illustrative examples. These do not represent a complete set of detailed comments on the draft technical criteria.
3. Considerations (6) 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 could require some re-mining and additional operations. However, the potential 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.

4. 60.2 - Under definitions, the definition of "barrier" should be expanded to include materials or structures which function to reduce corrosion and modify or exclude groundwater and thus prevent anything from getting to the radioactive waste to move it outward. As written, the barrier function only covers retardation of radionuclide movement outward.
5. 60.101 (e) - We believe the first sentence of this subparagraph should state that the "subsequent sections assume that disposal will not be in saturated media".
6. 60.111(a)(2) - This subparagraph refers to as yet unestablished Environmental Protection Agency performance standards which will apply to radioactive waste releases to the accessible environment after repository decommissioning. As such, it seems premature to specify an annual release rate (10^{-5} of 1000 year inventory per year) without guidance from the EPA.
7. 60.111(a)(3) - The last sentence requires that retrievability be accomplished in about the same period of time as that during which the wastes were emplaced. There is no technical justification for this requirement. The designer should estimate the time required for retrieval and design the underground structure to permit retrievability to be accomplished over the estimated time period. Since retrieval is not expected to occur, the design of the waste package should not be unnecessarily influenced by the time required for retrieval, which could be the case if a specified time requirement is imposed.
8. Paragraph 60.111, item (c) (1) and (2) - The footnote to these subparagraphs notes that these sections apply only to HLW. In fact, the entire regulation applies only to HLW and, as such, item (c) (3) should not distinguish between HLW and TRU waste. If a distinction is necessary, reference should be made in item (c) (3) (ii) to long-lived actinides contained within HLW such that the applicability of this regulation would not be confused.

9. 60.111(c)(1) - The beginning of this paragraph states that the waste packages shall be designed so that radionuclides will be "contained". Referring to the definitions of 60.2, "containment" means keeping radioactive waste within a designated boundary. In the case of the 60.111(c)(1) requirement, what is the designated boundary? One would assume that the designated boundary is the boundary of the waste package, but does this include the retrievable package or all components emplaced (such as a liner that might be preplaced)? This should be clarified.

This subparagraph also requires waste packages to contain all radionuclides for at least 1000 years given expected processes and events as well as various water flow conditions. These two requirements are not compatible. The assumption of full or partial saturation as part of expected processes and events is overly conservative and unreasonable. These types of conditions would most likely occur only as a result of gross failure of the geologic environment and all engineered systems, the very conditions against which the geologic environment and engineered systems were selected.

10. 60.111(c)(2)(ii) - This subparagraph requires the design of the underground facility to contain all radionuclides within the first 1000 years after decommissioning. In addition to expected processes and events, it requires the assumption that "some of the waste dissolves soon after decommissioning". This assumption appears overly conservative. Major efforts and expense are going into waste package design to contain all wastes for at least 1000 years so an assumption that some dissolves immediately after decommissioning is inconsistent.

Also, what is the "designated boundary" for containment? It cannot be the boundary of the underground facility since, after decommissioning, the boundary is not longer definable. What is important is that radionuclides not reach the accessible environment for 1000 years. This is accomplished by providing a waste package that will last for 1000 years and, in case of failure of the package, a geologic barrier that provides a radionuclide travel time of 1000 years as required by 60.111(c)(4)(iii).

11. 60.111(c)(3) - The title of this section should be "Overall Performance of the Engineered System After the Containment Period."
12. 60.121(c) - The last sentence indicates that institutional controls should not be assumed to persist for more than 100 years. Based on past history, this assumption is unnecessarily conservative. Also, the time assumed for institutional controls to exist should be specified to start after decommissioning.
13. 60.122(a)(2)(i) - The 100 kilometer radius specified for investigations has no technical basis. The area surrounding the repository site should be investigated to the extent required to characterize the principal features of the geologic regions in which the repository will reside. The extent of this area is site specific.
14. 60.122(a)(7) - This paragraph requires continuous verification and assessment of changes in site conditions. This is impractical if the word "continuous" is interpreted literally. Furthermore, there is no indication of how long this should be carried out.
15. 60.122(a)(8) - This paragraph requires estimates of all resources. This can be an endless job depending on the interpretation of "all" and the definition of a "resource."
16. 60.122(a)(9) - Many of the properties and characteristics required to be determined by the subparagraphs of this section are impossible or impractical to obtain in the implied detail without adversely affecting the future integrity of the repository. Also, use of field tests in lieu of on site in-situ tests and off site in-situ test where appropriate, should be allowed.
17. 60.122(b) - The applicability of this section should refer to Paragraph 60.122(a)(9), (2 kilometers from the limits of the repository) rather than item (a)(8), (within 100 kilometers of the site).

18. 60.122(b)(1) - In the draft technical criteria, paragraph 60.122(b)(1) "Potentially adverse human activities" the repeated use of the word "reasonable" when assessments are made may well lead to significant controversy. Better definitions would be appropriate and quantification best, if such were possible.
19. 60.122(b)(1)(iii) - This subparagraph indicates that the presence of economically exploitable resources would disqualify a site. This is overly restrictive since it will be difficult to find a site where no resources exist (again, what is the definition of resource). This restriction makes some sense in the case of a rare commodity, but not in the case of a commodity that is widely available since the probability of that commodity being sought for at the precise location of the repository is low.
20. 60.122(b)(1)(iv) - Resource assessments should be limited to the net comparative value of the resource since this value and not the gross value will determine the probability of recovery.
21. 60.122(b)(4)(1) - This paragraph is confusing and appears to be unnecessary.
22. 60.132(b)(2) - The option to overpack rather than decontaminate retrieved waste should be maintained.
23. 60.132(c)(2)(i) - The second sentence of this paragraph states, "The Department shall include an identification and a comparative evaluation of alternatives to the major design features that are provided to enhance radionuclide retardation and containment." It is reasonable to describe alternatives that have been considered, but as stated, this requirement implies a never ending search for perfection when the objective should be to exceed the performance requirements. Looking at all possible alternatives will not help in performing this function.

24. 60.132(c)(2)(iv)(a) - It is unclear what the phrase "sealed along their entire length" requires. It may not be desirable to provide a continuous seal from the repository level to the surface in lieu of a series of seals separated by backfill of the host rock. The criteria borehole plugging methods and their anticipated performance prematurely.
25. 60.132(c)(2)(iv)(a) - This subparagraph should be deleted. It is up to the designer, not the regulator, to determine how the shafts and boreholes should be sealed as long as the seals meet the performance criterion which is stated in the following subparagraph. Furthermore, the time of sealing will be dictated by operational considerations and should not be specified by the regulator. Subparagraphs (c) and (d) are redundant to the basic criterion of subparagraph (b).
26. 60.132(c)(2)(vi) - This subparagraph is incorrectly designated as (iv).
27. 60.132(c)(4)(ii) - This subparagraph indicates that the design of openings shall be "optimized". What is the meaning of "optimized"?
28. 60.132(c)(6)(ii), (iii), and (iv) - Criteria of this type should generically address the issue. It is up to the designer to develop a satisfactory means of meeting the criteria.
29. 60.132(c)(9)(iv) - This subparagraph talks about control of water from waste emplacement areas. Is the concern that the water might be contaminated? If so, it should be stated.
30. 60.132(c)(9)(v) - This is too specific. The concern should be specified along with a requirement that a means be provided to ameliorate the concern. It is up to the constructor to determine if pregrouting is appropriate.
31. 60.133(a)(1) - The comments on 60.132(c)(2)(i) and 60.132(c)(4)(ii) also apply here with regard to "comparative evaluation" and "optimization".

During the design process, it can be expected that a number of designs will be developed and evaluated. However, this is an evolutionary process aimed at achieving a balanced design to accommodate all the applicable functional requirements and performance objectives, some of which might be conflicting (for example, the desire to design a package to contain radionuclides for as long as possible is contradictory with the requirement for retrieval; that is, the package cannot be designed with such high integrity that it cannot be taken apart again). Making design comparisons solely for the purpose of comparison is not productive.

32. 6.133(a)(5) - Testing to show compliance with 60.133(a)(1) has no meaning. Testing should be directed toward supporting the basis for concluding that the performance objectives of 60.111 will be met.
33. Paragraph 60.133(c)(3) - Surface contamination limits should not be referenced to an exposure criteria but rather should relate to the waste package content such as the DOT regulations do.
34. 60.135 - The comment to 60.111(a)(3) also applies here with regard to the time period in which the waste must be retrieved.

July 13, 1980

DOCKET NUMBER
PROPOSED RULE

PR-60 (21)
(45 FR 31393)

Attached are comments on
Docket No PR 50-51

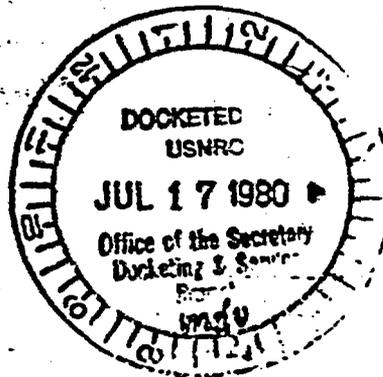
on Proposed Rulemaking - Technical
Criteria for Regulating Geologic
Disposal High-Level Radioactive
Waste

10 CFR Part 60

from
Federal Register / Vol. 45, No 94
Tues. May 13, 1980

Acknowledged by card... 7/17/80:mdv

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1. Lifetime of the Repository. Paragraph 3 states "...construction of repository and emplacement methods will not compromise...protect future populations." In the background info, we find that technical criteria is still under development. How, then, can we determine licensing for technical procedures that are not yet known.

Page 31395, para. 1 states "final protection is achieved by ability of geologic setting to inhibit migration of wastes..." Yet in Area 3 - Waste/Rock Interaction, we find that we know there will be a physical effect on the rock, but we do not know the extent of that effect. How, therefore, can we depend on the rock as final protection.

Page 31395 4. Treatment of Uncertainties "...no opportunity to observe behavior over the long term-the decision to close the repository in effect will be a statement of its expected behavior based upon inference, deduction and extrapolation..." Considering the nature of the waste, and the uncertainties of its interaction with rock, it would seem short-sighted to be unable to observe it. With that many variables, it would also seem short-sighted to be unable to retrieve it even 1,000 years from now, with some wastes having a half-life of 24,000 years.

Page 31395. 5. Human Intrusions. Those geologic, hydrologic or mineral resources that are not interesting to man now may be 1000 years from now

Page 31396. (3) "...simplicity and stability of geologic settings." Is it feasible to try to predict geologic events with regard to the longevity of hazardous waste.

(4) "...problems associated with HLW disposal are sufficiently understood, it is possible, even in absence of an EPA standard, to identify relevant areas of regulation..." This is debatable.

Page 31397 (4) Adequacy of Favorable and Unfavorable Site Characteristics to Impose Proper Technical Restrictions.

Reading and re-reading consideration #4 leads one to wonder how the NRC can possibly consider licensing the DOE for HLW disposal. Specifically "...the question of general site acceptability criteria is an open one in the sense that the staff has not identified to date such criteria..."

Page 31398 Para. #2 "...Through expert opinion in public proceedings, and the exercise of judgment by the Commission, a satisfactory if imprecise margin of safety for site characteristics and engineering design can be realized..."

satisfactory - maybe for DOE and NRC. What about the people who live near the site - will they be comfortable with a "satisfactory if imprecise margin of safety"?????

(6) Retrievability. Is it possible to pinpoint a safe date for sealing the repository.

(7) - Human Intrusion Problem "...Simply stated, human intrusion cannot be prevented..." Simply stated, that is seemingly a significant factor in consideration of licensing a geologic site.

Page 31400 60.111 (2) (ii) "...and that some of the wastes dissolves soon after decommissioning..." What wastes, how soon???

60.121 (a) Ownership and control of the geologic repository operations area. "...lands that are either acquired lands under the jurisdiction and control of the Department or lands permanently withdrawn and reserved for its use..." How does the DOE propose to "acquire" 2000-6000 Acres of land. In all probability, it will not be without considerable ill will by former land owners; certainly with the discomfort of neighboring landowners. What about control - completely by DOE? is it feasible or advisable for local input?

(c) Long-term control. It is good to see that the NRC recognizes that this procedure is of global concern.

"...For the purpose...institutional controls will not persist for more than one hundred years." Does that mean that after 100 years someone else (i.e. a private company) takes over management of facility?

Page 31401 (7) The Department shall continuously verify and assess any changes..." What if 51 years later adverse conditions appear and the repository is sealed? How often is "continuously"

Page 31404 (2) Waste isolation engineering (1) "The Department shall demonstrate that the underground facility includes those engineering features that are needed to limit radioactive releases after decommissioning to levels that are as low as reasonably achievable."

"Reasonably achievable" may vary from agency to agency, expert to expert.

Page 31405. (7) In situ testing and verification (iii)...The Department shall measure and monitor changes in subsurface conditions on a regular basis..." How regular - daily, every 10 years???

(9) Water control during operations "...The Department shall provide water control systems...to minimize the potentially adverse effect.... minimize - once again, ~~a subjective~~ ^{an imprecise} measure. The tendency to use such terminology is also extensive on page 31406 under (3) Waste handling an emplacement (1) and (ii)

Page 31407 60.135 Retrieval of waste "...The design of the geologic repository operations area shall provide for retrievability of the waste within a period of time that is about the same as that in which it was emplaced." ---Vague and non-specific

Respectfully submitted,

Ralph Tauke
Ralph Tauke, M.D.
Marilyn Adam

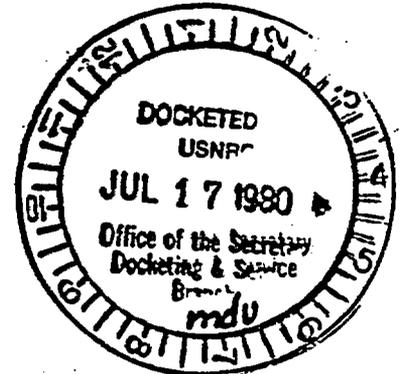
Marilyn Adam

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ENERGY RESOURCES CONSERVATION
AND DEVELOPMENT COMMISSION1111 HOWE AVENUE
SACRAMENTO, CALIFORNIA 95825

(916) 920-6815

July 14, 1980

DOCKET NUMBER PR-60 (22)
PROPOSED RULE (45 FR 31393)Secretary of the Nuclear
Regulatory Commission
Washington, D.C. 20555Attn.: Docketing and Service
Branch

Dear Mr. Secretary:

The California Energy Commission (CEC), Nuclear Fuel Cycle Committee, submits the following comments on the Draft Technical Criteria for Regulating Geologic Disposal High-Level Radioactive Waste 10CFR60, Subparts E and F (45FR31393).

With two exceptions, the draft technical criteria identify what appear to be the important technical issues relevant to the performance of a geologic repository for HLW. But identifying technical issues is different from resolving them. The discussion of uncertainty in the Supplementary Information accompanying these draft technical criteria indicates that the Nuclear Regulatory Commission (NRC) understands this difference. The NRC also appears to understand that efforts to resolve the outstanding technical issues through rigorous scientific investigation have begun only recently; otherwise the notion of uncertainty probably would not occupy the prominent position it does in these draft technical criteria. It is therefore difficult to determine whether the technical issues are identified "adequately and fully." (p. 31398) Some technical issues may of wider scope than is currently believed. New issues may also arise as investigations continue.

The first exception concerns the importance of in situ testing as a necessary step in determining how the physical and chemical properties of a proposed site affect transport of radionuclides. Although Section 60.122(a)(9)(iii-vi) requires in situ investigation, there is no discussion of what constitutes an in situ test. Moreover, it is unclear whether these in-situ investigations are necessarily site specific or whether generic test data for a particular medium are acceptable. The CEC recommends that in situ testing be performed at repository depth and under conditions which are as close as possible to the actual repository environment. The acceptability of generic and site specific in situ testing data should also be clarified. For example, generic in situ testing data may be acceptable in conjunction with additional site characterization criteria to assure that the properties of a particular site do not vary significantly from those in which the generic data were obtained.

Acknowledged by card... 7/14/80 mdv

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The second exception is more fundamental. It concerns the basic approach to scientific investigation which is embodied in the draft technical criteria.¹ The content of the draft technical criteria indicates that the CEC and the NRC have fundamentally different conceptions of what it means from a scientific standpoint to "reasonably deal with issues in an appropriate manner." (p.31398)

The CEC's position is best explained by considering, first, that the goal of nuclear waste management is to isolate wastes from the biosphere during the period of hazard; and second, that the scientific feasibility of isolating radioactive wastes in geologic media remains to be established.^{2,3} These two factors imply not only that a basic understanding of the processes in a loaded repository is necessary in order to be confident that the stated goal can be achieved, but that current scientific knowledge falls short of that basic understanding.

The flaw in the draft technical criteria is that they do not establish a minimum of scientific knowledge which is necessary for licensing. In fact, these are not licensing criteria at all but categories of information which must be addressed to an unspecified extent in an effort to hedge against technical uncertainty. Thus, instead of assuring that a licensing decision will be based on an understanding of the repository environment, the draft technical criteria would simply use whatever body of scientific knowledge exists at the time a licensing decision is made. Although the draft technical criteria provide a framework within which the knowledge base could be advanced to the point of understanding the repository environment, the current proposal lacks sufficient clarity to be even an effective hedge against uncertainty. For example, as stated above, there is no definition of what constitutes an "in situ determination." What does it mean that the "Department (of Energy) shall validate analyses and modeling of future conditions and changes in site characteristics using field tests, in situ tests, field-verified laboratory tests, monitoring data, or natural analog studies." (p. 31401) What constitutes validation?

The CEC's position on the technical basis for a licensing decision is that a predictive capability must be demonstrated. Experiments must be performed whose anticipated results are matched by empirical data. This approach is stated more clearly in the CEC's Statement of Position in the NRC's Waste Conference Rulemaking (44FR61372). Until a predictive capability has been achieved, no hedging strategy can presume to assure isolation of radio-nuclides from the biosphere.

Although the draft technical criteria represent a serious effort to come to grips with the problems of licensing a repository, the criteria are premature. The qualitative, philosophical approach embodied in these

¹The "basic approach to scientific investigation" should not be confused with the approach to licensing in the procedural element (44FR70408).

²California Energy Resources Conservation and Development Commission, Nuclear Fuel Cycle Committee, Status of Nuclear Fuel Reprocessing, Spent Fuel Storage, and High-Level Waste Disposal, January 11, 1978

³Report of the Interagency Review Group on Nuclear Waste Management, March 1979, p. 42

Secretary of the Nuclear
Regulatory Commission
July 14, 1980
Page 3

criteria is an indication of how little unambiguous data currently exists on repository performance. This approach simply does not provide confidence in licensing decisions. Moreover, the formal criteria which do exist are not well conceived.

For example, the criteria provide no containment standard applicable to the geologic barriers. Section 60.111(c)(1) directs that waste packages should provide reasonable assurance of complete containment for the first 1000 years after decommissioning. Section 60.111(c)(2) requires only the same 1000-year containment, as does 60.111(c)(3) pertaining to overall performance of the engineered system. In other words, the criteria do not require the geologic media to provide any containment whatsoever. Under this approach to isolating wastes, it is not likely that investigations of the physical and chemical properties of host media will be performed adequately.

Furthermore, how can the NRC have confidence that the current proposal will meet the Environmental Protection Agency's radiation protection standards when those standard do not yet exist?

The draft technical criteria nevertheless serve the purpose of demonstrating that the NRC is aware of the technical issues relevant to repository licensing and is proceeding as rapidly as possible toward useful technical criteria under the constraints of an incomplete data base. We applaud this current effort and hope our comments will be useful in focusing additional efforts.

Sincerely,



EMILIO E. VARANINI, III
Commissioner and Presiding Member
Nuclear Fuel Cycle Committee
California Energy Commission



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

WASHINGTON, D.C. 20460

18 JUL 1980

DOCKET NUMBER

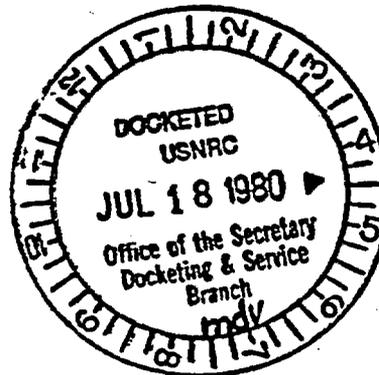
PROPOSED RULE

PR-60 (23)
(45 FR 31393)

Secretary of the Commission
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Docketing and Service Branch.

Dear Mr. Secretary:



OFFICE OF THE ADMINISTRATOR

The U.S. Environmental Protection Agency (EPA) has reviewed the advance notice of proposed rulemaking, 10 CFR Part 60, "Technical Criteria for Regulating Geologic Disposal of High-Level Radioactive Waste", which were published in the Federal Register, Vol. 45, pages 31393-31408. EPA views these draft Technical Criteria as providing the regulatory means to implement the requirements of the generally applicable environmental standards to be proposed by EPA in the near future. The proposed draft Technical Criteria provide a satisfactory means to assure compliance with the standards to be promulgated by EPA. Adequate discussion is given the technical issues necessary for the licensing of a high-level radioactive waste (HLW) repository. We provide our comments below on specific issues and also address the questions posed by the Commission.

1. On page 31396 in the section on "Considerations", it is stated that engineering can be used to narrow the extent to which geological processes must be considered. This could be interpreted to mean that the NRC will allow substituting engineered barriers for poor geological characteristics. We feel that (1) a site with acceptable geologic characteristics should be selected and (2) engineering should be used to supplement the geology and enhance confidence that the waste will be retained in the repository. Thus, assurance will be given that engineering will add to the total effectiveness of a repository rather than substituting for a poor geological barrier. We believe NRC should give more emphasis to these points.

2. In the same section in (5) "Codification of Models in the Licensing Processes", NRC concludes that, because of the great uncertainties involved, the state of knowledge to determine the adequacy of a site is more qualitative than quantitative. Therefore, NRC proposes to rely primarily on judgements by experts in the applicable fields to arrive at a decision, rather than on numerical assessment methods (models). EPA agrees with NRC that, at the present stage of development, it is premature to codify specific models for use in the analyses. However, EPA plans to include both qualitative and quantitative requirements in its proposed standards. Therefore, EPA recommends that NRC expand the discussion to state that quantitative assessments must be performed, at least to the extent necessary to assure compliance with EPA numerical performance requirements.

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Acknowledged by nrc. 7/18/80 mdy

3. The proposed regulation does not adequately address the subject of groundwater resources. In several places, consideration is given only to present uses of groundwater. This view is not in concert with the recognition in Section 60.121(c) that institutional controls may not persist for a long time. "Accessible environment", as defined in Section 60.2(a), would only protect "presently used" aquifers as designated under 40 CFR 146. However, the legislative history of the Safe Drinking Water Act makes it clear that both currently-used and potential drinking water sources should be protected.

4. Sections 60.122(a) (8) and 60.122(b) (1) (iii) indicate the need to avoid sites with significant resource potential. However, these provisions specify resources which "are economically exploitable using existing technology under present market conditions" (emphasis added). Interpreted strictly, this could mean that a resource like oil shale need not be considered if a repository were to be licensed today. We believe that this provision should be broadened to include "reasonably foreseeable" technology and market conditions; this would be consistent with the approach used for other site characteristics.

5. In response to the specific questions asked by the Commission on page 31398, we wish to present the following replies to questions 1 through 4:

(1) The list of considerations adequately defines and identifies the relevant issues involved in disposal of HLW.

(2) The referenced draft rule will address the issues in an appropriate manner.

(3) The draft Environmental Impact Statement now in preparation by EPA in support of the draft environmental standards (40 CFR 191) will be less detailed than is required for an EIS supporting licensing of a HLW repository, and will be limited to a discussion of the health risks and the costs for disposal of HLW in specified model repositories. In order to avoid unnecessary duplication, we believe that the environmental impact statement to be prepared by NRC should deal with the specifics of implementation of the draft Technical Criteria. It should therefore examine implications of specific geologic and engineered alternatives which NRC believes would satisfy the Technical Criteria. The EIS should specifically address those areas where NRC judgments are operative in narrowing the choices available in the EPA standards, or where NRC interpretations are needed to define the range of available alternatives.

(4) NRC will need to review applicable sections of the proposed draft Technical Criteria to reflect comments which EPA expects to receive on its forthcoming generally applicable standards (40 CFR 191), especially those comments which may lead to changes in the final standards.

6. We anticipate that the proposed EPA standards will include a requirement that provision be made for recoverability of wastes. If this requirement is promulgated, the NRC draft Technical Criteria must provide for implementation.

7. Section 60.111 (a) (1) "Radiation exposure or releases during operation" should add the following: "... or such other standards as may be established by EPA".

8. Section 60.122 (b) (2), Potentially adverse natural conditions - geologic and tectonic, should include an additional item which reads as follows: "(viii) there is a uniqueness about the site that may substantially increase future exploration for purposes other than resources".

9. NRC and EPA should assure that the definition of "high-level waste" be identical in Section 60.2 and in the forthcoming EPA standards.

10. The numbering system used does not allow for easy reading of grouped and sequential ideas. Perhaps a number of additional subheadings would provide greater clarity.

We appreciate the opportunity to comment on the advance notice of proposed rulemaking and look forward to a continued, coordinated effort on this urgent national problem. Should you have questions concerning EPA's comments, please contact Ms. Betty Jankus of my staff (202) 755-0770.

Sincerely yours,

for Thomas R. Sheckelle
William N. Hedeman, Jr.

Director
Office of Environmental Review (A-104)

DOCKET NUMBER

PROPOSED RULE

PR-60 (24)
(45 FR 31393)

1601 Horn

Richland wa 99352

11 July 1980

Secretary, Nuclear Regulatory Commission
Washington D.C. 20555

Attn: Docketing and Service Branch

Dear Sirs,

Re: A.N.P.R., 10 CFR 60, F.R. Vol. 45, No. 94, 31393

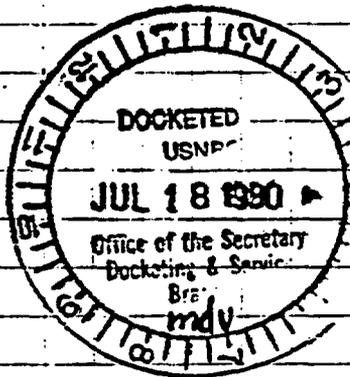
I believe the technical criteria to be very good for a first cut to the public. I have a few specific comments.

60.111 (2)(3)(i)

Quoting an annual rate quantitatively appears very premature. The rates should be different for different reviews.

General

Though it may be an EPA responsibility I believe that the concept of relative risk must be addressed either as an equivalent or body or otherwise. ALARA necessitates it!



Sincerely,
G. E. Johnson

SEARCHED BY CARD 7/18/80

8007250524

DUKE POWER COMPANY
POWER BUILDING
422 SOUTH CHURCH STREET, CHARLOTTE, N. C. 28242

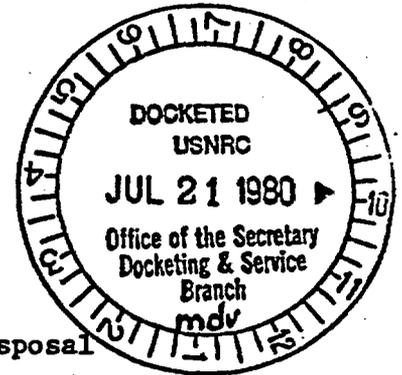
July 14, 1980

WILLIAM O. PARKER, JR.
VICE PRESIDENT
STEAM PRODUCTION

DOCKET NUMBER
PROPOSED RULE PR-60 (25)
(45 FR 31393)

TELEPHONE: AREA 704
373-4083

Mr. Samuel J. Chilk
Secretary of the Commission
Nuclear Regulatory Commission
Washington, D. C. 20555



Attention: Docketing and Service Branch

Subject: 10 CFR Part 60
Technical Criteria for Regulating Geologic Disposal
of High Level Radioactive Waste
File: GS 514.86

Reference: 45 F.R. 31393; May 13, 1980
Advance Notice of Proposed Rulemaking

Dear Mr. Chilk:

By the referenced notice, the Nuclear Regulatory Commission published for public comment an advance notice of proposed rulemaking on the technical criteria for regulating geologic disposal of high level radioactive waste. We understand the published technical criteria are simply draft ones, and as such are not being formally proposed at this time.

Duke Power strongly supports the prompt development of criteria for regulating the disposal of high-level radioactive waste. We believe that public concern in this area is a major obstacle to the continued acceptance of nuclear power in this country and abroad. High-level waste exists now, both from military and civilian sources, and will continue to be generated in the future. Therefore, whatever the future role of nuclear power in our society, a solution to the waste disposal question must ultimately be implemented.

Duke further believes that technology for high-level waste disposal in a conventional, mined geologic facility in salt is currently available and should be implemented by the Federal government on an expedited basis. While the Environmental Protection Agency (EPA) has not yet developed its high-level waste standard (10 CFR 191), Duke believes it is entirely feasible and appropriate for the NRC to develop at this time its regulatory framework, which will ensure compliance with the EPA standard.

The following represents Duke Power Company's comments on the supplementary information discussion provided in the notice. For reference, the underlined topics below correspond to topic headings set forth in the notice.

Acknowledged by card... 7/21/80... mdv

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Nature of the Problem

We believe this discussion serves a useful purpose in that it separates consideration of the problem in time, space, natural processes, and human actions, etc., and thus frames the problem in a form more tractable to solution.

We do, however, take exception to a few of the assertions contained in this section. First, it is stated that "[t]he chemical and thermal properties of the waste undoubtedly will have a significant interaction with the rock unit into which they are emplaced." This is true in the case of thermal properties, and eventually we can expect significant chemical interaction. However, the statement creates the wrong impression in that significant chemical interaction can take place only in the presence of water, which through proper repository siting and design, we can expect to be absent during the time frame most important for protection of the public.

Second, the assertion is made that the very fact that we do not have experience with geologic disposal "pose[s] fundamental difficulties." On the contrary, extensive experimental programs, both in the U. S. and abroad, have validated the concept of geologic disposal. The Atomic Energy Commission's report regarding Project Salt Vault, ORNL - 4555, stated

"With the completion of this experiment, it can be concluded that most of the major technical problems pertinent to the disposal of highly radioactive waste in salt have been resolved. Project Salt Vault successfully demonstrated the feasibility and safety of handling highly radioactive materials in an underground environment. The stability of the salt under the effects of heat and radiation has been shown, as well as the capability of solving minor structural problems by standard mining techniques. The data obtained on the deformational characteristics of salt have made it possible to arrive at a suitable design for a mine disposal facility."

Canadian experiments at Chalk River have provided additional evidence that at least one waste form, glass, can contain waste for long periods of time, even in flowing groundwater. Moreover, this experiment provides additional confidence in our predictive capability regarding the degree of retardation which can be expected in actual geologic settings. In-situ testing conducted by the United States and Sweden at Stripa, in granite formation has provided valuable data on hard, crystalline rock as a disposal medium. Swedish migration experiments at Studsvik have confirmed retardation of two of the most significant fission products, cesium and strontium, provided additional information on sorbent materials which may be used to augment the retardation capability of the natural emplacement medium, and corroborated predictive modeling capability.

We could cite other experimental evidence which points to the acceptability of the geologic disposal concept. However, it is most instructive to point to the Oklo uranium mine site in the Republic of Gabon. Here we have approximately two billion years of "experience" with geologic disposal of about 6 tons of fission products from a natural chain reaction (which, incidentally, took place in an environment saturated, or nearly so, with water). Investigators here concluded that most of the fission products remained essentially immobile

over periods of their half-lives and that the actinides, particularly plutonium, were also essentially contained.

Thus, we do not believe the fact that we do not now have an operating, commercial scale repository for high-level radioactive waste should be equated to "no experience...with geologic disposal."

Third, we would take issue with the statement "the problem of human intrusions, intentional or inadvertant moots much of the previous discussions, since there is no way to limit the variety of conceivable human activities which might compromise a forgotten repository." We would emphasize that the primary goal of nuclear waste management is to protect the general public's supplies of air and water. Attainment of this goal is dominated by the fission product content of the waste, the toxicity of which decays to that of the original one body from which the uranium came after only a few hundred years. Viewed in this light, the problem of intrusion becomes much more tractable. Further, safety analyses conducted for waste repositories treat natural events much more severe than that which would reasonably be expected from human intrusion, thereby bounding the problem. Finally, we assess the intrusional scenarios to produce minimal risk since we have to assume two unlikely circumstances with respect to society's continuity: 1) that the location and nature of the repository is lost, and 2) the technology for radiation detection is lost.

Underlying principles

We particularly agree with the statement that "[t]he analyses and requirements must reflect a degree of examination and control which corresponds to the importance to safety of any given technical area." This concept is central to our understanding of the "systems approach" as advocated by the Interagency Review Group and the technical community at large. We would strongly suggest strict adherence to this principle will result in efficiencies in program implementation and regulation, as well as a more cost-effective waste management system.

Considerations

The discussion defines the term "systems approach" as "relat[ing] to the set of natural and engineered barriers which would function to contain and isolate the waste from the biosphere..." While this statement is true, we believe a "systems approach" means something more. The fundamental precept upon which this approach is founded is that the requirements for each barrier, or element of the system, should be formulated only in the context of its contribution to the performance of the overall system.

We agree with the discussion pointing out the "three primary barriers of the waste disposal system: the geologic setting; the design configuration of the repository, including the waste emplacement scheme and engineered barriers; and the waste package." We would point out however, consistent with the concept of a systems approach, additional engineered barriers between the waste package and the host geologic medium should not be a regulatory requirement unless they are shown to be necessary for overall system performance. Also, with respect to the three barriers delineated in the discussion, any analysis of health and environmental impact must also include the effects of dilution in the accessible environment and other processes comprising the pathways of radioisotopes to man. In a manner of speaking, this may also be regarded as a "barrier."

With respect to the discussion regarding minimum performance standards, we agree that such standards are sometimes appropriate. For instance, during handling and emplacement, the waste package must retain its integrity under normal and hypothetical accident conditions, for protection of operating personnel. However, the danger in the widespread use of minimum performance standards for each element of the system is that, if too stringently set, they can defeat the systems approach concept which looks to overall system performance as the only meaningful figure of merit.

The discussion regarding the adequacy of favorable or unfavorable site characteristics to impose proper technical restrictions raises the question as to whether it may be appropriate to impose general site acceptability criteria or to determine site acceptability on a case-by-case basis. We believe a search for sites is quite properly guided by site suitability criteria; however, at the stage where a potential site must be analyzed for ultimate acceptability it is our view that such a determination should be made on a case-by-case basis. This, we feel, is consistent with the systems approach concept.

With respect to the discussion as to whether regulations should codify models to be used in licensing analyses or simply allow their use, it is our view that some degree of codification will be required. In the absence of such codification, the licensing proceeding will be unduly complicated and extend not only to whether the repository meets all applicable criteria, a question quite properly addressed in such a proceeding, but also to the question as to whether the analytical models perform adequately and as they are intended.

While we claim no particular expertise in the area of nuclide transport modeling, it is our view based on our present knowledge that the statement "the 'old' models, in which there is the greatest confidence because of their 'proven' use appear to be as qualitative as they are quantitative" is in error. All models have their limitations; they represent, to varying degrees, approximations of reality. The key to the proper use of models does not necessarily lie in their development to the stage of an "elegant theory embodied in a mathematical description which represents a culmination of human thought," but rather in an understanding by the user of the limitations of the model and the sensitivity of the overall model results to approximations internal to the model and uncertainties in input data.

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 regulations, 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.

Questions: Below are our responses to the specific questions raised in the notice.

- (1) Does the list of considerations above clearly, adequately, and fully identify the relevant issues involved in disposal of HLW?

Response: First, we understand these considerations to relate only to the technical aspects of the problem, and not to the procedural aspects of the problem which are being addressed separately. Our comments with respect to the latter (10 CFR Part 60, Subparts A-D) were submitted by letter of March 3, 1980. As we have stated at other times and in other forums, we believe the institutional problems associated with nuclear waste management far outweigh the technical ones.

Having noted this, and in the context of our discussions above relating to the "Considerations" section, we believe the considerations identify the major technical issues. However, we are concerned that the discussion of the issues provided in the notice does not reflect our view as to what the term "systems approach" should mean to the regulator. Simply stated, we do not believe the term "systems approach" means simply that the repository is a multicomponent series of barriers, each backstopping the next, but rather extends to the concept that each component of the system should be viewed only in the context of the performance of the whole to produce the desired effect.

Our other concern with respect to this section is the emphasis on the unknown. In our view, the information we lack we currently know how to get. By and large this is in-situ data which we can obtain only by moving forward in a site identification and characterization program. Naturally, there will be some uncertainty in this data, but the effects of uncertainty can be accommodated by conservative analyses. Where models need further development and validation, again it is our understanding that there are no insuperable difficulties; we merely need to proceed to do the necessary work.

- (2) Would a rule structured along the lines of the referenced draft rule reasonably deal with issues in an appropriate manner?

Response: The overall structure of the referenced draft rule seems appropriate; however, its content indicates inadequate attention to the systems approach concept. See our specific comments on the draft rule, attached.

- (3) In light of the fact that EPA has the responsibility and authority to set the generally applicable environmental standard for radiation in the environment from the disposal of HLW, with what factors/issues should an NRC environmental impact statement on technical criteria deal?

Response: Since the EPA will presumably set generally applicable environmental standards, NRC's environmental impact statement on its technical criteria should examine only those questions related to the environmental impact of the proposed and possible alternative criteria, including cost-benefit analyses and evaluation of resource utilization. NRC's environmental impact statement should not reexamine the programmatic choice of disposal technology, resulting from DOE's own environmental impact statement.

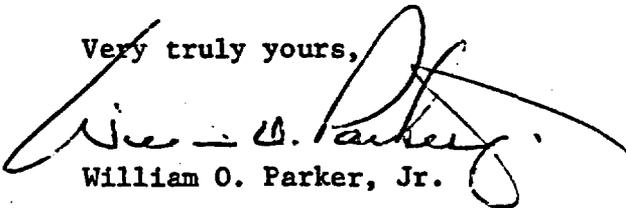
- (4) What are the environmental impacts of criteria constructed in accordance with the above cited principles? What alternative criteria exist and what are their impacts?

We have indicated in the discussion contained in the body of this letter, as well as in the attached specific comments on the draft rule, that the major shortcoming of the discussed criteria lies in inadequate attention to what we believe to be the essence of the "systems approach" concept. Regulation of individual components of the system tends to separate the true purpose of regulation, the protection of public health and safety and environment, from reality, that reality being simply the overall performance of the repository system. We would suggest that it is entirely possible to develop reasonable criteria around this concept, and that the result of such an effort would be criteria which regulate exactly what we wish to regulate - population doses - rather than release rates from individual system components which are some steps removed from man.

Please find attached Duke's specific comments on the draft rule. We should note that we have not had an opportunity to review the support and rationale document which the NRC generated in conjunction with this draft.

Duke is currently participating in the development of more extensive comments on this draft rule, in conjunction with the Utility Nuclear Waste Management Group. We appreciate the opportunity to submit these comments to the Commission, and hope they may be useful in the development of effective technical criteria for high-level waste disposal.

Very truly yours,

A handwritten signature in cursive script, appearing to read "W. O. Parker, Jr.", written in dark ink. The signature is fluid and somewhat stylized, with a long horizontal stroke extending to the right.

William O. Parker, Jr.

Attachment

Specific Comments on 10CFR Part 60

Draft Technical Criteria for Regulating Geologic
Disposal of High-Level Radioactive Waste

45 F. R. 3193-31408

60.101 (e) Why the presumption of saturated media?

60.111 (a) (3) The retrievability requirement is unclear. What is the rationale behind a retrievability requirement which extends 50 years beyond emplacement of the last waste? Can the retrievability aspects of repository design, construction, and operation be relaxed if decommissioning is planned before the expiration of such a 50 year period? At any rate, such a period is far longer than that required for gathering of in-situ data confirming the acceptability of the disposal scheme.

60.111 (c) (1)-(2) The specific performance requirements placed on the waste package (including waste form) and underground facility violates the concept of a systems approach - overall repository performance is the appropriate figure of merit.

60.111 (c) (3)-(4) This section deals with the overall performance of the engineered system and the performance of the geologic environment. Again, the discussion ignores our view of the systems concept. In any event, however, it would seem inappropriate to regulate a release rate per year, based in terms of a fraction of the inventory present at some given time. Such a criterion is unrelated to impact on public safety and the environment, since a greater fractional release rate from a small repository might well be less in absolute magnitude than a smaller fractional release rate from a larger repository.

In sections (4) (i) and (ii), the term "long term" needs to be defined. In section (4)(iii), we have the same problem of inconsistency with the systems approach concept, but in any event, do not understand how the specified travel time is directly related to public health effects, and cannot ascertain from what point the 1000 years is measured. From the waste package to the accessible environment? From the repository boundary (undisturbed geology) to the accessible environment?

60.121(c) We believe it realistic to assume that institutional controls will last beyond 100 years.

60.122 (a)(8) The question of avoidance of natural resources has, in our view, been somewhat overemphasized. We find it difficult to envision a future civilization with the capability to bore 2000 ft. deep holes, which at the same time is unable to detect radioactivity. Even this unlikely set of circumstances is of concern only if all records of repository location and content are lost.

60.122 (b)(1) Again we have the problem of an overemphasis on recoverable resources. While we see the need to limit the possibility of future adverse human activities at the repository site, the draft criteria are much too

stringent and could well eliminate otherwise superior sites, especially in salt. In particular, the criterion that "drilling for whatever purpose to depths below the lower limit of the accessible environment" shall "give rise to a presumption that the geologic repository will not meet the performance objectives" is particularly inappropriate.

60.132 (b)(2) We do not see the logic in requiring that full scale retrieval facilities be built on the surface. To the extent the retrieval option is considered necessary for repository performance checkout, the surface facility should be designed and constructed to allow full scale retrieval facilities to be added if deemed necessary in the future. We simply cannot conceive of a situation where we find ourselves so much in error as to the actual performance of the repository system that we find it necessary to immediately remove waste; rather, we would have time to act to put in place any surface facilities required.

Certainly the capability of retrieving small numbers of canisters should be incorporated into the surface facilities, and the design of such facilities should include the capability for expansion, but any further requirement for such full-scale facilities to be actually constructed at the outset would result in an unjustifiable expenditure of funds.

60.132 (c)(2)(iv) In paragraph (a), the requirement for shaft and borehole sealing "as soon after they have served their operational purpose as is practicable" seems to be inconsistent with the retrievability requirement. With respect to paragraph (b), we would suggest that the requirement that sealed shafts and boreholes provide at least as good a barrier to radionuclide migration as does the undisturbed rock ignores the concept of a systems approach.

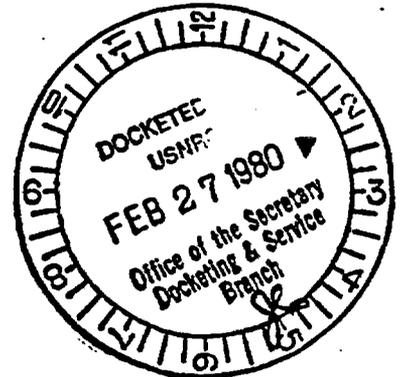


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DOCKET NUMBER
PROPOSED RULE ^① PR-2 et al
(44 FR 70408)

February 21, 1980



Secretary of the Nuclear Regulatory Commission
Washington, D.C. 20555

ATTENTION: Docketing and Service Branch

Dear Sir:

Following a recent discussion with Mr. Seth M. Coplan of the Nuclear Regulatory Commission, I have reviewed the Proposed Licensing Procedures for Disposal of High-Level Radioactive Wastes in Geologic Repositories, as they appeared in the Federal Register Vol. 44 No. 236, pp. 70408-70421, of Thursday, December 6th, 1979. I would like to comment as follows:

1. Multiplicity of sites for characterization

It will be necessary to essentially complete characterization of at least 3 sites before submitting a request for licensing of one of the sites as a repository. It could well arise that all the sites were found to be suitable for licensing as repositories, perhaps with varying levels of engineered barriers. In such an event it seems logical to license all suitable sites. This may be possible under the proposed regulations, but it is not clear whether, for example, 2 or more sites must be rejected for each one accepted. This would be an unnecessary restriction.

Considering the cost of repository excavation and exploration it should be noted that all U.S. commercial nuclear waste generated to the year 2000 could be accommodated in 2 national repositories. It should be noted that repositories found unacceptable or unnecessary for nuclear waste, although not ideally suited for alternative use, could possibly be put to good effect in other applications, e.g., strategic oil storage, pumped hydro-electric power, etc. In this way the cost of multiple site characterization may be reduced.

It may also be that a site originally intended as a large repository could be made acceptable if redesigned on a more modest scale, e.g., by the addition of engineered barriers.

The proposed regulations should not eliminate the above possibilities.

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2. Site characterization report

§60.11, p. 70416, "extent of planned excavations" should include a preliminary design of the repository. Knowledge of the proposed design would help indicate how the in situ testing program related to the repository layout, the susceptibility of the design to modifications in the event that the site characteristics were found to differ from expectations, and the opportunities for provision of additional engineered barriers.

3. License application

§60.21, p. 70417, (c)(1)" . . .The assessment shall contain an analysis of the geology, hydrology. . .etc." Presumably "meteorology" as used here relates to the possibility of meteorite impact at the site, rather than study of general weather conditions. It would seem advisable to include also "tectonic and volcanic history" (unless these are understood within the term "geology"). The same grouping of "geology, hydrology and meteorology" is used in other parts of the regulations.

(c)(3)"A description and analysis of the design and performance requirements. . .(iii) the effectiveness of engineered and natural barriers" should be defined to include the start of 'in-situ' demonstration of the effectiveness of proposed shaft-sealing and tunnel back-filling techniques. Such tests should be conducted for as long a period as possible, using in-situ test sections, prior to closure of the repository. In this way the efficacy of isolation of the filled repository from the biosphere can be given the fullest possible test, prior to the request for decommissioning (§60.51, (a)(4), p. 70420).

4. General

Overall, the proposed regulations appear to provide a prudent procedure for the development of safe permanent repositories for high level radioactive waste isolation.

Yours sincerely,



Charles Fairhurst
Professor and Head

CF:dt

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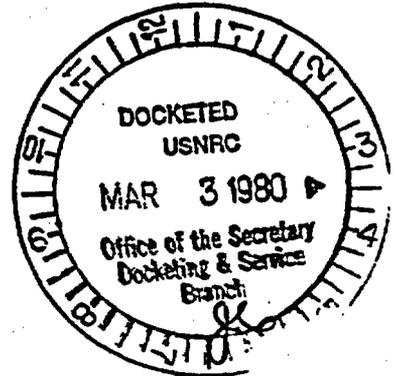
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DOCKET NUMBER

PROPOSED RULE

②
PR-2 et al
(44 FR 70408)

March 3, 1980



Secretary of the Commission
U.S. Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Docketing and Service Branch

Re: Disposal of High-Level Radioactive
Wastes in Geologic Repositories;
Proposed Licensing Procedures
10 CFR Parts 2, 19, 20, 21, 30, 40,
51, 60, 70
44 F.R. 70408 (December 6, 1979)

Dear Sir:

In response to the Commission's request for comments on its proposed procedural rule for licensing of disposal of high-level radioactive wastes in geologic repositories, we are pleased to submit the following comments on behalf of the Utility Waste Management Group (UWMG)* and the Edison Electric Institute (EII).

*/ Arizona Public Service Company; Boston Edison Company; Commonwealth Edison Company; Consolidated Edison Company, Inc.; Department of Water & Power, City of Los Angeles; Duke Power Company; Florida Power & Light Company; Georgia Power Company; Houston Lighting & Power Company; Illinois Power Company; Iowa Electric Light & Power Company; Long Island Lighting Company; Nebraska Public Power District; Northeast Utilities Service Company; Pacific Gas & Electric Company; Portland General Electric Company; Power Authority of the State of New York; Sacramento Municipal Utility District; Virginia Electric & Power Company; Yankee Atomic Electric Company.

Acknowledged by card. 3/11/80

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Secretary of the Commission
Page Two
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The Commission's proposed rule supersedes the proposed General Statement of Policy it had published on November 17, 1978 (43 F.R. 53869-72). In the UWMG's January 16, 1979, comments we pointed out that the Commission has statutory flexibility to fashion specific procedures for the licensing of repositories tailored to the particular activities and hazards involved; and we stressed that the Commission has the obligation, as well as the opportunity, to develop procedures which assure that decisions relating to the Federal waste management program are reached in timely fashion in the appropriate forum without duplicative and unnecessary environmental reviews. We indicated that there was a great deal in the procedures with which we agreed, but that the proposed policy did not seem to take into account fully that NRC licensing was only one aspect of an overall Federal program. We were concerned that the proposed licensing approach did not appropriately reflect the basic importance of the steps that the Department of Energy (DOE) will be taking nor did it reflect an appropriate allocation of responsibilities and decision-making between the two agencies.

Now that the Commission has proposed its more detailed licensing procedures, there continues to be a great deal in the Commission's approach with which we agree. Moreover, we heartily endorse the change in the Commission's approach which would eliminate the formal step of "provisional construction authorization" and permit site characterization work (including work "at depth") to be performed in advance of the filing of an application.*

However, some of the concerns we have previously expressed persist, and some new questions have arisen in light of the detailed requirements that first appear in the proposed rule.

The views and recommendations of UWMG and EEI on all of these matters are set forth below.

Duplicative Review of DOE's Programmatic Decisions

For reasons that were set forth at some length in the UWMG's January 16, 1979, comments we urged that programmatic decisions

*/ As set forth later in these comments, we do not agree that such site characterization work should be mandated at all alternative sites. (Pages 4-5, infra.) In addition, we believe that the scope of the permitted shaft work should be expanded to include such work as DOE deems necessary or desirable. (Pages 5-6, infra.)

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reached by DOE in accordance with NEPA should not be subject to unnecessary duplicative review in a subsequent licensing proceeding.* For example, we recommended that the Commission's policy and regulations should assure that its licensing proceedings not reexamine DOE's programmatic decisions on the objectives, structure and timing of the overall DOE program for the management of solidified high level wastes or spent fuel.

The Commission appears to defer acting on the UWMG's recommendation by stating that the proposed rule does not explicitly address the NEPA responsibilities of the Commission regarding matters within the scope of DOE's generic environmental impact statement on the management of commercially generated wastes (the "GEIS"). 44 F.R. 70408. The Commission indicates that the possibility of adopting DOE's GEIS may be considered at an appropriate time. Id.

We do not quarrel with the notion that the Commission can defer some aspects of consideration of the impact of the GEIS on the Commission's program until the final GEIS is issued.** But in our view, the Commission's proposed rule fails to reflect appropriate consideration of the deference that should be given to DOE's programmatic decisions -- regardless of the precise decisions reached by DOE on the basis of the GEIS. Specifically, we believe that the Commission should not dictate either in the proposed rule or in the accompanying statement of considerations the number of alternative sites or media that DOE should explore. As the Commission is well aware, in his Message to Congress of February 12, 1980, the President, pending final decisions under NEPA, adopted an interim planning strategy under which DOE will investigate a number of potential repository sites in a variety of different geologic environments with diverse rock types. When four to five sites have been evaluated, one or more will be selected for further development as a licensed full-scale repository. Following completion of the GEIS, the President will reexamine this interim strategy and decide whether any changes need to be made. DOE will also prepare by 1981 and update biannually a National Plan for

*/ Our comments set forth the detailed legal basis for avoidance of duplicative reconsideration of programmatic decisions citing, inter alia, Scientists Institute for Public Information v. AEC, 481 F.2d 1079 (D.C. Cir. 1973); Energy Research and Development Administration, et al., (Clinch River Breeder Reactor Plant), CLI-76-13, 4 NRC 67, 73 (1976), and the then recently adopted CEQ regulations (40 CFR §§ 1502.4, 1502.20). To avoid repetition of that discussion, we simply incorporate it by reference.

**/ DOE has indicated that the final GEIS may be issued this fall.

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Nuclear Waste Management. Both the interim strategy and any changes thereto will, of course, be subject to Congressional review processes.

DOE's ultimate determination -- subject to the foregoing Presidential and Congressional reviews -- as to the number of sites and number of media it will investigate prior to selection of the first repository site "are the very paradigm" of those entrusted to DOE under its authority to manage the Nation's defense and commercial radioactive wastes. The Commission should avoid directly or indirectly appearing to dictate the minimum number of sites and media that DOE will investigate -- otherwise it will improperly place itself "in the position of scrutinizing afresh" the judgments on program development made by the agency to which such judgments were primarily confided.*

In discussing the proposed rule, the Commission states that it anticipates that DOE will characterize a minimum of three sites representing a minimum of two geologic media and that it fully expects DOE to submit a wider range of alternatives than the minimum suggested. 44 F.R. 70411. Although at this time the Commission's expectations appear to be fully consistent with DOE's program, this does not remedy the basic flaw in the Commission's approach. The Commission's expectations simply have no place as part of the regulatory scheme. The scope and timing of DOE's consideration of alternative sites and media may change because of any number of policy considerations; such programmatic developments should not be impeded by a regulatory requirement that improperly deals with programmatic decisions.

Scope of Information on Alternative Sites

In addition to our disagreement with the possibility that the Commission may seek to dictate the number of sites and media to be investigated by DOE, we also disagree with the Commission's indication that exploration "at depth" will be necessary at the alternative sites. 44 F.R. 70409.

Until the technical requirements of Part 60 are developed, it is highly premature to judge that exploration "at depth" will be needed to satisfy such requirements.

Even when the requirements are known, however, the Commission's regulations should not prejudice or dictate how DOE should obtain the necessary information. The regulations should describe the type of information required, and allow DOE to determine how it can most effectively comply. Surely if DOE could develop the required information from existing records

*/ See Clinch River, supra, 4 NRC at 83.



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or from data available at an adjacent site or elsewhere within the region, the Commission should not mandate investigations "at depth" for their own sake.

We should emphasize that we concur fully in the thrust of the Commission's proposed rules that would permit site characterization work (including excavation of exploratory shafts and limited subsurface lateral excavations and borings) prior to the filing of an application and the obtaining of construction authority. We agree that the obtaining of information "at depth" with respect to the site for which a license is sought may be important prior to a formal licensing decision, and we do not believe there is any countervailing significant consideration that should impede DOE's ability to obtain such information before a formal licensing proceeding is held. However, we seriously doubt that such information is necessary for purposes of a comparison of alternative sites,* and we believe that the Commission should not require that it be obtained.

It is possible that the Commission seeks to require DOE to perform work "at depth" at alternative sites in order to avoid the appearance of a premature commitment by DOE if it sinks a shaft at only a single site. 44 F.R. 70410. We believe such concern is unwarranted. DOE is entrusted with important responsibilities and is subject to a multiplicity of reviews, including those by Congress. There is no reason to expect that it will not carry on its site selection activities properly. It should not be subjected to arbitrary delays and expenditures for work that may not be required to characterize a particular site.

In this connection, we also believe that the regulation should provide that, as part of authorized site characterization work, the permitted "exploratory shaft" can include shaft work to the extent deemed necessary or desirable by DOE. If, for example, at a particular site, DOE determines that a large

*/ In reactor licensing, the Commission has explicitly recognized that it is not necessary for purposes of site comparison that the applicant develop as much information concerning alternative sites as it has developed for the proposed site. Public Service Company of New Hampshire (Seabrook Station, Units 1 and 2), CLI-77-8, 5 NRC 503, 529 (1977). The Commission pointed out that requiring such intensive analysis of alternative sites would involve unconscionable costs which should not be imposed in the absence of a mechanism that "would permit banking of any sites which might be previously approved." Id. Since such "banking" mechanism is equally unavailable for repository sites, the foregoing argument is similarly applicable to repository licensing.



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exploratory shaft or expanded work associated with the shaft (work comparable in magnitude to a main shaft) would obviate the time and expense later required to expand or seal the shaft, the regulation should enable DOE to take what it considers to be the most effective action.

Standard for Commission's Action
Under NEPA

The proposed regulation states that the Commission may authorize construction if it determines, as to environmental matters, "That, after weighing the environmental, economic, technical and other benefits and considering reasonable alternatives, the action called for is issuance of the construction authorization." (Proposed § 60.31(c)) In the Supplementary Information, the Commission indicates that it will authorize construction if it "finds after considering reasonable alternatives that the benefits of the proposal exceed the costs under NEPA. . . ." 44 F.R. 70411.

Although these iterations are similar to the approach employed in the issuance of other licenses by the Commission, in our view they are not properly applicable to the unique circumstances relevant to repository licensing.

First, we believe that a specific licensing proceeding is not the appropriate forum to compare the benefits of a repository to its costs. In our view, such overall balancing, if performed at all for regulatory purposes, should be done generically by the Commission as an amendment to the regulations after it adopts the substantive requirements applicable to repository licensing. We take this position because we believe that such balancing involves essentially policy judgments which the Commission would be better able to make than a licensing board and that relegating such decision to a licensing proceeding could unnecessarily complicate and protract such proceeding. In the case of all repositories the benefits will be the same, i.e., the fulfilling of the Federal Government's responsibility for the management of the Nation's defense and commercial wastes. Such benefits are unquantifiable, and certainly not measurable in terms which can be balanced simply against costs in a proceeding involving a single repository. The costs and impacts of a repository which satisfies the Commission's forthcoming substantive requirements -- otherwise it would not be licensed -- can be generically bounded by the Commission. Thus, there is no reason why the Commission should not reach the decision generically, instead of subjecting a specific licensing proceeding to the potential delays and complexities associated

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with adjudicatory determinations of a basic policy question.*

This does not mean that the specific environmental costs or impacts of particular sites, designs or methods of operation could not be considered in the licensing proceeding. Such information would be used in evaluating whether improvements to minimize specific environmental impacts should be required as a license condition, and would also be used in comparing sites to determine that an alternative under consideration is not obviously superior. But such information would not be used for an overall balancing of benefits versus costs in an inappropriate forum.

Second, the regulation should make clear that only alternative sites proposed by DOE would be compared. For reasons discussed above, the scope and timing of DOE's investigation of alternative sites and media are basic programmatic decisions which should not be reexamined in the licensing process. Such decisions could be utterly frustrated and the licensing process subjected to extraordinary delays, if determined opponents were permitted to engage in endless debate concerning the unlimited number of sites throughout the country which might ultimately also be proven suitable for a repository.

Similarly the regulation should make clear that there would be considered only repository-related technology** would be reasonably available by the time the repository is expected to be operational.*** Proceedings could be unnecessarily protracted if they were permitted to encompass discussion of future technology not available for application in the scheduled time frame for implementation of the repository program. If the technology proposed by DOE satisfies the Commission's

*/ If, notwithstanding our recommendation, the Commission determines that the overall balancing should be relegated to the licensing proceeding, the regulations should be modified to make clear how the benefits of the repository are to be measured and to provide explicit guidance to licensing boards as to how the balancing is to be performed.

**/ Our comments presuppose that disposal methodologies other than repositories would not be considered in a proceeding under Part 60. The Commission indicated it will consider alternative technologies later (44 F.R. 70411), but obviously any such consideration should be in a generic proceeding and not within the framework of a proceeding involving a specific repository license application.

***/ In other words, the proceeding should not engage in crystal-ball speculation concerning future waste forms, packaging, repository designs, engineered barriers, etc.

Secretary of the Commission
Page Eight
March 3, 1980

substantive requirements, it should only be compared to other available repository technology and needless speculation should be avoided concerning the benefits of improvements that will not become available until the distant future.

Information To Be Included
in an Application

As in the case of reactor licensing, the proposed regulation contemplates that a construction authorization will be issued prior to construction and that an operating license will be issued prior to operation of the repository. The regulations applicable to construction permits for reactors recognize that to make the decisions pertinent to authorizing construction it is not necessary to have available final information concerning all aspects of facility design, construction and operation. Thus the regulations permit the applicant to file an application at the construction permit stage (the preliminary safety analysis report) which contains "preliminary" information on such subjects as design of the facility, analysis and evaluation of the facility's design and performance, plans for the applicant's organization, training of personnel and conduct of operations, and plans for coping with emergencies. 10 CFR § 50.34(a). The regulations then require final such information to be filed in the application for an operating license (the final safety analysis report). 10 CFR § 50.34(b).

The proposed repository regulation concerning the contents of the application for a construction authorization, however, does not use the adjective "preliminary" in describing any of the information to be submitted. (Proposed § 60.21(b)). Thus, it appears that prior to the issuance of a construction authorization "final" information must be submitted even with respect to such subjects as design of the facility, the quality assurance program for operations, plans for coping with emergencies, plans for decommissioning, etc. The only concession that some information might properly be less than final appears in another section which states, somewhat ambiguously, that the application "shall be as complete as possible in the light of information that is reasonably available at the time of submission." (Proposed § 60.24(a))

We can appreciate that the Commission would prefer to reach its judgments, even at the construction stage, on the basis of final and complete information. However, it should be recognized that until construction is authorized (including the approval of specific design criteria and design bases) refinement of design can be a wasteful and needless exercise, and that many aspects of design and operation can be more suitably

Secretary of the Commission
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March 3, 1980

determined during construction than prior thereto. We therefore suggest that the Commission modify § 60.21(b) to identify those items of technical information which can properly be submitted in preliminary form without affecting the Commission's ability to reach an appropriate decision on construction authorization.

Respectfully submitted,

UTILITY WASTE MANAGEMENT GROUP
EDISON ELECTRIC INSTITUTE

By Maurice Axelrad
Lowenstein, Newman, Reis,
Axelrad & Toll
1025 Connecticut Avenue, NW
Washington, D. C. 20036



Environmental Policy Institute
317 Pennsylvania Ave. S.E. Washington, D.C. 20003
202/544-8200

③

March 3, 1980

DOCKET NUMBER

PROPOSED RULE

PR-Subal
(44FR 70408)

Secretary of the Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Docketing and Service Branch

The Environmental Policy Institute makes the following comments concerning the Commission's Proposed Rule on Disposal of High Level Radioactive wastes in Geologic Repositories: Proposed Licensing Procedures (44 F. R. 70408, December 6, 1980):

The Environmental Policy Institute endorses, in principle, the licensing procedures outlined in the proposed rule. These new procedures address many of the problems we found with the November, 1978 General Statement of Policy regarding early site activities. Specifically, the Institute endorses the concept, and substance, of the "site characterization" requirement contained in Sec. 60.11 of the proposed rule. We also agree with the proposed series of licensing steps: a construction authorization (Sec. 60.31), a repository license (sec. 60.41), a decommissioning amendment (Sec. 60.51) and a license termination review (Sec. 60.52).

The proposed rule is deficient, however, in several key respects and continues to reflect the overly passive approach of the Commission to dealing with the Department of Energy program which we criticized in the 1978 General Statement of Policy.

First, much is made in the Notice of the Commission's intent to require DOE to characterize several sites before construction will be authorized. Nowhere in the rule, however, is there any requirement for multiple characterizations. Such a requirement is most notably absent from Sec. 60.21 "Content of Application" which should explicitly require characterization of multiple sites and the degree to which these characterizations must be described and comparable with one another. Since this section establishes the fundamental requirements for licensing, and since the NRC intends to maintain an "informal" prelicensing relationship with DOE concerning site selection activities, it is essential that a specific multiple site requirement be included in the first "formal" stage outlined in Sec. 60.21.

Second, "Construction Authorization" (Sec. 60.31) is not dependent upon any finding that the best site, to say nothing of the best site

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among those characterized, be selected. While there is a recognition that the construction authorization, as envisioned by the Commission, is a complex process and extends beyond the issue of site suitability, DOE has embarked upon a "systems approach" to repository development wherein the site decision cannot be removed from the other components of a repository development. Similarly, choice of a site represents a fundamental decision in many respects on a repository technology. To omit a "best available site" determination from Sec. 60.31 "Construction Authorization" is a serious flaw especially in light of DOE's penchant for developing sites of convenience on its own reservations.

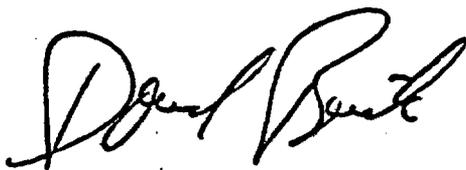
Third, the NRC continues to adopt an overly passive approach to the fundamental issue of technology selection. The Commission has not put any teeth into its licensing procedures that would allow it to cull out inadequate DOE repository technologies either in terms of types of geologic media or waste forms. While the Notice implies that the NRC will, at a minimum, permit DOE to develop only the best of several characterized sites, the proposed rule contains no such requirement. The NRC proposes to oversee the DOE waste form development program, but does not intend to specifically license waste forms. The Commission proposes to oversee the DOE's site selection program, but does not require that DOE in fact even have such a program. Rather, NRC assumes that the sites DOE has chosen to characterize have resulted from a careful and thorough selection process. DOE's interest in the WIPP site at Carlsbad, New Mexico, the Nevada Test Site, and the Hanford Reservation do not reflect site choices based upon a technical site selection process.

The Commission is not, as the Notice points out, licensing nuclear reactors under this proposed rule. It is licensing a completely undeveloped technology in which every repository is a generically new facility. To this end, the NRC licensing process should be based upon a defense-in-depth approach requiring DOE to find and develop the best site, the best waste form, the best repository design. The proposed rule does not establish these minimum requirements.

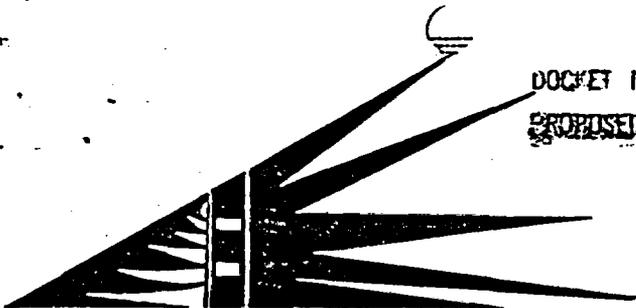
The "Other Reviews" referred to in the Notice (44 F.R. 70412) concerning site screening and waste form should be formalized. They are not merely programmatic decisions by the DOE but represent critical elements of a waste repository and certainly basic elements of a defense-in-depth approach. The Site Characterization Report preparation should not be defined as an "informal conference between the prospective applicant and the staff" (Sec. 60.11). We cannot agree with the Commission's unqualified assurances that the opportunities for public participation and

staff review provide an acceptable process for review of DOE's site characterization program. NRC's argument that multiple site characterizations would nullify the value of a hearing process is irrelevant given the lack of requirements that such characterizations will in fact occur. We request that the NRC propose procedures under 10CFR Part 2, Subpart F for review of the DOE site characterization report.

Respectfully,

A handwritten signature in black ink, appearing to read "David Berick". The signature is written in a cursive, flowing style with a large initial "D".

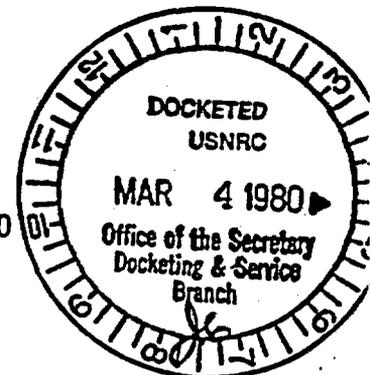
David Berick
Director
Nuclear Waste Project



DOCKET NUMBER: **4**
PROPOSED RULE: **DR-2 et al**
(44 FR 70408)

SOUTHWEST RESEARCH AND INFORMATION CENTER

February 28, 1980



Secretary of the Nuclear Regulatory Commission
Washington, D.C. 20555
Attn: Docketing and Service Branch

RE: Comments on Proposed rule for Disposal of High-Level Radioactive Wastes in
Geologic Repositories; Proposed Licensing Procedures

Dear Secretary of the NRC:

This is to reserve our final comments on this proposed rule. Since we did not receive a copy of the proposed rule until February, we will not finish our comments until next week. They will be mailed on or about March 3, but you will not receive them until a few days thereafter. Because of our interest and involvement with nuclear waste disposal issues, we do want to officially comment, however.

Our major concerns are in three areas: site characterization, consultation and concurrence with states and public participation.

Regarding site characterization, our detailed experience with the proposed WIPP site in New Mexico is that site characterization has not been properly defined in §60.2 (n). Specifically, there has apparently not been adequate consideration of problems below the repository level or in the regional geology which are the basic problems (in addition to the mineral resource conflict) at the proposed WIPP site. It is not clear that the definition of site characterization or the site characterization report must deal with these or similar issues. Obviously, if there are such problems with a site, the time, expense and work of in situ testing should be avoided. Thus, we would suggest that in §60.2(n) and in §60.11(a) specific mention of regional geologic conditions be required. Furthermore, it seems to us that in §60.11(f) that an environmental impact statement should be prepared, rather than leaving it to the discretion of the Department, as in the proposed rule.

Consultation and concurrence with the state should be required in §60.11(b), rather than merely a notification that state or local governments may be requested, as in the proposed rule. State participation and approval in all significant decision points of repository development is essential for any kind of public confidence in the licensing process. Thus, in §60.61 NRC staff must be readily available to the states to provide technical assistance and information.

Regarding public participation, it should not be left exclusively to the states, which is what the proposed rule seems to imply in §60.62(c)(4). NRC should have public participation in its proceedings. And more than just allowing such participation through hearings, NRC should consider funding such participation, at least under a reimbursement method similar to that used in the Public Utility Regulatory Policy Act (PURPA). Furthermore, NRC's rule should require that DOE fund and be responsive to public concerns and input. Specifically, in §60.11(a)

Acknowledged by card: *[Signature]*

(6) the rule should include not only the means used to obtain public input, but also the substance of the public input and what response the Department has made in addressing such input.

As we have more detailed comments on the proposed rule, we will submit them. Thank you for your consideration.

Cordially,



Don Hancock

5
PROPOSED RULE - 2 et al
(44 FR 70408)



Westinghouse
Electric Corporation

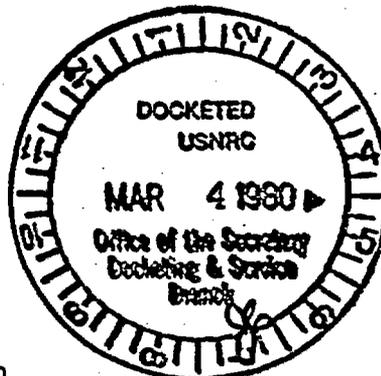
Power Systems
Company

Box 10864
Pittsburgh Pennsylvania 15236

M T Johnson
General Manager
Advanced Energy Systems Division

February 25, 1980

Secretary
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555



Attention: Docketing and Service Branch

Subject: Disposal of High Level Radioactive Wastes in Geologic Repositories

Dear Sir:

This is in response to your request for comments on the proposed licensing procedures for disposal of high level radioactive wastes (HLW) in geologic repositories.

The proposed licensing procedures have several general deficiencies:

- a. The preamble's references to "best" (pages 70410 and 70412) makes inevitable a never-ending quest for a licensable repository site. It is unlikely that a "best" site can ever be determined. More likely, many sites will be found, each capable of meeting realistic licensing criteria provided a systems approach is utilized.

The National Academy of Sciences recently concluded that it is not necessary to look upon HLW disposal as a problem to which a perfect solution must be found before any action can be taken. They emphasized that storage of waste at geologic sites would engender much smaller risk to the public than that of routine emissions from the rest of the fuel cycle.* NRC's rulemaking on 10CFR60 should take this into account. A licensing philosophy based on a "best" site, a "best" waste form or a "best" waste package should be avoided. Instead, an overall systems approach should be adopted to license a geologic repository. Realistic licensing criteria should be developed during the design, construction and operation of repository system demonstrations which should become a required element in near-term national programs.

- b. It is our understanding that forthcoming technical criteria, 10CFR60 Subpart E, will place no reliance on the geology for radionuclide containment during the first 1,000 years. If this is the case, the proposed licensing procedures

* Handler, P. et al, "Energy in Transition, 1935-2010," Committee on Nuclear and Alternative Energy Systems (COMAES), National Academy of Sciences, Washington, D.C., December 1979.

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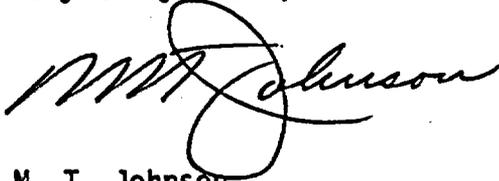
concerning site selection are too conservative (e.g., see Attachment Item 1). However, we believe that due reliance should be placed on geologic barriers, and that performance criteria should apply to the overall repository system. Therefore, NRC should not finalize the proposed rule until the forthcoming technical criteria are published and acted upon.

- c. In some cases these proposals go beyond licensing procedures, and appear to establish national policy. For example, irradiated reactor fuel should not be included in the definition of high level waste, 60.2(i). Such a definition preempts a change in the existing National Policy on reprocessing. In addition, the footnote to 51.40(d) and the definition of required site characterization, 60.2(n), call for a large number of exploratory shafts and testing at depth. These policy proposals appear to exceed both technical and NEPA requirements, and should not be included in NRC regulations.
- d. The proposed procedures tend towards increasing bureaucracy and taxpayer expense rather than toward assurance of public health and safety. For example, 10CFR60.3(b) and 10CFR60.11(g) state that NRC may deny DOE a license for a given site if certain NRC administrative procedures are not followed. The granting or denial of a license should be determined solely on a balance of factors affecting the public interest, and not regarded as an inter-agency punitive remedy.

Also, need for the proposed extensive involvement of NRC during the site characterization process is far from clear. Since NRC will issue no license or authorization at this point in the process, or be in any way bound as a result of such review, it is difficult to see how this accomplishes any useful objective.

Additional detailed comments are provided in the attachment. Westinghouse fully recognizes that national importance of nuclear waste management, and is prepared to assist in any way possible in the resolution of our comments.

Very truly yours,



M. T. Johnson
General Manager

Attachment

ATTACHMENT - DETAILED COMMENTS ON NRC PROPOSED LICENSING PROCEDURES

1. The requirement for at-depth evaluation of alternative sites and geologic media in addition to the preferred site is more than that which is required. Surface investigation and borehole drilling will allow a comparison of potential sites and geologic media which can be identified as alternatives. In order to provide a balance between data required and expenditures, only the preferred site, as determined from the surface evaluations should be investigated in situ. The in situ evaluation will identify whether this preferred site is adequate as a geologic repository. Assuming the site is found to be adequate, there should be no need to further investigate alternative sites since from a surface evaluation, none is clearly superior. The concept that a proposed site must be adequate with no clearly superior alternatives, rather than optimal, has been determined in several Atomic Safety and Licensing Appeal Board Hearings.

If the preferred site should be evaluated as not adequate based upon the site characterization at-depth, the program must then be modified to make the repository adequate by changing the scope of the mission or an alternative repository must be evaluated in depth. This evaluation can be substantiated by the NRC at the time of construction permit application and would eliminate the need for expending resources to evaluate alternate repositories at depth which would not be required for the mission.

2. The stated costs of 20 million dollars per site investigation (including in situ experiments) appears to be much too low, depending on the geologic media.
3. Note that not only can NRC (Director) comment on site work, but based upon DOE's research and development in waste matters he is free to comment on all such matters, and can do so, presumably, based upon preliminary data that DOE would furnish under the explanation of "Other Reviews", Page 70412. The Director can also provide ... "specific guidance on technical matters relevant to licensing requirements". This can seriously delay the timing for DOE's submission for construction authorization, and receipt of wastes (Part 3).
4. The definition of high-level waste in 60.2(i) should be revised so that irradiated reactor fuel is not included in material emplaced "with no intent to retrieve for resource values" (60.2(e)).
5. In 60.6, it would appear that exemptions can be granted without notice or opportunity for comment. This seems inappropriate.
6. 60.11(e) should be revised to specify time limits for NRC's review.
7. It should be clarified throughout that DOE regulations require an Environmental Assessment for each site characterization, and not an Environmental Impact Statement.



6

DOCKET NUMBER
PROPOSED RULE PR-2 et al
(44 FR 70408)

PRESIDENT
RUTH J. HINERFELD

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Oklahoma City, Oklahoma

Ann W. Viner
New Canaan, Connecticut

Executive Director
Harriet Lentges

February 28, 1980

Secretary of the Nuclear Regulatory
Commission
Washington, DC 20555
Attention: Docketing and Service Branch

Dear Sir:

Enclosed are the League of Women Voters of the United States' comments on the Nuclear Regulatory Commission's proposed rule on the disposal of high-level radioactive wastes in geologic repositories. 10 CFR Parts 2, 19, 20, 21, 30, 40, 51, 60 and 70.

Sincerely,

Dorothy Powers

Dorothy Powers
Energy Chair



Acknowledged by card: 3/7... 9...

8007030171

**Comments on the Proposed Rule for
Licensing the Receipt and Disposal of High-level Radioactive Wastes (HLW)
at Geologic Repositories**

Nuclear Regulatory Commission 10 CFR Parts 2, 19, 20, 21, 30, 40, 50, 60
and 70.

We are pleased that the proposed rule includes opportunities for state and local involvement in HLW repository siting and licensing. To further improve these provisions, we would like to offer the following recommendations:

- (1) While the proposed rule provides opportunities for formal hearings during the siting and licensing process, it leaves the decision on whether hearings are actually needed to the NRC Commission. [2.105(a)] Considering the national importance of such projects and the concern that state and local governments and the general public have expressed with regard to nuclear waste disposal, it seems reasonable to require mandatory hearings before any HLW repository is authorized for construction.
- (2) While the proposed rule states that "proposals for participation and review shall be signed by the governor of the state submitting the proposal..." the regulations do not specify that the governor's office will coordinate the preparation of the proposal. [60.62(c)] Thus, under the proposed rule, citizens would be at a loss to know whom in their state to approach with recommendations for this proposal. The regulations should require the governors of affected states to appoint a lead agency, office or committee to serve as a liaison with NRC staff and citizens on the site characterization plans and license application.
- (3) The regulations state that after the Department of Energy has published a notice of the availability of the draft site characterization analysis in the Federal Register, "a reasonable period, not less than 60 days, shall be allowed for comment on the draft site characterization analysis." [60.11(e)] The regulations also say that states potentially affected by DOE's analysis may submit to the Director (NRC) a proposal for state participation in the review of the site characterization report and/or license application. [60.62(b)] But what is not clear is how much time a state will have to prepare a proposal (including obtaining citizen comments), apply to NRC for funding of that proposal, and complete its program. Assuming that the state participation program takes a year or longer to complete (which is very likely), it would seem that the general public should have the same length of time concurrently to comment on the characterization plan. Thus, the regulations should clarify how the time frame for state participation in DOE's site analysis will relate to the time frame for general public review and comment.



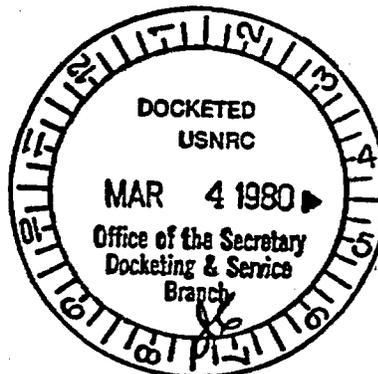
THE UNIVERSITY OF ARIZONA
TUCSON, ARIZONA 85721

COLLEGE OF ENGINEERING
DEPARTMENT OF NUCLEAR ENGINEERING

8

February 20, 1980

DOCKET NUMBER
PROPOSED RULE PR-2 et al
(44 FR 70408)



Secretary of the
Nuclear Regulatory Commission
Attn: Docketing and Service Branch
Washington, D. C. 20555

Dear Sir:

Attached are my comments on the proposed rules, 10CFR Parts 2, 19, 20, 21, 30, 40, 51, 60 and 70 as published in the Federal Register, Vol. 44, No. 236, December 6, 1979.

The overall proposed rules are well written; however, it is apparent from my comments that I take issue with several concepts.

If there are any questions on my comments, please feel free to contact me at (602) 626-4985.

Sincerely,

James G. McCray, Acting Director
Nuclear Fuel Cycle Research Program

Encl.
JGM/mfr

Acknowledged by card... 3/7... [signature]

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COMMENTS

General

1. It should be clearly specified that no EIS is necessary for the Site Characterization Report.
2. The Site Characterization Report should be made to NRC on a site by site basis. This report should be restricted to justification for beginning site characterization at a particular site and not involve comparisons with other candidate sites.
3. The Site Characterization Report should not involve the Department's program for further development of alternatives.
4. The NRC should not be involved in the screening of sites for site characterization.

Subpart B - Licenses

60.11 Delete (5)

Delete in (7) "The Department may include multiple sites in a single site characterization report." and... "and alternate areas".

Comment:

The Site Characterization Report should not be a candidate site comparison document.

Subpart C - Participation by State Governments

Paragraph 60.83 (c)

Add: "....., the decision shall be approved by the Commission and shall state the reason for the rejection."

Comment:

If there is a requirement that the state plan be signed by the State Governor, then it seems appropriate that any rejection be approved at the highest level, i.e. the Commission.

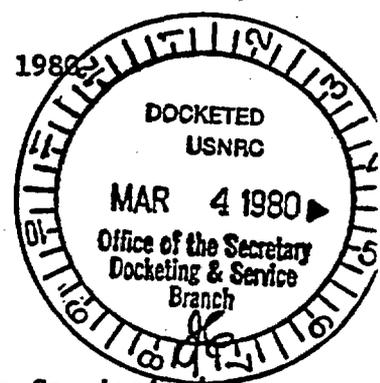


by Ansel Adams in *This is the American Earth*

DOCKET NUMBER **9**
PROPOSED RULE **PR-2 et al**
SIERRA CLUB (44 FR 70408)

330 Pennsylvania Avenue, S.E.
Washington, D.C. 20003
(202) 547-1141

March 3, 1980



Secretary of the Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Docketing and Service Branch

The Sierra Club appreciates this opportunity to comment on the Commission's Proposed Rule on Disposal of High Level Radioactive Wastes in Geologic Repositories: Proposed Licensing Procedures (44 F.R. 70408, December 6, 1980).

The Sierra Club endorses many of the principles in the Proposed Rule, many of which have been supported by the Final Report of the Interagency Review Group on Nuclear Waste Management and in President Carter's February 12, 1980 Policy Statement on Nuclear Waste Management. However, we do differ with a number of the provisions of the Proposed Rule. The comments below are limited to several of these key provisions. However, our interests and concerns are not necessarily limited to those sections specifically addressed below.

Before addressing specific provisions in the Proposed Rule, we must discuss the underlying assumption that the Nuclear Regulatory Commission should retain the legal authority to license and otherwise regulate the geologic disposal program. This is assumed, of course, by the Interagency Review Group and President Carter.

There is no question that the geologic disposal program should be regulated by a federal agency other than the Department of Energy, which is responsible for conducting the program. However, the Sierra Club does not believe that, barring fundamental changes at the Commission, the Commission can counted on to perform this important function.

We believe that the Commission, both as an institution and in the case of the majority of its personnel, is biased in favor of the nuclear power industry. This pro-industry inclination has been noted recently by the President's Commission on the Accident at Three Mile Island. The Commission's Report stated:

...we have seen evidence that some of the old promotional philosophy still influences the regulatory practices of the NRC. While some compromises between the needs of safety

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Acknowledged by *[Signature]*

and the needs of an industry are inevitable, the evidence suggests that the NRC has sometimes erred on the side of the industry's convenience rather than carrying out its primary mission of assuring safety. (p. 19)

The NRC, the Commission found, "is so preoccupied with the licensing of plants that it has not given primary consideration to overall safety issues." (p. 51), and that "(w)ith its present organization, staff, and attitudes, the NRC is unable to fulfill its responsibility for providing an acceptable level of safety for nuclear power plants." (p. 56) (emphasis added)

The Rogovin Report was also highly critical of the NRC's operations, finding that "(i)n sum, the Nuclear Regulatory Commission has provided neither leadership nor management of the Nation's safety program for commercial nuclear plants." (p. 114)

Largely in response to the evidence of this pro-industry mind set, the President's Commission recommended a major restructuring of the NRC, including the establishment of an oversight committee on nuclear reactor safety, to be appointed by the President, to examine the performance of the NRC and the industry in addressing nuclear power plant safety issues and "in exploring the overall risks of nuclear power." (Recommendation No. 2)

The second reason for our concern is that the growing uncertainties regarding nuclear waste management, including the absence of an approved geologic repository, are beginning to have significant adverse political and economic consequences for the nuclear industry and the future of the nuclear power program. Representatives of the nuclear power industry have publicly identified the nuclear waste issue as being as great a threat to the nuclear power program as the Three Mile Island accident and power plant safety questions. Moreover, legislation now before the Congress would require a phase-out of the nuclear power program unless specific "solutions" to the nuclear waste crisis are achieved by certain dates.

In the area of nuclear power plant regulation, the President's Commission found that the pro-industry bias of the Commission resulted in at least some actions designed for the protection of the industry, at the expense of public safety concerns. Neither the President's Commission nor the Rogovin Report investigated the nuclear waste regulation role of the NRC. Unfortunately, we find no substantial reasons to believe that the NRC's pro-industry bias will not also prejudice the Commission in its regulation of nuclear waste management activities, including the Department of Energy's geologic disposal program.

The NRC has not demonstrated any intention to regulate the geologic disposal program with the resolve to be expected of the regulating agency. The weaknesses of this Proposed Rule, as discussed below, unfortunately, are further testimony to the Commission's unwillingness to cast aside its past prejudices and to demonstrate the political courage requisite to a successful geologic disposal program.

The safe management and disposal of high level wastes, transuranic wastes, and spent fuel, are necessary to protect the public health and safety and natural support systems, both now and for generations to come.

We must ensure that the regulators of the nuclear waste management program will strive only to provide for the safest possible disposal of these wastes, and will not be influenced by concerns for the well being of the nuclear power industry. Therefore, we must conclude that, barring a radical change in its attitudes and its operations, the NRC should not remain responsible for regulating the geologic disposal program. We recommend that, absent rapid, major shifts in the the Commission's attitudes and functioning, the Commission's licensing authority over the DOE geologic disposal program be transferred to a new independent commission in the federal executive branch whose sole responsibility is the regulation of nuclear waste activities and programs including, but not necessarily limited to, geologic disposal.

Notwithstanding the above comments, we welcome the opportunity to comment on this Proposed Rule. Adoption of these and similar suggestions by other interested persons could, of course, constitute the major shifts we believe are necessary in the NRC program. We endorse, in principle, the majority of the licensing procedures outlined in the Federal Register discussion preceeding the Proposed Rule. (Assuming, of course, that the NRC retains its licensing authority.) However, the Proposed Rule would fail to implement adequately several of the most important of these principles.

(1) The Proposed Rule should expressly require the Department of Energy to characterize fully several sites in a variety of different geologic media as a prerequisite to applying for a license under Section 60.21. The Federal Register discussion preceeding the Proposed Rule stresses repeatedly the value of characterizing several potentially acceptable sites in a variety of geologic media. Moreover, it is assumed that DOE will conduct such a program. (See "Departure From the General Statement of Policy" at 70409, "Site Characterization Review" at 70409, "Provision for Characterizing Several Sites" at 70409-10, and "Procedures" at 70411.) This requirement was also stressed in President Carter's February 12, 1980 Policy Statement. Yet neither Section 60.21 nor any other section requires multiple site characterizations prior to DOE's application for a license.

(2) The standard to be applied in deciding whether to authorize construction of a geologic repository is entirely too weak. (Section 60.31) The required "Safety" finding (Section 60.31(a)) is merely that there be a "reasonable assurance" that the types and amounts of wastes in the application "can be received, possessed, and disposed of in a repository of the design proposed without unreasonable risk to the health and safety of the public." This finding is entirely too lax.

The purported "Environmental" finding (Section 60.31(c)) is not even an environmental finding. Rather, it is a balancing test which could allow a construction authorization for a repository with recognized catastrophic potential environmental effects. Indeed, this finding is so vague as to be of virtually no value to the Commission or other interested parties.

Similarly, the suggested "Common defense and security" finding (Section 60.31(b)) is so vague as to be of no consequence.

This Section should include a "best available site" standard, in addition to stricter versions of the "Safety," "Common defense and security," and "Environmental" standards currently in the Section.

The laxness of the Commission's standards is further evidenced in the "Other Reviews" discussion preceding the Proposed Rule, describing the Commission's hope that the DOE site-screening process will lead merely to "a slate of characterized sites whose members are among the best that reasonably can be found." (at 70412)(emphasis added)

(3) Similarly, the standards for issuance of a license under Section 60.41 are entirely too weak. Among other things, the test in subsection (c) should be strengthened substantially.

(4) Section 60.11 should require formal public hearings prior to site characterization. The value of these hearings is touched upon in the "Site Characterization and Authorization of Construction" discussion (at 70410-11) and the "Site Characterization Review" discussion (at 70409). The reasons given for rejecting these hearings are not sufficiently strong to outweigh the hearings' merits. We find it difficult to comprehend the Commission's reasoning that "any decision on alternative sites issues at this early point is likely to require reexamination at the construction authorization proceedings and, therefore, would be of questionable value," given that the Proposed Rule does not require the characterization of alternate sites. (at 70410) Moreover, the Commission's finding that the hearing process "can be an inefficient and cumbersome means of arriving at decisions" (at 70410) should be outweighed by the importance of the issues and the Commission's own recognition that "it would be possible for the Commission to structure its proceedings so as to provide for formal hearings on limited issues at an early stage in the process," and that "(t)he hearing process has clear advantages as a mechanism for fact finding." (at 70410)

(5) The Proposed Rule should also require formal proceedings for public consideration of DOE's waste form research and development program. The Proposed Rule should contain other action-enforcing provisions enabling the Commission to ensure that the waste form program is sufficient.

(6) The Proposed Rule should establish an intervenor funding program for persons who contribute in a significant fashion to any proceeding which is a part of the regulatory process described in the Proposed Rule. The NRC currently has the power to establish such a program.

(7) The Proposed Rule should provide that the Immediate Effectiveness Rule shall not apply to any official actions of the Commission covered by the Proposed Rule.

(8) The Commission should prepare an environmental impact statement for the Proposed Rule. This would be consistent with the Final Report of the Interagency Review Group on Nuclear Waste Management and President Carter's February 12 Policy Statement, both of which stressed the

importance of NEPA in the nuclear waste management program. (See 70412)

(9) The strictness of the "important to safety" standard applicable to structures, systems and components should be increased significantly. (Section 60.2(j), at 70416)

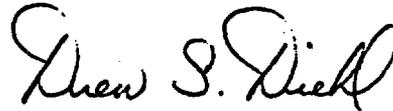
(10) The minimum period for public comments on the draft site characterization analysis should be increased from 60 days to 90 days. (section 60.11(e), at 70416)

(11) Section 60.32 should be strengthened by amending subsection (b) to read: "The Commission shall incorporate provisions requiring..." (at 70419)

(12) Section 60.52, which provides for the termination of a license following the decommissioning of the site, should be eliminated from the Proposed Rule. The issue of license termination is a major policy question requiring further study prior to adoption. Such a provision can always be added to the Commissions's Rules at a future date.

This concludes our formal comments on the Proposed Rule. Once again, we appreciate the opportunity to comment on this important proposal.

Respectfully Submitted,



Drew S. Diehl
Washington Representative

Site Characterization

Site characterization is the foundation of the licensing process; it provides the data on which the licensing decision will be based. Similarly, a key feature of site characterization is the investigation of alternative sites and media.

NRC appears to agree with this view. Footnote seven on page 70411 of the Supplemental Information states that NRC expects the U.S. Department of Energy (DOE) to submit a "wider range of alternatives" than what is considered a minimum: three sites representing a minimum of two geologic media. The "significance of the decision selecting a site for a repository" is cited as justification for expecting DOE to exceed the minimum requirements.

We have two concerns about this approach. First, our interpretation of the significance of repository selection is such that two media should be investigated at a minimum of two sites per medium. Second, NRC's intent with respect to considering alternatives is not reflected in the regulations. There is no requirement for DOE to submit more than one site characterization report or to characterize more than one site. Furthermore, the Environmental Impact Statement (EIS) filed with the license application may have to be site specific to fulfill the requirements of sections 51.5 and 60.21. We suggest that the regulations specify more explicitly the requirements for site characterization and the contents of the site characterization report. Alternatively, an EIS could be required for the site characterization process. In addition, the proposed regulations do not provide for adequate consideration of either NRC's or the public's comments on site characterization reports. The regulations should specify that DOE must respond to issues raised in the site characterization report.

The process for implementing the technical criteria is also vague. The draft regulations indicate that the hydrology, geochemistry, geology, etc., of the proposed sites must be explored. They also indicate that these features need to be explored through a series of tests, including in situ testing at depth. The data obtained from these tests would then be compared against the yet-to-be-developed technical criteria. We envision these criteria to be such things as, for example, tolerance limits for thermal response of the host rock, leach rate limits for the in situ waste form, and ion migration rates under conditions of repository failure. Since the technical criteria are nonexistent, however, the regulations lack an important step; that is, a matching of technical criteria with the specific test or tests which will prove that these criteria can be satisfied by the proposed repository site. Although such a matching is impossible to complete without technical criteria, it can be approached by specifying certain experiments which absolutely must be performed. These experiments can be specified using the current scope of understanding of the technical aspects of repository design, and without obligating NRC to issue a license once the experiments are done. The California Energy Commission has done extensive

work in this area and has discussed these experiments in public documents. For example, in addition to the requirements for alternative site and media investigations mentioned above, we recommend that thermal experiments be run at well above design base heat loads to determine if unexpected effects occur and to our ability to predict thermal response. In situ tests should also include radionuclide or stable element migration over reasonable ranges of water temperature, pressure, Eh, and pH to examine actual geochemical, diffusion and waste-rock interactions under natural conditions.

Thus, NRC could currently specify within the procedural element of the proposed regulations, a number of specific experiments which would aid in the successful licensing of a repository. Doing so would demonstrate the good faith of NRC to address the scientific issues, including the most basic issue: Are the technical criteria adequate to assure isolation? Furthermore, specifying such experiments is a necessary step if NRC views the licensing process as a means for developing technical criteria.

License Application and Construction Authorization

Section 60.21(c)(13) requires DOE to specify in its license application--that is, after site characterization and before construction authorization--"those structures, systems, and components of the geologic repository, both surface and subsurface, which require research and development to confirm the adequacy of design." A time scale is required for resolving issues related to items "important to safety."

Although this language describes a procedure which is common in reactor licensing, repository licensing differs from the former in at least one critical aspect. As noted in the Supplemental Information section, under Site Characterization Review (page 70409), the two processes differ in "the extent to which engineered features can be relied upon to accommodate deficiencies in site characteristics." Obtaining such information for geologic repositories has been an elusive goal in the past, and there is little certainty about how quickly such information can be gathered in the future. Therefore, if critical, unanswered scientific and engineering questions are identified as requiring further research and development, and construction is authorized on this basis, there is a possibility that the licensing process and construction may have to be terminated at a later date--at a great cost. There is also a possibility that the project will acquire sufficient momentum that, except in the event of highly visible failure, termination will be ruled out. The regulations therefore should specify criteria which must be met prior to NRC's authorizing construction.

The most important criterion to be met concerns the geologic disposal concept itself. Our first concern is that the proposed regulations do not address adequately the contribution which geology makes to successful isolation. None of the criteria for site characterization includes provisions for locating a geologically stable site which provides assurances for predicted stability over the life of the repository. Site studies which do not consider geologic history may neglect adverse future changes in the ability of a site to isolate wastes for thousands of years. Therefore, we recommend that the proposed rule adopt the following guideline which was discussed in the NRC conference on

State Review of Site Suitability Criteria for High-Level Radioactive Waste Repositories which was held in Denver, New Orleans, and Philadelphia during September, 1977:

"The repository site should be shown to be geologically stable, i.e., it shall not have experienced geological events during the past 10⁷ year period of a type and magnitude such that the long-term effectiveness of the repository could be compromised were similar events to occur at some future time."

In addition, we recommend that the geology of a proposed site be classified as "important to safety."

Second, the generally accepted view is that the geologic disposal concept has not been verified as a method which will assure long-term isolation of high-level radioactive wastes. This view is reflected in the Interagency Review Group's (IRG) report and in President Carter's recent statement on nuclear waste disposal. The licensing regulations therefore should require NRC, prior to authorizing construction, to 1) hold a formal proceeding and 2) make a specific finding on the feasibility of geologic disposal at the proposed site.

Deferring detailed consideration of decommissioning until all wastes have been emplaced (Section 60.51) is inappropriate. On p. 70409, it was noted that improper evacuation of an exploratory shaft could make the repository unsealable. The NRC cannot make a decision as to whether the repository can be sealed unless the methodologies for sealing are set forth and demonstrated prior to drilling the first shaft. Although relevant information will be acquired during the operational period and should be used at the time of the issuance of a license amendment, detailed plans should be in hand well before then to assure long term isolation.

State Participation

Support C -- Participation by State Governments -- does not meet what we see as the necessary criteria for state involvement in the siting, construction and decommissioning of a repository. Although the proposed regulations offer the state an opportunity to participate, and allow states to specify the scope of their concerns, the NRC is given the authority to make the ultimate decision on what issues states will and will not be able to review in a specific licensing proceeding, as well as the level of funding for review of approved state proposals. In addition, there is no process through which states can appeal an NRC decision on the scope of state involvement.

We realize that DOE bears a large portion of the responsibility for State participation and that NRC's proposal for State participation in the licensing process may be limited for that reason. What DOE proposes for State participation is unclear, however. It is therefore important for the licensing process to provide the basis for meaningful State review. Moreover, the comprehensive nature of the current proposal provides a framework for implementing necessary State participation processes.

The fundamental shortcoming of the current proposal is the lack of a mechanism for states, whether potential host states, or adjacent states, to halt the repository siting process when their concerns are not resolved. Interested states (i.e., states which have a generic interest or a policy concerned with nuclear waste) also have concerns which must be met through specific procedures; the scientific questions in repository development are the same for host, adjacent, and interested states. Section 60.62(b), which contains the undefined term "affected (states)," may eliminate input from interested states.

One mechanism for state involvement which has received a good deal of attention, most recently by the Interagency Review Group (IRG), is consultation and concurrence. While the Nuclear Fuel Cycle Committee of the Energy Commission is not tied to this specific terminology, we do support the concept which is embodied in the terminology. Consultation implies an absolute requirement for the federal government to meet, interact, and exchange information with states. Moreover, the idea of concurrence necessarily includes the possibility of nonconcurrence. The proposed licensing regulations appear to bypass entirely the latter concept.

The essential role of a potential host state under current scientific conditions and state-of-the-art should be to participate in the fundamental scientific verification program, even prior to a project being initiated within the state. This role means not only some form of consultative type interaction between the state and the federal government, but also that the state itself should be able to issue a series of concerns or scientific questions and have those questions resolved by its own experts by means of literature searches and informational hearings.

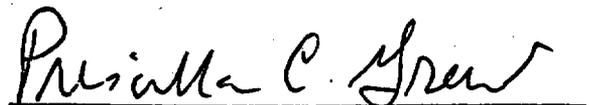
Normally the potential host state role is defined as either having a veto or some form of "cooperative" interaction with the capability to stop the project. This essentially anticipates a subordinate role. In terms of development and in terms of verification prior to licensure, a potential host state should have a capability of interacting on the project and halting the project at any phase of its development if the state is not satisfied that the project is moving forward with a reasonable and predictive set of methodologies. Of course, a mechanism must also be specified for arbitrating cases on non-concurrence and for an ultimate federal override if arbitration fails.

We offer these comments as constructive criticism of the proposed licensing regulations. We hope you give them serious attention.

Very truly yours,



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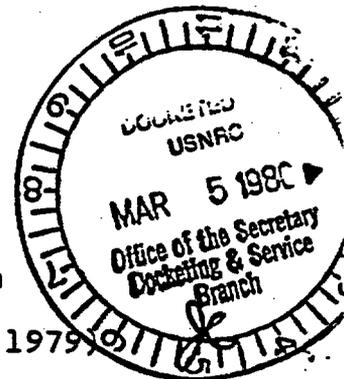
February 29, 1980

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Secretary of the Nuclear Regulatory Commission
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Docketing and Service Branch

Re: Disposal of High-Level Radioactive Wastes in
Geologic Repositories; Proposed Licensing
Procedures (44 Fed. Reg. 70408; December 6, 1979)



The Natural Resources Defense Council (NRDC) hereby submits its comments on the Nuclear Regulatory Commission's (NRC or the Commission) proposed licensing procedures for the disposal of high-level radioactive wastes in geologic repositories. The development of both these licensing procedures and the upcoming safety standards for repositories are urgently needed to guide the on-going activities of the Department of Energy (DOE or the Department) in selecting possible sites for geologic repositories. Unfortunately, due in large part to the absence of such procedures and safety standards, the Department continues an inadequate approach to the selection of potential sites for geologic repositories.^{1/}

^{1/}In particular, NRDC finds the Department's emphasis on salt domes in the Gulf Coast region highly ill-advised. Salt domes are inherently unstable formations, are often associated with significant natural resources, (footnote continued on next page)

acknowledged by card... *[Signature]*

800 707 0084

The Commission's proposed rule is a significant improvement over the earlier proposed general statement of policy. (43 Fed. Reg. 53869; November 17, 1978.) We applaud the overall approach incorporated in the proposed rule, and we congratulate the Commission on a job basically well done. NRDC strongly supports, in particular, the proposed step-by-step process for reviewing the Department's development of geologic repositories. This cautious approach, together with appropriate technical conservatism that we urge be incorporated in the upcoming technical criteria, is desirable because there is no experience in constructing geologic repositories anywhere in the world, and because there are known significant scientific uncertainties and gaps in knowledge about how to design, construct, and operate geologic repositories safely.^{2/} Careful review at each initial stage in the selection of sites, construction and operation of repositories, and in the closure of repositories is necessary to protect public health and the environment adequately.

Also, geologic exploration and in situ testing at depth of several potential sites in different geologic media are an

^{1/}(cont. from page 1) are potentially valuable as storage facilities (as in the case of the strategic petroleum reserve), and they have the other disadvantages of salt, e.g., high solubility, low sorptive capacity, and inconvenience of maintaining ready retrievability of wastes. In our view, if DOE had had the benefit of adequate standards addressing the issue of natural resources and human intrusion, there would not be the current emphasis on salt domes.

^{2/}See, for instance, Interagency Review Group on Nuclear Waste Management, Subgroup Report on Alternative Technology Strategies for the Isolation of Nuclear Waste, TID-23315 (Draft), Appendix A, page vi (October 1978).

essential component of regulations designed to protect the public health and safety of thousands of human generations to come. Important information about the possible future behavior of wastes emplaced in a deep geologic environment can be obtained only by study in that environment. Laboratory tests and investigations from the surface are useful and important, but they are also inherently limited. A high degree of assurance that wastes will remain isolated from the biosphere can be obtained only by extensive study deep underground at the actual site proposed for disposal.^{3/}

An important aspect of the proposed approach is that there be investigation of several sites prior to selection of one for development, because this procedure will reduce the chance of undue institutional momentum accruing to a site that may be inferior. We believe that it was this concern that was behind the President's recent decision to cancel the Waste Isolation Pilot Plant, for instance. Indeed, without a provision for comparative review prior to commitment to one site, the desirability of a requirement for exploration and in situ testing at depth would be significantly diminished. The proposed regulations help ensure that the commitment of a particular investigative and design team to an individual site will not be

^{3/}See, Committee on Radioactive Waste Management, National Academy of Sciences - National Research Council, Implementation of Long-Term Environmental Radiation Standards: The Issue of Verification, A Report Prepared by the Panel on the Implementation Requirements of Environmental Radiation Standards (1977).

controlling, because there will be a comparative review of several alternatives that have been studied to the same extent.

The intent of the proposed provisions for state and general public involvement in the NRC's reviews of DOE's plans are also highly desirable. The federal government in the past gave too little attention to the advice and concerns of state officials, independent scientists and the general public, particularly at the early stages of investigating and developing facilities for long-term storage or disposal of radioactive wastes. Had early, independent comments been heeded about proposed sites at, for instance, Lyons, Kansas, tax dollars would not have been misspent on unsound approaches and progress toward safe disposal would have been much faster. Furthermore, confidence in the federal program, which is almost totally absent today, would have developed.

There are, however, fatal omissions in the proposed rule. In order for the stated objectives of the NRC to be fulfilled, and for the NRC to meet the Atomic Energy Act's (AEA) requirements to protect public health and safety, these serious deficiencies must be corrected in the final rule. In particular, (1) the final regulations should specify a minimum number of sites that must be characterized by the Department before an application to construct a repository can be docketed by the NRC; (2) all of the minimum number of sites should qualify under an early screening test to assure that they satisfy, to the extent possible prior to exploration and in situ testing at

depth, NRC's technical criteria for sites;^{4/} (3) the regulations should explicitly identify the problems of conflict with natural resources, and other situations potentially leading to inadvertent human intrusion into a repository, as major issues to be discussed fully in site characterization reports and license applications; (4) the rule should explicitly state that in the event there is NRC dissatisfaction with a site characterization report, an application to construct a repository will not be docketed; and (5) DOE should be required to explore and investigate these multiple sites at depth.

Additionally, the discussion of the environmental impacts associated with site characterization preceding the proposed rule should be substantially improved, and the final regulations should improve the provisions for state participation in the NRC review process, particularly by "interested" states. Finally, we are concerned that the NRC has omitted discussion and formulation of policy on (1) the implementation of the National Environmental Policy Act (NEPA), as it applies to NRC's activities in licensing geologic repositories, and (2) provision of financial and other assistance to public interest groups that, with the availability of adequate resources, could

^{4/}The determination, based on information prior to exploration and in situ testing at depth, that sites are "qualified" should be made only after there has been a public hearing on the issue.

meaningfully contribute to the NRC's review of DOE plans.^{5/}
We urge the NRC to direct attention to these two important matters at the earliest possible time, because adequate policies on them are essential to a sound licensing approach.

The licensing procedures should not become final until the NRC's NEPA policy and program for providing assistance to intervenors is available. Moreover, the comment period on the proposed licensing procedures should remain open until the proposed technical criteria are available formally for public review and comment. These documents are integral to the NRC's overall regulatory program to assure high-level wastes will be disposed of safely. Piecemeal review of the NRC's approach is inherently unsatisfactory, prohibiting comprehensive and thorough analysis by the public.

I. The Proposed Licensing Procedures Should Require the Department of Energy to Characterize, Including Exploration and In Situ Testing at Depth, A Minimum Number of Sites.

The NRC prefaces its proposed regulations with the expectation that the Department will characterize "a minimum of three sites representing a minimum of two geologic media" in response

^{5/}Additionally, within the context of the proposed regulations, the NRC should maintain a current list of individuals and organizations that are interested in radioactive waste disposal or licensing matters. Written notification of the NRC's receipt of site characterization reports and license application should go to all those on this list automatically. Reliance on notices in the Federal Register are inadequate in this regard.

to the requirements of the National Environmental Policy Act (NEPA) to consider alternatives to a proposed action. (44 Fed. Reg. 70415; footnote.) NRDC concurs that NEPA requires DOE to evaluate fully several alternative sites in a variety of geologic environments. The proposed regulations, however, inexplicably do not themselves require the Department to consider several sites in a variety of different types of rock as matter important for protection of public health and safety. (See, 44 Fed. Reg. 70415; footnote.) We believe strongly that, pursuant to its obligation under the Atomic Energy Act to protect public health and safety, the NRC should require a specific, minimum number of sites that the Department must characterize. In particular, we urge the NRC to incorporate the recent Presidential directive, based on the recommendation of a majority of the Interagency Review Group on Nuclear Waste Management, to the Department to locate at least four sites in a variety of different geologic environments before selecting the first site for a repository.^{6/} We interpret the phrase "a variety of geologic environments" in the Presidential "Fact Sheet" to mean that at least three different types of rocks have to be characterized.

The need for characterizing several sites in a variety of rock media is justified by more than the need to consider alternatives under the provisions of NEPA, although that is

^{6/}Office of the White House Press Secretary, "Fact Sheet, The President's Program on Radioactive Waste Management," p. 4 (dated February 12, 1980).

sufficient justification. Specifically, we believe that there are two more compelling reasons for characterization of several sites: (1) consideration of several sites in a variety of rock types provides critical information about the relative safety of different environments; and (2) characterization of several sites avoids Departmental momentum in favor of only one site and undue institutional commitment to only one proposal. These are issues at the heart of the NRC's responsibility to protect public health and safety under the requirements of the Atomic Energy Act.

There are significant gaps in our scientific knowledge about the geologic disposal of radioactive wastes. These uncertainties have potentially serious implications for the level of safety provided by geologic repositories. Predicting possible future releases of wastes from geologic repositories, furthermore, is an activity of unknown, but probably low, reliability and accuracy. To compensate, at least partially, for these problems in assessing safety, the NRC should assure that during the selection of a disposal environment the "best" of a set of qualified sites is selected.

To help assure that the selection of a site involves comparison of valid alternatives, the NRC should conduct a careful review of DOE's selection of sites for characterization. Before a final determination on whether DOE's sites are "qualified," the NRC should hold a public hearing to obtain the views of members of the public, interested organizations, independent scientists, Indian nations, and local and state

governments. Such a procedure would help avoid the undue commitment of public funds to sites that could never be acceptable for construction of repositories. The basis for comparison should be NRC's as yet unreleased technical criteria for siting repositories. DOE should not be able to count as one of the minimum number of sites any that clearly violate the technical criteria.^{7/}

The federal program in radioactive waste management, moreover, has suffered in the past from an inability to maintain flexibility and to consider a range of possible solutions for each step of the process ending in disposal. A requirement to characterize several sites in a variety of geologic environments, thus, is not only fully justified on safety and environmental grounds, it also would improve the likelihood of success of the Department's program.

The "supplementary information" to the proposed regulations concludes that, ". . . the data needed to establish the ultimate suitability of the site is likely to be obtained only through exploration and in situ testing at depth, i.e., in the proposed rock unit. . . . [W]ithout exploration and in situ testing in the proposed host rock unit, neither the defects nor the key parameters can be determined with confidence." (44 Fed. Reg. 70410). NRDC concurs with this judgement, which is

^{7/}As indicated in these comments, we believe that such a careful early screening test would disqualify Gulf Coast salt domes and the bedded salt site near Carlsbad, New Mexico.

amply justified by recent technical analyses.^{8/} We are surprised, therefore, that the proposed regulations do not require DOE to conduct the necessary exploration and in situ testing at depth.

In conclusion, consistent with the recent decision of the President, we urge the Commission to revise its proposed rule so that the Department is required to characterize, through exploration and in situ testing at depth, a minimum of four qualified sites in three different rock media before an application to construct a repository is docketed.

II. The Environmental Impacts of Site Characterization Have Not Been Adequately Addressed by the Commission in the Proposed Rule.

The Commission states in its rationale for a site characterization report that the environmental impacts of site characterizations are "relatively insignificant" and that the principal impact will be the "management of the spoils from

^{8/}See, for instance, Interagency Review Group on Nuclear Waste Management, Subgroup Report on Alternative Technology Strategies for the Isolation of Nuclear Waste, TID-28818 (Draft), Appendix A (October 1978); J. D. Bredehoeft, et al., U.S. Geological Survey, Geologic Disposal of High-Level Radioactive Wastes -- Earth-Science Perspectives, Circular 779 (1978); U.S. Environmental Protection Agency, Report of an Ad-Hoc Panel of Earth Scientists, The State of Geological Knowledge Regarding Potential Transport of High-Level Radioactive Wastes from Deep Continental Repositories, EPA/520/4-78-004 (June 1978); and Committee on Radioactive Waste Management, National Academy of Sciences - National Research Council, Implementation of Long-Term Environmental Radiation Standards: The Issue of Verification, A Report Prepared by the Panel on the Implementation Requirements of Environmental Radiation Standards (1979).

excavation of an exploratory shaft" measuring 5000 cubic yards. (44 Fed. Reg. 70409; footnote 4.) This statement fails to consider the economic and political impacts of land withdrawals, and the potential impacts of aquifer disruption and reclamation of the site if subsurface exploration results in abandonment. Furthermore, the NRC's view that site characterization has insignificant environmental impact is inconsistent with other statements suggesting that the Department may decide to prepare an "environmental impact statement with respect to site characterization activities." (44 Fed. Reg. 70417.)

Thus, we believe that the Commission's evaluation of the potential environmental impacts of site characterization is incorrect. Undoubtedly, DOE will have to prepare an environmental impact statement on any proposed site characterization, pursuant to the requirements of NEPA. This NEPA statement, and a discussion of potential environmental consequences in its site characterization report, should be key elements of the NRC's review of DOE's plans. The potential environmental impacts during site characterization explicitly must be found acceptable, and there must be no preferable alternatives, before the NRC approves DOE site characterization reports.

III. The Provisions for State and Public Involvement in NRC's Review of DOE's Site Characterization Report Should Be Strengthened.

The proposed regulations in two key respects restrict the opportunity for states to participate in the NRC's review of

its characterization reports and license applications. First, a state's participation is subject to the "availability of funds" and "approval" by the Director of the Office of Nuclear Material Safety and Safeguards. (§ 60.83.) Second, such participation is limited to "affected states." (§ 60.62(b).) NRDC believes that neither restriction is appropriate or necessary. Indeed, these restrictions are likely to impede careful technical review of DOE's plans, and they are likely to erode further the already strained state-federal relationship. The NRC, instead of conditioning or restricting its assistance, should provide all interested, affected or host states with the assistance they need to participate effectively in the NRC's review of DOE's site characterization reports and license applications. Additionally, NRC should offer the same assistance to Indian Nations.

IV. The Proposed Regulations Should Explicitly Consider The Natural Resource and Human Intrusion Questions in Site Characterization Reports and License Applications.

Primarily because the principal focus of DOE's site selection program of DOE's Office of Nuclear Waste Isolation is on salt deposits, potential conflict with natural resources is a major concern in considering the adequacy of site characterization reports and license applications. DOE's advocacy of the WIPP site near Carlsbad, New Mexico, and its emphasis on salt domes for disposal of commercial wastes, underscore this concern. Yet, the proposed regulations do not address the

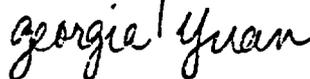
issue of potential conflicts over natural resources. This is a fatal omission. (See, § 60.21.) Indeed, consideration of this issue may be even more important in terms of finding an acceptable site than the other technical areas of concern currently identified in the proposed regulations. (§ 60.21(c).)

The final regulations should require, in DOE's site characterization reports and license applications, a full discussion of the presence and potential of natural resources as a threat to the integrity of the waste containment system. In particular, DOE should be directed to evaluate the probability and possible consequences of extraction of resources in the area of the proposed site, assuming that the human intruders are unaware of the presence of deposited radioactive wastes.

Submitted by:

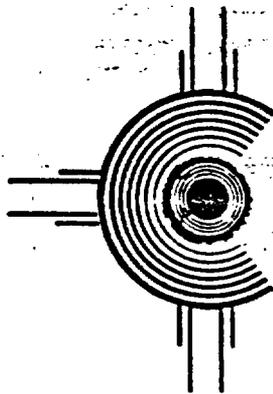


Terry R. Lash



Georgia Yuan

TRL/GY/KJ



DOCKET NUMBER **7**
PROPOSED RULE **PR-2.etal**
(44FR 70408)

Council Of Energy Resource Tribes

One Thousand Connecticut Avenue, N.W.
Suite 610 • Washington, D. C. 20036
(202) 466-7702

March 3, 1980

Executive Committee:

- Peter MacDonald
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Navajo
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Vice-Chairman
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- Leonard Atole
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- Fort Belknap
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- Fort Hall
- Fort Peck
- Hopi
- Jemez Pueblo
- Santa Ana Pueblo
- Spokane
- Uintah-Ouray
- Ute Mountain
- Wind River
- Yakima
- Zia

Executive Director:

Ed Gabriel

Secretary of the Nuclear
Regulatory Commission
Attn: Docketing and Services Branch
Washington, D.C. 20555

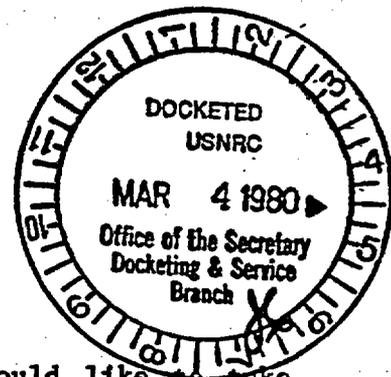
Dear Sir:

The Council of Energy Resource Tribes (CERT) would like to take this opportunity to comment on the NRC's proposed rules on the "Disposal of High-Level Radioactive Wastes in Geologic Repositories, Proposed Licensing Procedures." The proposed procedural rules represent a first step in finding a long-term solution to the problems associated with disposing high-level radioactive wastes. It is our understanding that the NRC will propose technical standards in future rulemaking. The following comments address the procedural mechanisms being proposed in this rulemaking.

As presently drafted, the licensing procedures fail to account for the unique status of Indian tribes and Indian lands. This oversight can be corrected by amending these regulations in at least two ways.

First, Indian tribal governments should be provided an adequate opportunity to participate in the licensing process. Separate consideration for Indian tribes is necessitated by the absence of state jurisdiction over land-use and resource matters on Indian lands as well as by the special relationships between the federal government and Indian tribes.

Second, the legal and institutional aspects of site acquisition and regulatory controls should be addressed more thoroughly. In their current form, the regulations implicitly assume that the applicant has title to, and jurisdiction over, the site. The extremely complex nature of land-ownership patterns in the western states could pose problems which are as formidable as the technical questions. The unique status of tribal lands illustrate this situation. The commission could benefit from expanding its review of such matters throughout the licensing process.



Acknowledged by cert. *[Signature]*

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The following materials discuss these concerns in greater detail.

Tribal Participation In Waste Management

CERT is an association of 25 Indian tribes in the West which own substantial blocs of coal, uranium, oil and gas and other resources. Exhibit I lists the member tribes and indicates their location relative to states and counties. Exhibit 2 is a map indicating the general location of the reservations.*

Several CERT tribes are either directly or indirectly affected by existing radioactive waste storage facilities. For example, the Yakima Nation and Fort Hall Tribes are located near the operations at Hanford and Idaho Falls, respectively. The Navajo Nation, Pueblo of Laguna, and Spokane Tribes produce uranium and have experienced the adverse impacts of mill tailings from the mills located on or adjacent to their reservations. Similarly, several Indian Pueblos are near the transuranic wastes stored at Los Alamos, New Mexico. Their experiences with these existing, temporary waste sites have heightened their concerns about the long-term effects on the surface water and groundwater quality, on air quality, on soil productivity and on land use.

If the Energy Department anticipates using basalt (Washington State), granite (Nevada) and/or salt domes as possible geologic media for the permanent disposal of highly radioactive wastes, these and other American Indians may once again be affected. Any Indian tribe affected by the siting process should be made an integral part of the NRC's review and licensing proceedings.

Regulations should explicitly provide for the participation of Indian tribes for both legal and practical reasons. Quite often, regulation writers presume that Indian tribes are within the purview of the states, and that by providing for state participation Indian interests are covered. This, however, is not the case. Indian tribes have a unique position in the governmental regulatory scheme because of their status as**/sovereign entities having inherent powers of self-government—subject only to congressional enactments and the oversight of their federal trustee, the Secretary of the Interior. Together,

*/ This discussion is limited to the CERT-member tribes. CERT suggests that the Commission and DOE consult with the Department of the Interior and other Indian specialists for detailed information on the non-CERT member tribes.

**/ Virtually all of the CERT member tribes operate under a system of government developed by their people and codified in Tribal Constitutions and By-Laws or in a Tribal Code. The majority of the CERT tribes are organized consistent with the provisions of the 1934 "Indian Reorganization Act (IRA)".

Secretary of the  Nuclear
Regulatory Commission
March 3, 1980
Page Three

tribal sovereignty and the federal trust relationship legally preempt any state role in, or jurisdiction over, the affairs of the CERT tribes. In practice these legal factors constrict the flow of funds and information between the states and the tribes.

Recent federal legislation and federal administrative actions have begun to accommodate the legal distinction between Indian tribal governments and their state and local counterparts. Examples include the Surface Mining Control and Reclamation Act and Part I of the Uranium Mill Tailings Control and Reclamation Act. In addition, the Bureau of Land Management provides for the direct participation of Indian tribes in its Coal Management Program on a par with affected states. Likewise, the Environmental Protection Agency has initiated direct funding to Indian tribes for their air and water quality management programs.

CERT urges the NRC to amend the proposed regulations to provide expressly for the participation of affected Indian tribes whenever a potential disposal site could have an impact on tribal land. Attached to this letter are some possible language changes which could achieve this purpose.

Site Aquisition

The regulations assume that the site(s) for waste storage will be owned or acquired by the federal government. However, the complex nature of land ownership in the western United States may present obstacles to the siting of storage facilities. The proposed regulations devote considerable attention to important technical matters, but fail to provide for review of these legal and institutional matters. CERT feels that the Commission would be advised to analyze these aspects of the site in tandem with the technical reviews. On Indian reservations the right to surface or subsurface use of the land is obtained only, by written contract with the tribe and the approval by the Secretary of the Interior. These agreements are for a limited time only, and can be extended only by the tribe's consent. It would be wasteful to proceed with a site characterization review on the assumption that Indian lands, could be acquired, only to find this assumption totally unfounded. Such problems could be prevented by requiring certification of ownership and jurisdiction as part of the general license information. Such information is a standard element in mining and other land-use licensing procedures. Regulatory language for this change also is included in the attachment.

Thank you for your consideration of these concerns. If we can be of further assistance, please notify us.

Sincerely,



Barbara Gabriel
Executive Director

Attachment

EXHIBIT I
Location of CERT Tribes
by
County and State

CERT Tribe	County	State
Acoma Pueblo	Valencia	New Mexico
Blackfeet	Glacier Pondera	Montana
Colville	Okanogan Ferry	Washington
Cheyenne River Sioux	Ziebach Dewey Perkins	South Dakota
Jicarilla Apache	Sandoval Rio Arriba	New Mexico
Southern Ute	Montezuma La Plata Archuleta	Colorado
Pueblo of Laguna	Bernalillo Valencia Sandoval	New Mexico
Fort Peck	Phillips Blaine	Montana
Wind River	Fremont Hot Springs	Wyoming
Fort Berthold	McKenzie Dunn Mercer McLean Mountrail	North Dakota
Uintah-Ouray	Uintah Duchesne Grand	Utah
Crow	Big Horn Yellowstone Treasure	Montana
Navajo	Apache Navajo Coconino San Juan McKinley San Juan	Arizona Utah New Mexico
Spokane	Stevens	Washington
Santa Ana Pueblo	Sandoval	New Mexico

Ute Mountain

Fort Belknap

Northern Cheyenne

Jemez Pueblo

Nez Perce

Hopi

Fort Hall

Zia Pueblo

Yakima

Chippewa-Cree

Montezuma

La Plata

San Juan

San Juan

Blaine

Phillips

Big Horn

Rosebud

Sandoval

Nez Perce

Lewis

Clearwater

Coconino

Navajo

Bannock

Bingham

Caribou

Power

Sandoval

Yakima

Klickitat

Choteau

Hill

Colorado

New Mexico

Utah

Montana

Montana

New Mexico

Idaho

Arizona

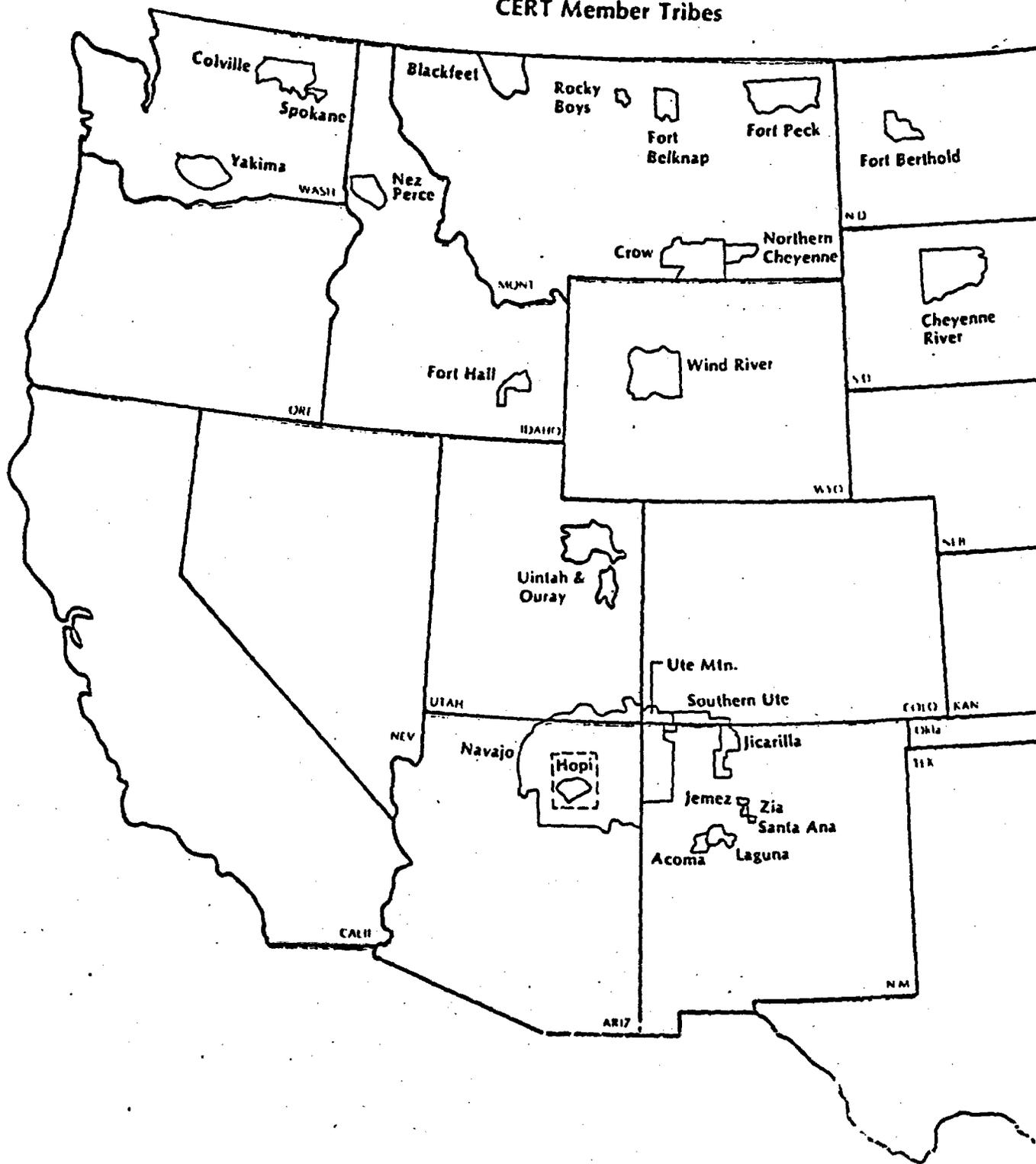
Idaho

New Mexico

Washington

Montana

CERT Member Tribes





ARKANSAS ARCHEOLOGICAL SURVEY

Director • Charles R. McGimsey III
State Archeologist • Hester A. Davis

Coordinating Office
University of Arkansas Museum
Fayetteville, Arkansas 72701
Phone: 501-575-3556

(13)

MEMORANDUM

DOCKET NUMBER
PROPOSED RULE PR-2 et al
(44FR 70408)

TO: Secretary of the Nuclear Regulatory Commission

FROM: Hester A. Davis
State Archeologist *[Signature]*

DATE: February 26, 1980

RE: Disposal of high-level radioactive wastes in geologic repositories;
proposed licensing procedures

I am interested in the proposed licensing procedures, especially regarding how the cultural resource review process will be initiated. Although it is not explicitly stated in the proposed rules, I assume that a review by the State Historic Preservation Officer will be required in the early stages of site characterization, prior to earth disturbing activities. I think that some statement concerning the timing of State Historic Preservation Officer review should be made in the final procedures for radioactive waste disposal.

HAD/lcm

cc: State Historic Preservation Officer
Thomas King



[Handwritten scribbles]

8007030024

SHAW, PITTMAN, POTTS & TROWBRIDGE

1800 M STREET, N. W.
WASHINGTON, D. C. 20036

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STUART L. PITTMAN
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PHILLIP D. BOSTWICK
R. TIMOTHY HANLON
GEORGE H. ROGERS, JR.
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BRUCE W. MURCHILL
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THOMAS A. BAXTER
JAMES M. BURGER
SHELDON J. WEISEL
JOHN A. McCULLOUGH
J. PATRICK HICKEY
JAMES THOMAS LENHART
STEVEN L. MELTZER
DEAN D. AULICK
JOHN ENGEL

STEPHEN B. NUTTNER
WINTHROP N. BROWN
JAMES E. HAMLIN
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RICHARD E. GALEN
ROBERT B. ROBBINS
STEVEN M. LUCAS
MATIAS F. TRAVIESO-DIAZ
VICTORIA J. PERKINS
JOHN M. O'NEILL, JR.
JAY A. EPSTIEN
RAND L. ALLEN
TIMOTHY B. McBRIDE
ELISABETH M. PENDLETON
LUCY G. ELIASOF
PAUL A. KAPLAN
HARRY H. GLASSPIEGEL
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SUSAN D. FALKSON
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JOHN L. CARR, JR.
PHILIP J. HARVEY
ROBERT M. GORDON
JEANNE A. CALDERON
BARBARA J. MORGEN*
BONNIE S. GOTTLIEB
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SHEILA E. McCAFFERTY
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14

DOCKET NUMBER
PROPOSED RULE PR-2 et al
(44FR 70408)

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TELECOPIER
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TELEX
69-2693 (SHAWLAW WSH)
CABLE "SHAWLAW"
EDWARD B. CROSLAND
COUNSEL

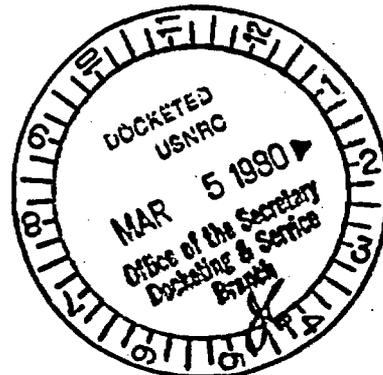
March 4, 1980

*NOT ADMITTED IN D.C.

Secretary of the Commission
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Docketing and Service Branch

Re: Proposed Licensing Procedures for
Disposal of High-Level Radioactive
Wastes in Geologic Repositories



Gentlemen:

On December 6, 1979, the Nuclear Regulatory Commission published for comment proposed regulations relating to the licensing procedures for the disposal of high-level radioactive wastes in geologic repositories. (44 Fed. Reg. 70408). The Federal Register notice invited comments on the proposal. On behalf of the Radioactive Waste Management Group, we are pleased to submit the comments which follow. The Radioactive Waste Management Group is composed of utilities who are operating, constructing and planning nuclear power reactors. The members of the Group are American Electric Power Company, Baltimore Gas and Electric Company, Duquesne Light Company, General Public Utilities Corporation (and its subsidiaries Jersey Central Power & Light Company and Metropolitan Edison Company), Kansas City Power & Light Company, Kansas Gas and Electric Company, Madison Gas and Electric Company, Northern States Power Company, Ohio Edison Company, Pennsylvania Power & Light Company, Rochester Gas and Electric Company, The Cleveland Electric Illuminating Company, Toledo Edison Company, Union Electric Company, Wisconsin Electric Power Company, Wisconsin Power & Light Company, and Wisconsin Public-Service Corporation.

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2/7/80

Secretary of the Commission
Page Two
March 4, 1980

The proposed regulations supersede the proposed General Statement of Policy on Licensing Procedures for Geologic Repositories for High-Level Radioactive Wastes (43 Fed. Reg. 53869, November 17, 1978). Comments filed on January 16, 1979 by the Radioactive Waste Management Group on the proposed General Statement of Policy commended the Commission for its diligent attempt to devise procedures which would meet the goals of maximizing public confidence while at the same time proceeding in an expeditious fashion with the waste management program. We did however recommend a number of changes in the proposed General Statement. We are pleased to note that some of these changes are reflected in the proposed regulations. Other problem areas however remain and new ones have been created. The following comments address our main areas of concern.

1. Alternative Sites

Both in the proposed regulations (see, e.g. proposed §51.40(d)) and in the Supplementary Information accompanying the proposal (see, e.g. 44 Fed. Reg. at 70411), the Commission states that "to satisfy the requirements of NEPA", it anticipates that there will be site characterization for "a minimum of three sites representing a minimum of two geologic media." The Commission also proposes that this multiple site characterization must be substantially completed before NRC will act on an application for construction authorization. We find no such requirement in NEPA and respectfully submit that NRC should not prejudge the nature or magnitude of the alternatives analysis which may be appropriate.

The current program of the Department of Energy is looking towards examination of a variety of sites in a variety of media. The President's February 12, 1980 policy statement on radioactive waste management codifies this approach.

Immediate attention will focus on research and development, and on locating and characterizing a number of potential repository sites in a variety of different geologic environments with diverse rock types. When four or five sites have been evaluated and found potentially suitable, one or more will be selected for further development as a licensed full-scale repository.

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Page Three
March 4, 1980

However, the Commission's proposal appears to go beyond the President's program and will likely cause significant delays in the program with little offsetting benefits. We would make a number of points in this regard.

First, it is our opinion that NEPA does not require multiple site characterization of the type contemplated by the Commission. It must be borne in mind that "site characterization" in the context of the proposed regulations is an elaborate, time consuming process including

borings, surface excavations, excavation of exploratory shafts, limited subsurface lateral excavations and borings, and in situ testing. . .

Proposed §60.2(n). In other contexts, NRC has recognized that different levels of information may be available for alternatives and that the level of information which would be developed from a "site characterization" type process is not required for an alternatives analysis which meets NEPA requirements. This differing level of information was indeed the basis for the "obviously superior" standard developed in the Seabrook line of cases. See New England Coalition on Nuclear Power v. USNRC, 582 F.2d 87 (1st Cir. 1978) (recognizing the fact that "the proposed site will inevitably have been subjected to far closer scrutiny than any alternative site. . ."). Thus NEPA does not mandate that all alternatives studied be studied in the same detail.

Second, the Commission appears to require a higher level of site information on alternates than does the President's statement. The President's statement called for a finding of the potential suitability of four to five sites. This type of determination would not necessarily involve the high degree of data contemplated by the site characterization process with its requirements for exploration at depth of every site.

Third, the Commission underestimates the cost of the site characterization. A figure of \$20 million for a generic hypothetical site is presented. 44 Fed. Reg. at 70410. No basis for this cost is given. Even at this cost, the Commission is calling for expenditures in the neighborhood of \$100 million (since NRC expects DOE to present "a wider range of alternatives" than the three site minimum, 44 Fed. Reg. at 70411). Also, it is our opinion that the \$20 million

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figure is too low. We note that DOE has proposed to spend \$21 million in Fiscal Year 1981 alone on "further site characterization and protection of the site" near Carlsbad, New Mexico, even though the Carlsbad site has been under study for many years.

Fourth, we are concerned that NRC is establishing perfection as the standard for siting decisions, rather than as a goal. Thus, NRC indicates its intent that DOE present the Commission with "a slate of candidate sites that are among the best that reasonably can be found." 44 Fed. Reg. 70410. The appropriate standard should be the selection of a site, chosen from among reasonable alternatives, which meets NRC's technical criteria. In determining the reasonableness of the alternatives, the NRC is entitled to -- and should -- consider the delay factor which could result from awaiting the discovery of the "best" sites. See Porter County Chapter of Izaak Walton League v. AEC, 533 F.2d 1011, 1017 (7th Cir.), cert. den. 429 U.S. 945 (1976).

2. NEPA Compliance

In our comments on the proposed General Statement of Policy, we urged that NRC in its NEPA review not reopen important generic issues treated by DOE. The Supplemental Information accompanying the proposed regulations states

The proposed regulations do not explicitly address the NEPA responsibilities of the Commission regarding matters within the scope of the Department's generic environmental impact statement on the management of commercially generated radioactive wastes. The possibility of adopting the Department's statement may be considered by the Commission, as suggested in comments, at an appropriate time.

44 Fed. Reg. at 70408. We continue to urge that the Commission make use of the "tiering", "lead agency" or "joint lead agency" concepts codified in the Council on Environmental Quality regulations to assure that NRC will not unnecessarily duplicate DOE's efforts.

Multiple levels of review are already built into generic decisionmaking on waste management (i.e., DOE, Interagency Review Group, the President, Congress, the State

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Planning Council, and individual states). Yet another layer of review (NRC's reexamination of generic decisions in the course of NEPA process) will add little except the opportunity for delay. Questions involving the timing of repository development, regional siting, the scope and future of the commercial nuclear program, and the like ought to be excluded from NRC NEPA analyses based upon their consideration in DOE NEPA reviews. Similarly, disposal technologies other than mined geologic repositories ought not to be considered by the Commission since those alternatives are not likely to be available in the foreseeable future. 44 Fed. Reg. at 70411. The scope of NRC's NEPA responsibilities should be clearly delineated in advance. This will avoid needless arguments at later stages of the process.

3. Site Characterization Review

Our comments on the proposed General Statement of Policy supported the concept of informal NRC-DOE interaction in advance of formal licensing. The proposed regulations have expanded this informal mechanism considerably. We still believe that interagency consultation at an early stage is important. We would express a concern that the process not be made unnecessarily rigid and overproceduralized.

Proposed §60.11 would require DOE to submit a site characterization report "[a]s early as possible after commencement of planning for a particular geologic repository operations area, and prior to site characterization. . . ." Since activities which NRC might consider "site characterization" have already been carried out at some potential repository sites (such as Carlsbad, New Mexico) and may be carried out at others before the proposed regulations are adopted, the proposed regulation should reflect this fact.

The proposed scope of the site characterization report could also be usefully narrowed in some areas without compromising its purpose. For instance, section 60.11(a) calls for the report to include the identification and location of alternative media and sites on which DOE intends to conduct site characterization for which DOE anticipates submitting subsequent site characterization reports. This would seem to unnecessarily delay DOE from submitting a site characterization report for one site until it had identified all other alternate sites which it wanted to characterize. The process could lead to a "convoy" system where the slowest

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paced site governs the timing for every other site. This is of particular concern in the context of the proposed regulations because of their prohibition on the conduct of site characterization activities prior to Staff review. It is not clear why information on alternative sites is relevant at the site characterization stage. Research and development on waste forms, another item required to be included in the site characterization report, would also seem to be of relatively minor relevance at the site characterization stage.

Two minor comments on site characterization are also appropriate. First, a maximum time period (perhaps 90 days) should be provided for comments on the draft site characterization analysis, in addition to the minimum comment period of 60 days specified in §60.11(e). Second, §60.11(f) should provide that any objections by the Staff on the site characterization report do not affect the authority of the Commission, Appeal Boards, Licensing Boards, etc. This would provide the necessary symmetry to the provision in §60.11(f) that a "no objection" finding does not affect the authority of the Commission.

4. Scope of information for license application

Proposed Section 60.21 describes the information to be included in the application for construction authorization. In general, the regulations do not explicitly reflect the preliminary nature of some of the information which will be available. In some cases, the information requested seems to be overly detailed for a preconstruction stage.

In the reactor licensing context, 10 CFR §50.34(a) acknowledges that the construction permit application may contain "preliminary" information. Thus the preliminary safety analysis report may include the "preliminary design of the facility", §50.34(a)(3), a "preliminary analysis and evaluation of the design and performance of structures, systems and components", §50.34(a)(4), a "preliminary plan for the applicant's organization", §50.34(a)(6), and a discussion of "preliminary plans for coping with emergencies", §50.34(a)(10). Proposed Part 60 does not contain comparable language. Indeed, the language of §60.24(a) that the application be "as complete as possible in light of information that is reasonably available at the time of submission" could be read to imply the need to go beyond the preliminary information more typical of the pre-construction stage. Some of the requested categories of information in §60.21

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would not seem necessary, at least in full detail, at the construction authorization stage. These include emergency plans, §60.21(c)(9), nuclear material accounting and control, §60.21(c)(10), retrieval plans and alternate storage, §60.21(c)(11), organization, §60.14(c)(i), and decommissioning, §60.21(c)(14)(vii). We would also recommend that the findings to be made by the NRC in issuing a construction authorization, described in §60.31, be tailored to the preliminary nature of information in these areas.

5. Other comments

In addition to these major areas of comment, we would like to point out several other provisions where changes should be made.

- a. §60.2(i): Spent fuel should be characterized as "high-level radioactive waste" only where the determination has been made to permanently dispose of the specific spent fuel assemblies. This will avoid disputes as to whether spent fuel is "radioactive waste" under circumstances where permanent disposal is not intended.
- b. §60.21(a): The proposed regulation should allow DOE to submit a site specific environmental impact statement, if one has been prepared, in place of the environmental report now called for. (This comment would of course not apply if the more fundamental NEPA-related changes discussed above are made).
- c. §§60.33(b) and 60.45(b): These provisions, dealing with amendments to construction authorizations and licenses, should incorporate the "significant hazards" language for pre-noticing now found in the analogous Part 50 provision, §50.91.
- d. §60.43(b): The proposed regulation would require that license conditions cover "restrictions as to location, size, configuration and physical characteristics . . . of the storage medium". These would seem to be governed by the nature of the site selected. Thus, license conditions would be unnecessary.

SHAW, PITTMAN, POTTS & TROWBRIDGE

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- e. §60.71(c): The reporting requirement for deficiencies should specify the timing of such reports. Presumably the timing could parallel that established in 10 CFR §50.55(e).

We appreciate the opportunity to submit these comments.

Very truly yours,



Jay E. Silberg
Counsel for the Radioactive
Waste Management Group



MISSISSIPPI DEPARTMENT OF NATURAL RESOURCES

Office of Energy
P. O. Box 10586
Jackson, Mississippi 39209
(601) 961-5060



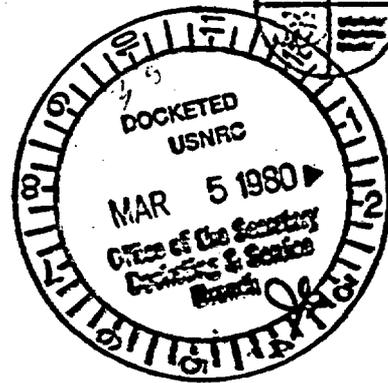
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March 3, 1980

DOCKET NUMBER

PROPOSED RULE

PR-2 et al
(44FR 70408)



Secretary
Nuclear Regulatory Commission
Washington, D. C. 20555

Attn: Docketing and Services Branch

Dear Sirs:

RE: COMMENTS ON PROPOSED RULE FOR DISPOSAL OF
HIGH-LEVEL RADIOACTIVE WASTE (HLW) IN GEOLOGIC
REPOSITORIES; PROPOSED LICENSING PROCEDURES

The present approach to the HLW Disposal process evidenced by the proposed licensing procedures outlined in FR, Vol 44, No. 236 is an action in the proper direction. The Mississippi Office of Energy supports the concept of the NRC's involvement in expanded site characterizations rather than provisional construction authorizations and in the review of the Department of Energy's plans for site characterization and site selection procedures, methods and criteria prior to the use of such procedures, methods, and criteria.

There are, however, several comments and questions that deserve additional attention:

- 1) It is most important at the state and local level that agency representatives and citizens in general have a clear understanding of the roles to be played by DOE, NRC, EPA, and other federal agencies that might be involved. The process now defined tends to cloud and distort the view as to these roles.

Some overview of these relationships should be made an ongoing part of any state and local public hearing and/or meetings.

- 2) There are presently several site characterization decisions in progress by DOE, including three sites in Mississippi. The site characterization reports under the pre-application review should apply in retrospect to these efforts.
- 3) The site characterization report does not address directly the problems of site-related impacts, such as transportation, economic and social, on the local and state infrastructure and population. This should be specifically addressed in any site characterization report.

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ACKNOWLEDGED BY CARD...

3/7 [Signature]

Secretary, Nuclear Regulatory
Commission

Page 2

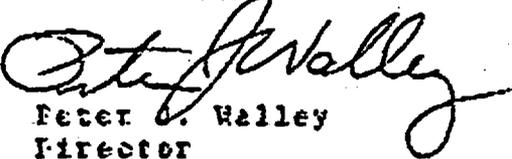
March 3, 1980

- 4) The contents of license applications require plans for coping with radiological emergencies. These types of plans place a considerable amount of responsibility for planning on the state and local governments. The extent and scope of the plans should be defined as in those regulations required for nuclear commercial power reactors.
- 5) In the license amendment to decommission the description of the program for post-decommissioning monitoring should be more specific and require some minimum level of activity in perpetuity.
- 6) The general tone of the Subpart C--Participation by State Governments--gives the impression that state and local governments are that of observers and occasional participants provided they generate enough activity.

The consultation process should give the state a stronger, more formalized role in the activities of site characterization, particularly those that relate to site specific data as opposed to generic data. The concurrence part of the consultation and concurrence process would then be addressed by any state and/or federal laws in place. The consultation definition and process should be made clearer to the extent that the state has the procedure available to recommend specific courses of action whereupon the Director of the NEC's Office of Nuclear Materials Safety and Safeguards would respond in writing as to why a particular recommendation was not taken, if so. This would define the state participation program in a formal sense. This, of course, would then modify the approval of proposals process (Section 60.83).

Please be assured that Mississippi is vitally concerned with this process and will provide additional comments and concerns as the issue matures.

Sincerely,


Peter C. Walley
Director

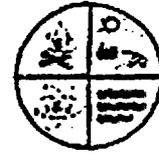
FJW/js

cc: Governor William Winter
Attorney General William A. Allain
Mississippi Congressional Delegation



MISSISSIPPI DEPARTMENT OF NATURAL RESOURCES

Bureau of Geology
P. O. Box 5348
Jackson, Mississippi 39216
(601) 354-6228



March 3, 1980

United States Nuclear Regulatory Commission
Office of the Secretary
Washington, D. C. 20555

Attn: Docketing and Service Branch

Re: Comments on Proposed Rules for NRC Licensing Procedures
for Nuclear Waste Repositories

Mr. Secretary:

These proposed rules are intended to present requirements applicable to the Department of Energy in submitting an application for a license for a nuclear waste repository. The proposed rules also set forth provisions for consultation and participation in the license review by State Government. With reference to the State participation, it is stated, "the Commission has undertaken a thorough review of the matter and now proposes a more extensive informal involvement during early phases of site characterization and a deferral of formal proceedings until site characterization has been completed." The term informal involvement appears to be somewhat out-of-step with previously stated ideas that target States would be actively involved by being assured of having the opportunity to engage in the decision making process. This idea is even stated in these proposed rules under the Site Characterization Review section. We object to the term informal involvement, especially, if the Federal government (including The President) is sincere in its many statements relative to the States' role of "consulting partners" to the Federal government in matters concerning nuclear waste repositories.

We fully agree with the concept of the Nuclear Regulatory Commission, as well as the States, having the opportunity to consult in and review the site characterization studies to help insure adequate data and safeguards are obtained before a site is finally selected.

It is stated in the Scope of Proposed Rule section, "The technical criteria against which the license application will be reviewed are still under development." Are the States going to be consulted during the development of these criteria, as we have been led to believe? If so, why isn't it indicated in the rules? If not, why not?

It is stated once the wastes have been placed the Department of Energy may submit an application to decommission the site. There is no mention of a long-term monitoring system. Will the site be monitored and will the States be involved in the design of same? Will appropriate State agencies be involved in any way in the monitoring process?

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United States Nuclear Regulatory Commission

March 3, 1980

Page 2

Under Subpart D, Section 60.71 - Records and Reports - Why not also notify the affected State of any deficiency found in the site?

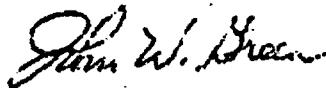
Section 60.73 - Inspections - Section states the Department of Energy shall allow the Nuclear Regulatory Commission to inspect on the premises of the repository. Why not allow appropriate State representatives to accompany on such inspections?

Obviously, we have the idea States are being excluded as much as possible in these matters which are of great concern to them. We sincerely hope the States can be involved in these matters which could have an economic, social and safety effect on them for centuries to come.

We appreciate the opportunity of reviewing these Proposed Rules.

Sincerely

BUREAU OF GEOLOGY



John K. Green
Environmental Geologist

JKG:js

cc: Hon. William A. Allain
State Attorney General

Alvin F. Eicker, Jr.
Acting Director
Bureau of Geology

EXXON NUCLEAR COMPANY, Inc.

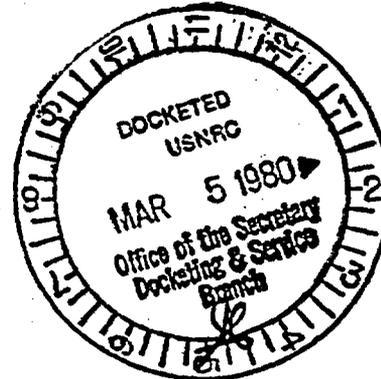
777 - 106th Avenue N.E., C-00777, Bellevue, Washington 98009, Telephone (206) 453-4300

RAY K. ROBINSON
Vice President

DOCKET NUMBER
PROPOSED RULE 60 - *Rehal*
(44 FR 70408)

16

29 February 1980



Secretary of the Commission
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Docketing and Service Branch

Subject: Proposed 10 CFR 60, "Disposal of High-Level Radioactive Waste in Geologic Repositories"

Gentlemen:

We are pleased to comment on the Commission's proposed new Part 60 to Title 10 of the Code of Federal Regulations.

In general, Part 60 appears to conform to the precepts embodied in Part 50, which governs the licensing of production and utilization facilities. However, unlike Part 50, Part 60 introduces what many will view as an inappropriate burden of policy issues in addition to the concepts normally found in the CFR involving strictly procedural matters and technical criteria. In particular, we believe that it is unnecessary for the Commission to address the policy-related issue as to the number of fully characterized high-level radioactive waste sites in these proposed new regulations.

It would seem to us that the NEPA process (to which DOE must adhere) would allow a site selection process involving a candidate site which adequately meets reasonable technical site criteria previously promulgated by the regulations and was the only site which had been subjected to an extensive and detailed site characterization process. Such an approach is entirely consistent with a total systems evaluation which takes into account the beneficial role of stabilized waste forms, engineered barriers, and other engineered considerations in meeting disposal criteria.

To the extent that the Department of Energy, to prudently manage a program for which it is the designated lead agency, may elect to investigate one or more backup sites and address these alternate sites and plans for investigating them in its site characterization report should

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AFFILIATE OF EXXON CORPORATION

8007020701

be viewed as the DOE's prerogative. Should this approach be adopted by the DOE, it would then be possible to "bank" these alternate sites for future use. But, if a site, in whatever media and in an acceptable location, can be shown with high confidence to meet the NRC's criteria, then submitting an application for a construction permit should not have to wait until other sites are fully characterized.

The proposed requirement for evaluating multiple sites may well become a requirement through other actions, such as administration policy, congressional action, or in DOE's development of its National Plan for Nuclear Waste Management. NRC's regulations need not duplicate these requirements, they merely need to be responsive to whatever national course of action is chosen.

Additional comments are provided in the attachment to this letter.

Sincerely,



R.K. Robinson

RKR:d1

Attachment

Attachment

Additional Comments on 10 CFR 60

1. 60.2(c), 60.51 and 60.52

The term "Decommissioning" has a significantly different meaning in this Part than it has for other types of facilities. We would rather see a different term used to identify the activities of "Final backfilling of subsurface facilities, sealing of shafts, and decontamination and dismantlement of surface facilities". On the other hand, if it is intended to actually terminate (60.52 uses the word "may") such licenses when the above-mentioned activities are complete, the term may be appropriate.

2. 60.2(e) and 60.21(c)(12)

By definition, there will be "no intent to retrieve HLW for resource values," however, 60.21(c)(12) requires "a description of plans for retrieval and alternate storage . . ." If retrieval capabilities have to be incorporated into such facilities, the definition of "disposal" should be made consistent with that intent.

3. 60.2(i)

We recommend that the definition of HLW be made consistent with IRG's definition which says (in part): "HLW are either intact fuel assemblies that are being discarded after having served their useful life in a nuclear reactor . . ." The concept of "discard" is missing in NRC's definition.

4. 60.11(f)

It is indicated that the Department may prepare an environmental impact statement; however, per 10 CFR 51, this is a function of the NRC for other licensing actions under Part 50, 70, etc.

The process of site characterization should not require the submittal of an EIS. Using 60.2(n)'s definition of site characterization, it seems likely that this activity would be excepted from NEPA procedures under 10 CFR 1021.5 which provides NEPA exemption for classes of DOE activities, specifically 1021.5(d)(9) information gathering, analysis and dissemination and 1021.5(d)(11) actions in the nature of conceptual design or feasibility studies.



STATE OF CONNECTICUT
 DEPARTMENT OF ENVIRONMENTAL PROTECTION
 STATE OFFICE BUILDING HARTFORD, CONNECTICUT 06115



DOCKET NUMBER
 PROPOSED RULE PR-2, et al (17)
 (44 FR 90408)

February 28, 1980

Mr. Michael Bell
 High Level Waste Technical
 Development Branch
 Division of Waste Management
 U.S. Nuclear Regulatory Commission
 Washington, D.C. 20555

Dear Mr. Bell:

I have had the opportunity to review the Federal Register Notice concerning the Disposal of High Level Radioactive Wastes in Geological Repositories Proposed Licensing Procedures.

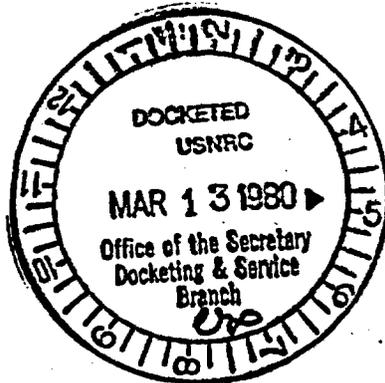
I was pleased to see the provisions made for State participation in the entire regulatory procedure.

I do not believe, however, that it will ever be appropriate for the U.S. Nuclear Regulatory Commission to terminate a license for a repository after decommissioning. Provisions must be made for adequate federal funding to support a monitoring and possible control program to be administered by the State after decommissioning.

Very truly yours,

A T Heubner

Arthur T. Heubner
 Director, Radiation Control



ATH/mp1

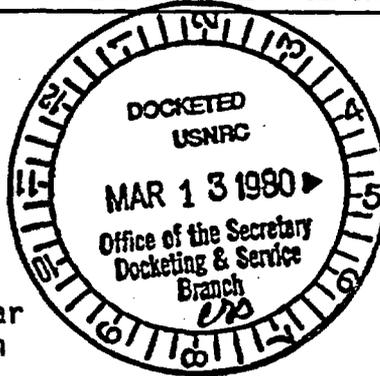
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DEPARTMENT OF MATERIALS SCIENCE
AND MINERAL ENGINEERING

HEARST MINING BUILDING
BERKELEY, CALIFORNIA 94720
(415) 642-3801



February 28, 1980

Secretary of the Nuclear
Regulatory Commission
Washington, D.C. 20555
Attention: Docketing and Service Branch

Dear Sirs,

Disposal of High-level Radioactive Wastes
in Geologic Repositories:
Proposed Licensing Procedures
Comments on Proposed rule, Federal Register Vol. 44, No. 236

It would be inappropriate and unjustifiable to burden the Department of Energy with unnecessary costs and delays in their efforts to develop a geologic repository for the disposal of radioactive wastes. Nevertheless, I find myself in broad agreement with the stance of the Nuclear Regulatory Commission as enunciated in the above proposed rule.

Although full use must be made of such existing experience and precedent as is relevant, it must be recognized the disposal of radioactive wastes in geologic repositories is novel and involves many issues and factors lying outside the realm of current experience. Because of this and the sensitivity of the public to waste disposal, special actions and precautions are needed.

In principal, these actions and precautions should have two primary objectives. First, to obviate our lack of experience, particularly in the field, and thereby to broaden our understanding of the nature of this issue. Second, to guard against the unexpected.

The initial technical identification of potential sites must be made on the basis of surface geological and geophysical exploration with, perhaps, limited test drilling. However, it seems to be accepted by experts and laymen alike that the amount and quality of data that can be so obtained is not sufficient to make anything approaching an adequate appraisal of the site. Accordingly, at this level of information it is not practicable to select potentially acceptable sites-on technical grounds.

It is generally agreed that site specific technical information of the kind necessary to decide whether or not a site is suitable for the development of a waste repository can be obtained only from exploration and testing at the depth below surface of the proposed repository. In terms of the President's recent Report on His

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Proposals for a Comprehensive Radioactive Waste Management Program, the Department is directed to evaluate and find four or five sites in a variety of different geologic environments with diverse rock types to be suitable before one or more will be selected for further development as a licensed full-scale repository. This is tantamount to a directive from the President for the DOE and NRC to proceed in accordance with the proposed rule.

Having accepted that the data needed to establish the suitability of a site can be obtained only through exploration and testing at depth, it follows such exploration and testing will have to be done at a number of sites in different geologic media. Otherwise, there is no technical basis for choosing any particular site or medium as offering greater probabilities for the development of a successful repository than any other site or medium. In the absence of relevant hard data meaningful comparisons between different sites cannot be made.

Even underground exploration and testing cannot provide sufficient data to prove that a site will ultimately be adequate and safe for a waste repository. Once a site has been accepted on the basis of such exploratory data, new information will be forthcoming as excavation and engineering measurements proceed. It is most important that mechanisms for the collection of these data and their evaluation be mandated, so to minimize the chances of some adverse feature being overlooked and let pass without correction, or, if sufficiently serious, allowing development of the repository to proceed when, in fact, it should be abandoned.

The proposed rule correctly identifies two of the most important factors in ensuring adequate isolation, namely, the waste form and the (geochemical and hydrological) characteristics of the site. Quantitative information on these factors is essential to any evaluation of the suitability of a site to isolate radioactive wastes from the biosphere.

In addition to the fundamentally important characteristics of the waste form and the site, it is equally important that field techniques for excavation, emplacement of the waste, backfilling and sealing of the access ways and shafts be shown to be capable of practical implementation, and that their performance be shown to be adequate, before any decision concerning the acceptability of a repository can be made. Furthermore, the performance of engineered barriers to prevent the release of fission products and, perhaps, the long term release of radioactive materials should be assessed in the same context.

In summary, the development of geologic repositories for the disposal of radioactive wastes is an engineering venture into the unknown. The repercussions of even partial failure could be disastrous. Exceptional caution and care are, therefore, fully justifiable especially as they comprise only a direct cost, and do not incur continuing and unnecessary costs as would excessive factors of safety in the design of an aircraft.

Yours sincerely,

Neville G.W. Cook

Neville G.W. Cook



United States Department of the Interior

GEOLOGICAL SURVEY
RESTON, VA. 22092

In Reply Refer To:
EGS-Mail Stop 410

DOCKETED
PROPOSED RULE *PR-2, etal* (18)
(44 FR 70408)
FEB 25 1980

Mr. Samuel J. Chilk, Secretary
Office of the Secretary of the Commission
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

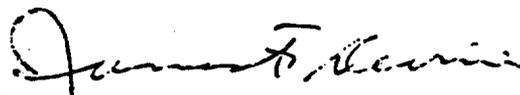
Dear Mr. Chilk:

This letter is in response to the Federal Register notice (Vol. 44, No. 36, dated December 6, 1979) inviting public comment on a proposed rule for licensing the receipt and disposal of high-level radioactive wastes (HLW) at geologic repositories (10 CFR Part 40 Subparts A-D). The staff of the U.S. Geological Survey (USGS) has reviewed those parts of the rule involving earth-science issues.

In general, the USGS endorses the procedures set forth in the proposed rule. They have been formulated to take account of the fact that disposal of radioactive waste in mined repositories requires new technology that must be developed in a stepwise, conservative manner. Each major step in the licensing provides opportunities for reevaluation of previous analyses and judgments; State and local officials and the general public will be involved in these reevaluations.

A major issue in the regulatory philosophy under development is the proposed requirement to characterize a number of sites in appropriate media by in situ tests at depth before selection of the repository site and issuance of a license to construct. The USGS supports these requirements. The enclosed comments offer more specific technical justifications for our endorsement of the proposed in situ testing requirements, together with some suggestions on technical approaches.

Sincerely yours,

for 
H. William Menard
Director



Enclosure

2-18-80
Administrated by card...

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Comments by U.S. Geological Survey (USGS) on a Proposed Rule for
Licensing the Receipt and Disposal of High-Level Radioactive
Wastes (HLW) at Geologic Repositories

Although the U.S. Department of Energy had been planning to conduct in situ tests early in the construction of any repository, the USGS feels it is useful to require collection of such data at a number of sites prior to full adjudicatory hearings of the licensing process. Those hearings can then proceed on the basis of critical, site-specific data on the candidate host rocks and their environs rather than on inferences derived from a limited number of drill holes supplemented by remote geophysical techniques. Characterization of geologic media is a particularly difficult problem in geotechnical engineering because of the ever-present possibility of lateral changes in the properties of host rocks and the possible presence of inhomogeneities too small to detect by remote or borehole techniques. Direct observation and in situ tests of host media will be the only way to characterize sites with confidence. Tests that should be conducted at or near the repository horizon include: thermomechanical and coupled thermomechanical-thermohydrologic response of the host rock and adjacent formations; hydrologic properties of the host rock and adjacent formations; tests for emplacing, monitoring, and retrieving waste packages; tests of possible interactions between the waste canisters and the rock fluid; and field tests of geochemical reactions which retard radionuclide migration both in the near- and far-fields.

At this point, a statement of caution is necessary. The Commission will have to have clearly defined objectives for these tests so that they are not required to continue for unduly long periods and do not damage the potential isolation characteristics of the host rock. For the first repository, a conservative strategy would be to substantially limit the thermal load and maximum temperatures in the repository. Thermal tests of repository design could therefore be conducted at relatively low temperatures. Some limited higher temperature tests might be useful to set limits on model parameters.

In order to make a meaningful comparison of a number of potential repository sites in a variety of different geological environments, as required by the President's comprehensive waste management plan of February 12, 1980, in situ tests at repository depths will be necessary at four to five sites. Although costly and time-consuming, such characterization at four to five sites will be necessary for a valid consideration of alternatives under the National Environmental Policy Act. The costs of such characterization will certainly not represent wasted funds. If characterization shows that an initially promising site is in fact not suitable, much of value will be learned. If characterization shows a site to be suitable, it can be reserved for later use as a repository if it is not selected for the first.

Although not strictly an earth-science matter, we note in passing that the proposed regulations do not consider possible interfaces with existing regulations governing Federal lands, specifically the Federal Land Policy and Management Act of 1976.

Atomics International Division
Energy Systems Group
8900 De Soto Avenue
Canoga Park, CA 91304
Telephone: (213) 341-1000
TWX: 910-494-1237
TELEX: 181017



Rockwell
International

DOCKET NUMBER
PROPOSED RULE

PR-2 metal (20)
(44 FR 70408)

February 28, 1980

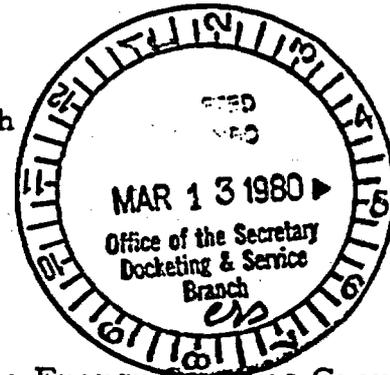
In reply refer to 80ESG-1978

Secretary of the Nuclear
Regulatory Commission
Washington, D. C. 20555

Attention: Docketing and Service Branch

Dear Sirs:

Subject: Comments on Proposed
Rule 10 CFR 60



The Atomics International Division of the Energy Systems Group of Rockwell International Corporation is pleased at the opportunity to comment on the proposed rule for Disposal of High-Level Radioactive Wastes in Geologic Repositories as published in the Federal Register, Volume 44, Number 236, pages 70408-70421 on Thursday, December 6, 1979. Our comments are of a general nature; however, if any or all are adopted, specific changes to 10 CFR 60 will be required. Our comments are divided into three categories: (1) Repositories; (2) Decision Making; and (3) Waste Forms.

1. Repositories

We would like to express our concern that the proposed rule-making appears to require that the "best" available site be selected. This is accomplished by requiring full site characterization of a number of sites and geologic media (minimum of three, but an implication of many more than three) before selecting any site. We believe that technical criteria should be established to limit any release to the biosphere to less than is now legally acceptable under 10 CFR 20. Then, if a site and its proposed waste form can be shown to meet the technical requirements, it should be deemed acceptable as a repository. To continue to search for the "best" will be fruitless in this ever improving technological world we live in.

Approved by card 3/14/80

8007/00013 3pp

One of our major concerns is that by using a "best" requirement, any obstructionist organization can effectively block progress in constructing a safe repository.

Another concern of ours is the requirement that during construction, the repository is evaluated for conformance with the design. It is our understanding that mines (and in essence a geologic repository is a mine) are usually "developed" and cannot be "designed" in detail without extensive exploratory drilling. We believe that this exploratory drilling should be done during the site characterization phase and in sufficient depth to permit the design of the mine. It should be recognized that design changes will probably be required as the mine is developed, as the exploratory drilling and mining cannot cover all contingencies.

2. Decision Making

We also believe that the proposed rule-making can lead to long delays before decisions are made. For example, on page 70409, second column, the fourth paragraph ends with "without undue schedule delays." We suggest that it might be advisable to specify a time limit for the various parties (state and public) to respond so that the hearings proceed expeditiously.

3. Waste Forms

The proposed rule also requires that the Department address and compare alternative waste forms. We concur that DOE should continue to develop better and better waste forms; however, our concern here is also that the "best" will be required and that the "best" form will always be something not quite developed. We believe that, as with site selection, specific technical criteria should be established to limit the release from the waste form. Once a waste form is demonstrated to meet these technical requirements, it should be certified for burial in a repository.

80ESG-1978
February 28, 1980
Page 3

We hope that our comments will be of value to you in developing this most difficult section of the Code of Federal Regulations.

Very truly yours,



D. G. Mason
Programs Director
Fuel and Waste Management

Natural Resources Defense Council, Inc.

25 KEARNY STREET

SAN FRANCISCO, CALIFORNIA 94108 DOCKET NUMBER

415 421-6561

PROPOSED RULE

PR-2, et al (21)

44 FR 70408

New York Office

122 EAST 42ND STREET

NEW YORK, N.Y. 10017

212 949-0049

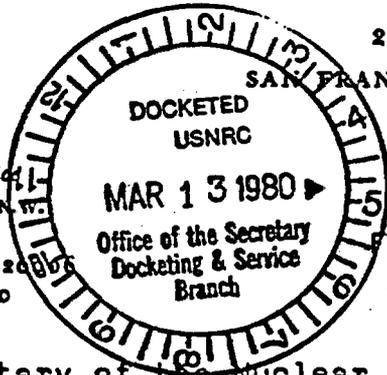
Washington Office

1725 I STREET, N.W.

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WASHINGTON, D.C. 20006

202 223-8210



February 29, 1980

Secretary of the Nuclear Regulatory Commission
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Docketing and Service Branch

Re: Disposal of High-Level Radioactive Wastes in
Geologic Repositories; Proposed Licensing
Procedures (44 Fed. Reg. 70408; December 6, 1979)

The Natural Resources Defense Council (NRDC) hereby submits its comments on the Nuclear Regulatory Commission's (NRC or the Commission) proposed licensing procedures for the disposal of high-level radioactive wastes in geologic repositories. The development of both these licensing procedures and the upcoming safety standards for repositories are urgently needed to guide the on-going activities of the Department of Energy (DOE or the Department) in selecting possible sites for geologic repositories. Unfortunately, due in large part to the absence of such procedures and safety standards, the Department continues an inadequate approach to the selection of potential sites for geologic repositories.^{1/}

^{1/}In particular, NRDC finds the Department's emphasis on salt domes in the Gulf Coast region highly ill-advised. Salt domes are inherently unstable formations, are often associated with significant natural resources, (footnote continued on next page)

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The Commission's proposed rule is a significant improvement over the earlier proposed general statement of policy. (43 Fed. Reg. 53869; November 17, 1978.) We applaud the overall approach incorporated in the proposed rule, and we congratulate the Commission on a job basically well done. NRDC strongly supports, in particular, the proposed step-by-step process for reviewing the Department's development of geologic repositories. This cautious approach, together with appropriate technical conservatism that we urge be incorporated in the upcoming technical criteria, is desirable because there is no experience in constructing geologic repositories anywhere in the world, and because there are known significant scientific uncertainties and gaps in knowledge about how to design, construct, and operate geologic repositories safely.^{2/} Careful review at each initial stage in the selection of sites, construction and operation of repositories, and in the closure of repositories is necessary to protect public health and the environment adequately.

Also, geologic exploration and in situ testing at depth of several potential sites in different geologic media are an

^{1/}(cont. from page 1) are potentially valuable as storage facilities (as in the case of the strategic petroleum reserve), and they have the other disadvantages of salt, e.g., high solubility, low sorptive capacity, and inconvenience of maintaining ready retrievability of wastes. In our view, if DOE had had the benefit of adequate standards addressing the issue of natural resources and human intrusion, there would not be the current emphasis on salt domes.

^{2/}See, for instance, Interagency Review Group on Nuclear Waste Management, Subgroup Report on Alternative Technology Strategies for the Isolation of Nuclear Waste, W10-22810 (Draft), Appendix A, page vi (October 1978).

essential component of regulations designed to protect the public health and safety of thousands of human generations to come. Important information about the possible future behavior of wastes emplaced in a deep geologic environment can be obtained only by study in that environment. Laboratory tests and investigations from the surface are useful and important, but they are also inherently limited. A high degree of assurance that wastes will remain isolated from the biosphere can be obtained only by extensive study deep underground at the actual site proposed for disposal.^{3/}

An important aspect of the proposed approach is that there be investigation of several sites prior to selection of one for development, because this procedure will reduce the chance of undue institutional momentum accruing to a site that may be inferior. We believe that it was this concern that was behind the President's recent decision to cancel the Waste Isolation Pilot Plant, for instance. Indeed, without a provision for comparative review prior to commitment to one site, the desirability of a requirement for exploration and in situ testing at depth would be significantly diminished. The proposed regulations help ensure that the commitment of a particular investigative and design team to an individual site will not be

^{3/}See, Committee on Radioactive Waste Management, National Academy of Sciences - National Research Council, Implementation of Long-Term Environmental Radiation Standards: The Issue of Verification, A Report Prepared by the Panel on the Implementation Requirements of Environmental Radiation Standards (1979).

controlling, because there will be a comparative review of several alternatives that have been studied to the same extent.

The intent of the proposed provisions for state and general public involvement in the NRC's reviews of DOE's plans are also highly desirable. The federal government in the past gave too little attention to the advice and concerns of state officials, independent scientists and the general public, particularly at the early stages of investigating and developing facilities for long-term storage or disposal of radioactive wastes. Had early, independent comments been heeded about proposed sites at, for instance, Lyons, Kansas, tax dollars would not have been misspent on unsound approaches and progress toward safe disposal would have been much faster. Furthermore, confidence in the federal program, which is almost totally absent today, would have developed.

There are, however, fatal omissions in the proposed rule. In order for the stated objectives of the NRC to be fulfilled, and for the NRC to meet the Atomic Energy Act's (AEA) requirements to protect public health and safety, these serious deficiencies must be corrected in the final rule. In particular, (1) the final regulations should specify a minimum number of sites that must be characterized by the Department before an application to construct a repository can be docketed by the NRC; (2) all of the minimum number of sites should qualify under an early screening test to assure that they satisfy, to the extent possible prior to exploration and in situ testing at

depth, NRC's technical criteria for sites;^{4/} (3) the regulations should explicitly identify the problems of conflict with natural resources, and other situations potentially leading to inadvertent human intrusion into a repository, as major issues to be discussed fully in site characterization reports and license applications; (4) the rule should explicitly state that in the event there is NRC dissatisfaction with a site characterization report, an application to construct a repository will not be docketed; and (5) DOE should be required to explore and investigate these multiple sites at depth.

Additionally, the discussion of the environmental impacts associated with site characterization preceding the proposed rule should be substantially improved, and the final regulations should improve the provisions for state participation in the NRC review process, particularly by "interested" states. Finally, we are concerned that the NRC has omitted discussion and formulation of policy on (1) the implementation of the National Environmental Policy Act (NEPA), as it applies to NRC's activities in licensing geologic repositories, and (2) provision of financial and other assistance to public interest groups that, with the availability of adequate resources, could

^{4/}The determination, based on information prior to exploration and in situ testing at depth, that sites are "qualified" should be made only after there has been a public hearing on the issue.

meaningfully contribute to the NRC's review of DOE plans.^{5/} We urge the NRC to direct attention to these two important matters at the earliest possible time, because adequate policies on them are essential to a sound licensing approach.

The licensing procedures should not become final until the NRC's NEPA policy and program for providing assistance to intervenors is available. Moreover, the comment period on the proposed licensing procedures should remain open until the proposed technical criteria are available formally for public review and comment. These documents are integral to the NRC's overall regulatory program to assure high-level wastes will be disposed of safely. Piecemeal review of the NRC's approach is inherently unsatisfactory, prohibiting comprehensive and thorough analysis by the public.

I. The Proposed Licensing Procedures Should Require the Department of Energy to Characterize, Including Exploration and In Situ Testing at Depth, A Minimum Number of Sites.

The NRC prefaces its proposed regulations with the expectation that the Department will characterize "a minimum of three sites representing a minimum of two geologic media" in response

^{5/}Additionally, within the context of the proposed regulations, the NRC should maintain a current list of individuals and organizations that are interested in radioactive waste disposal or licensing matters. Written notification of the NRC's receipt of site characterization reports and license application should go to all those on this list automatically. Reliance on notices in the Federal Register are inadequate in this regard.

to the requirements of the National Environmental Policy Act (NEPA) to consider alternatives to a proposed action. (44 Fed. Reg. 70415; footnote.) NRDC concurs that NEPA requires DOE to evaluate fully several alternative sites in a variety of geologic environments. The proposed regulations, however, inexplicably do not themselves require the Department to consider several sites in a variety of different types of rock as a matter important for protection of public health and safety. (See, 44 Fed. Reg. 70415; footnote.) We believe strongly that, pursuant to its obligation under the Atomic Energy Act to protect public health and safety, the NRC should require a specific, minimum number of sites that the Department must characterize. In particular, we urge the NRC to incorporate the recent Presidential directive, based on the recommendation of a majority of the Interagency Review Group on Nuclear Waste Management, to the Department to locate at least four sites in a variety of different geologic environments before selecting the first site for a repository.^{6/} We interpret the phrase "a variety of geologic environments" in the Presidential "Fact Sheet" to mean that at least three different types of rocks have to be characterized.

The need for characterizing several sites in a variety of rock media is justified by more than the need to consider alternatives under the provisions of NEPA, although that is

^{6/}Office of the White House Press Secretary, "Fact Sheet, The President's Program on Radioactive Waste Management," p. 4 (dated February 12, 1980).

sufficient justification. Specifically, we believe that there are two more compelling reasons for characterization of several sites: (1) consideration of several sites in a variety of rock types provides critical information about the relative safety of different environments; and (2) characterization of several sites avoids Departmental momentum in favor of only one site and undue institutional commitment to only one proposal. These are issues at the heart of the NRC's responsibility to protect public health and safety under the requirements of the Atomic Energy Act.

There are significant gaps in our scientific knowledge about the geologic disposal of radioactive wastes. These uncertainties have potentially serious implications for the level of safety provided by geologic repositories. Predicting possible future releases of wastes from geologic repositories, furthermore, is an activity of unknown, but probably low, reliability and accuracy. To compensate, at least partially, for these problems in assessing safety, the NRC should assure that during the selection of a disposal environment the "best" of a set of qualified sites is selected.

To help assure that the selection of a site involves comparison of valid alternatives, the NRC should conduct a careful review of DOE's selection of sites for characterization. Before a final determination on whether DOE's sites are "qualified," the NRC should hold a public hearing to obtain the views of members of the public, interested organizations, independent scientists, Indian Nations, and local and state

governments. Such a procedure would help avoid the undue commitment of public funds to sites that could never be acceptable for construction of repositories. The basis for comparison should be NRC's as yet unreleased technical criteria for siting repositories. DOE should not be able to count as one of the minimum number of sites any that clearly violate the technical criteria.^{7/}

The federal program in radioactive waste management, moreover, has suffered in the past from an inability to maintain flexibility and to consider a range of possible solutions for each step of the process ending in disposal. A requirement to characterize several sites in a variety of geologic environments, thus, is not only fully justified on safety and environmental grounds, it also would improve the likelihood of success of the Department's program.

The "supplementary information" to the proposed regulations concludes that, ". . . the data needed to establish the ultimate suitability of the site is likely to be obtained only through exploration and in situ testing at depth, i.e., in the proposed rock unit. . . . [W]ithout exploration and in situ testing in the proposed host rock unit, neither the defects nor the key parameters can be determined with confidence." (44 Fed. Reg. 70410). NRDC concurs with this judgement, which is

^{7/}As indicated in these comments, we believe that such a careful early screening test would disqualify Gulf Coast salt domes and the bedded salt site near Carlsbad, New Mexico.

amply justified by recent technical analyses.^{8/} We are surprised, therefore, that the proposed regulations do not, as they should, require DOE to conduct the necessary exploration and in situ testing at depth.

In conclusion, consistent with the recent decision of the President, we urge the Commission to revise its proposed rule so that the Department is required to characterize, through exploration and in situ testing at depth, a minimum of four qualified sites in three different rock media before an application to construct a repository is docketed.

II. The Environmental Impacts of Site Characterization Have Not Been Adequately Addressed by the Commission in the Proposed Rule.

The Commission states in its rationale for a site characterization report that the environmental impacts of site characterizations are "relatively insignificant" and that the principal impact will be the "management of the spoils from

^{8/}See, for instance, Interagency Review Group on Nuclear Waste Management, Subgroup Report on Alternative Technology Strategies for the Isolation of Nuclear Waste, TID-28818 (Draft), Appendix A (October 1978); J. D. Bredehoeft, et al., U.S. Geological Survey, Geologic Disposal of High-Level Radioactive Wastes -- Earth-Science Perspectives, Circular 779 (1978); U.S. Environmental Protection Agency, Report of an Ad-Hoc Panel of Earth Scientists, The State of Geological Knowledge Regarding Potential Transport of High-Level Radioactive Wastes from Deep Continental Repositories, EPA/520/4-78-004 (June 1978); and Committee on Radioactive Waste Management, National Academy of Sciences - National Research Council, Implementation of Long-Term Environmental Radiation Standards: The Issue of Verification, A Report Prepared by the Panel on the Implementation Requirements of Environmental Radiation Standards (1979).

excavation of an exploratory shaft" measuring 5000 cubic yards. (44 Fed. Reg. 70409; footnote 4.) This statement fails to consider the economic and political impacts of land withdrawals, and the potential impacts of aquifer disruption and reclamation of the site if subsurface exploration results in abandonment. Furthermore, the NRC's view that site characterization has insignificant environmental impact is inconsistent with other statements suggesting that the Department may decide to prepare an "environmental impact statement with respect to site characterization activities." (44 Fed. Reg. 70417.)

Thus, we believe that the Commission's evaluation of the potential environmental impacts of site characterization is incorrect. Undoubtedly, DOE will have to prepare an environmental impact statement on any proposed site characterization, pursuant to the requirements of NEPA. This NEPA statement, and a discussion of potential environmental consequences in its site characterization report, should be key elements of the NRC's review of DOE's plans. The potential environmental impacts during site characterization explicitly must be found acceptable, and there must be no preferable alternatives, before the NRC approves DOE site characterization reports.

III. The Provisions for State and Public Involvement in NRC's Review of DOE's Site Characterization Report Should Be Strengthened.

The proposed regulations in two key respects restrict the opportunity for states to participate in the NRC's review of

its characterization reports and license applications. First, a state's participation is subject to the "availability of funds" and "approval" by the Director of the Office of Nuclear Material Safety and Safeguards. (§ 60.83.) Second, such participation is limited to "affected states." (§ 60.62(b).) NRDC believes that neither restriction is appropriate or necessary. Indeed, these restrictions are likely to impede careful technical review of DOE's plans, and they are likely to erode further the already strained state-federal relationship. The NRC, instead of conditioning or restricting its assistance, should provide all interested, affected or host states with the assistance they need to participate effectively in the NRC's review of DOE's site characterization reports and license applications. Additionally, NRC should offer the same assistance to Indian Nations.

IV. The Proposed Regulations Should Explicitly Consider The Natural Resource and Human Intrusion Questions in Site Characterization Reports and License Applications.

Primarily because the principal focus of DOE's site selection program of DOE's Office of Nuclear Waste Isolation is on salt deposits, potential conflict with natural resources is a major concern in considering the adequacy of site characterization reports and license applications. DOE's advocacy of the WIPP site near Carlsbad, New Mexico, and its emphasis on salt domes for disposal of commercial wastes, underscore this concern. Yet, the proposed regulations do not address the

issue of potential conflicts over natural resources. This is a fatal omission. (See, § 60.21.) Indeed, consideration of this issue may be even more important in terms of finding an acceptable site than the other technical areas of concern currently identified in the proposed regulations. (§ 60.21(c).)

The final regulations should require, in DOE's site characterization reports and license applications, a full discussion of the presence and potential of natural resources as a threat to the integrity of the waste containment system. In particular, DOE should be directed to evaluate the probability and possible consequences of extraction of resources in the area of the proposed site, assuming that the human intruders are unaware of the presence of deposited radioactive wastes.

Submitted by:

Terry R. Lash

Georgia Yuan

TRL/GY/KJ

Natural Resources Defense Council, Inc.

25 KEARNY STREET
SAN FRANCISCO, CALIFORNIA 94108

415 421-6561

DOCKET NUMBER

PROPOSED RULE

PR-2-retal (22)

44 FR 70408

New York Office

122 EAST 42ND STREET
NEW YORK, N.Y. 10017

212 949-0049

Washington Office

1725 I STREET, N.W.
SUITE 600

WASHINGTON, D.C. 20006

202 223-8210

March 3, 1980

Secretary of the Nuclear Regulatory Commission
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Docketing and Service Branch

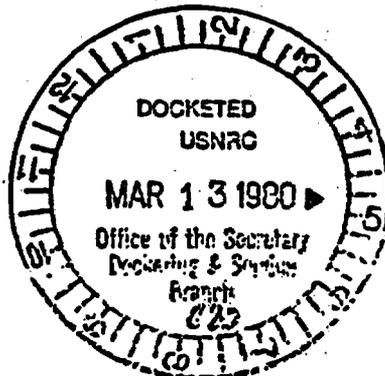
Re: Disposal of High-Level Radioactive Wastes in
Geologic Repositories: Proposed Licensing
Procedures (44 Fed. Reg. 70408; December 6, 1979)

There are three changes that should be made in the letter dated February 29, 1980, from the Natural Resources Defense Council, commenting on the above-captioned matter.

- 1) On page 3, footnote 3: the date in the last line should be 1979, not 1977.
- 2) Page 7, line 7: insert "a" between "as" and "matter".
- 3) Page 10, line 2: after "the proposed regulations do not" insert ", as they should,".

I enclose corrected copies of pages 3, 7 and 10, which you can insert into the original in place of the erroneous pages.

Please accept my apologies for this inconvenience.



Sincerely yours,

Kathryn A. Jones
Kathryn A. Jones
Secretary to Terry Lash

KAJ/hs

Acknowledged by card. *[Handwritten initials]*

essential component of regulations designed to protect the public health and safety of thousands of human generations to come. Important information about the possible future behavior of wastes emplaced in a deep geologic environment can be obtained only by study in that environment. Laboratory tests and investigations from the surface are useful and important, but they are also inherently limited. A high degree of assurance that wastes will remain isolated from the biosphere can be obtained only by extensive study deep underground at the actual site proposed for disposal.^{3/}

An important aspect of the proposed approach is that there be investigation of several sites prior to selection of one for development, because this procedure will reduce the chance of undue institutional momentum accruing to a site that may be inferior. We believe that it was this concern that was behind the President's recent decision to cancel the Waste Isolation Pilot Plant, for instance. Indeed, without a provision for comparative review prior to commitment to one site, the desirability of a requirement for exploration and in situ testing at depth would be significantly diminished. The proposed regulations help ensure that the commitment of a particular investigative and design team to an individual site will not be

^{3/}See, Committee on Radioactive Waste Management, National Academy of Sciences - National Research Council, Implementation of Long-Term Environmental Radiation Standards: The Issue of Verification, A Report Prepared by the Panel on the Implementation Requirements of Environmental Radiation Standards (1979).

to the requirements of the National Environmental Policy Act (NEPA) to consider alternatives to a proposed action. (44 Fed. Reg. 70415; footnote.) NRDC concurs that NEPA requires DOE to evaluate fully several alternative sites in a variety of geologic environments. The proposed regulations, however, inexplicably do not themselves require the Department to consider several sites in a variety of different types of rock as a matter important for protection of public health and safety. (See, 44 Fed. Reg. 70415; footnote.) We believe strongly that, pursuant to its obligation under the Atomic Energy Act to protect public health and safety, the NRC should require a specific, minimum number of sites that the Department must characterize. In particular, we urge the NRC to incorporate the recent Presidential directive, based on the recommendation of a majority of the Interagency Review Group on Nuclear Waste Management, to the Department to locate at least four sites in a variety of different geologic environments before selecting the first site for a repository.^{6/} We interpret the phrase "a variety of geologic environments" in the Presidential "Fact Sheet" to mean that at least three different types of rocks have to be characterized.

The need for characterizing several sites in a variety of rock media is justified by more than the need to consider alternatives under the provisions of NEPA, although that is

^{6/}Office of the White House Press Secretary, "Fact Sheet, The President's Program on Radioactive Waste Management," p. 4 (dated February 12, 1980).

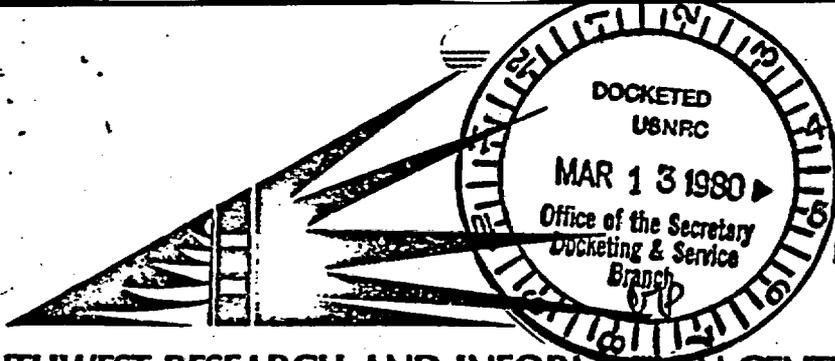
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^{8/}See, for instance, Interagency Review Group on Nuclear Waste Management, Subgroup Report on Alternative Technology Strategies for the Isolation of Nuclear Waste, TID-28818 (Draft), Appendix A (October 1978); J. D. Bredehoeft, et al., U.S. Geological Survey, Geologic Disposal of High-Level Radioactive Wastes -- Earth-Science Perspectives, Circular 779 (1978); U.S. Environmental Protection Agency, Report of an Ad-Hoc Panel of Earth Scientists, The State of Geological Knowledge Regarding Potential Transport of High-Level Radioactive Wastes from Deep Continental Repositories, EPA/520/4-78-004 (June 1978); and Committee on Radioactive Waste Management, National Academy of Sciences - National Research Council, Implementation of Long-Term Environmental Radiation Standards: The Issue of Verification, A Report Prepared by the Panel on the Implementation Requirements of Environmental Radiation Standards (1979).



DOCKET NUMBER PR-2, et al
PROPOSED RULE 44 FR 70408

23

SOUTHWEST RESEARCH AND INFORMATION CENTER

March 3, 1980

Secretary of the Nuclear Regulatory Commission
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555
ATTENTION: Docketing and Service Branch

RE: Disposal of High-Level Radioactive Wastes in Geologic Repositories;
Proposed Licensing Procedures (44 Fed. Reg. 70408, December 6, 1979).

Herein are the further comments of Southwest Research & Information Center (SRIC) on the proposed rules on licensing of high level nuclear waste repositories. SRIC is a private, non-profit organization, providing educational and scientific information to the public at large and to community groups on various public interest issues. Over the past seven years we have been carefully studying the need for safe nuclear waste disposal. We have been particularly involved with researching issues related to the federal government's proposed WIPP Project.

We feel that adequate controls to protect public health and safety from the long-term effects of nuclear waste are essential. Our experience indicates that the Department of Energy (DOE) cannot and will not adequately protect public health and safety, nor will it encourage and support necessary public participation and a legitimate role for state and local government agencies in nuclear waste management programs. Therefore, we welcome these proposed NRC rules and find them superior in many ways to the original proposed General Statement of Policy, released in November 1978.

Nevertheless, we feel that various important inadequacies remain. These problems must be resolved before the NRC can play an essential role in nuclear waste management and begin to rebuild the public's confidence in the nation's overall nuclear waste management program. Our major concerns relate to site characterization, NEPA requirements, consultation and concurrence with states, and public participation.

Acknowledged by [signature]

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1) Not all necessary information has been included in the provisions related to site characterization.

We believe that NRC should re-think its entire concept of site selection and site characterization.

a) Criteria for selection of potential sites are very important. While we understand that the Commission's technical criteria are still under development, it is not at all clear the the site characterization report requires discussion of several crucial issues: mineral resource conflicts, geologic conditions below the repository level, and regional geologic conditions. For example, in the case of the proposed WIPP site, conflicts with large potash, oil and gas reserves, deep salt dissolution and regional geologic uncertainties have effectively disqualified the site. Thus, such a site should never qualify for site characterization, as the proposed rule defines it. It is not clear, however, that site characterization as defined in §60.2(n) would lead to a site characterization analysis with specific, major objections from the Director.

b) Before NRC can make determinations about site characterization, it must require in its rules that DOE provide detailed information about all sites examined--presumably at least 10-12 locations before 4 or more are selected for further work. Such numerical goals for sites considered should be specified in the rule as the minimum requirement. The site characterization report(s) from DOE must include a detailed review of all sites examined and evaluated. Only through such a complete review can NRC know how well the technical criteria are actually followed.

c) Site characterization should be defined to include preliminary borings and geophysical testing, rather than those features included in the proposed definition in §60.2(n), which are more correctly identified as "site development." We feel that this change in definition is justified for three reasons. (1) The scale of insitu testing apparently being contemplated could clearly disqualify a site if improperly done, as the proposed rule recognizes. Such insitu testing is a much different level of work than preliminary site characterization work that does not require NRC approval. Such insitu testing should be done only if there is a high probability that such work will be the first stage in actual mine construction--i.e., that the actual shafts for the repository would be the same (or just enlarged versions) of the development shaft(s). (2) "Site development" work will actually cost many times more than the \$20 million estimate mentioned (44Fed. Reg. 70410). This assertion is based on the WIPP experience where almost \$100 million has already been spent and no shafts have been constructed, as well as on the basis of uranium

mining costs which indicate that one shaft alone would likely cost at least \$20 million.¹ (3) There is strong legal precedent for seeing actual mining and development work as part of the actual site construction, thereby requiring an EIS. Such construction should require concurrence from NRC and the host state before proceeding. The rule, therefore, should recognize that insitu work, under whatever name, is very important and should be undertaken only after alternatives have been considered and stringent technical criteria have been met.

2) The proposed rule does not adequately reflect the requirements of NEPA

Both site characterization and licensing of nuclear waste depositories are significant federal actions under NEPA. Therefore, the EIS process must be followed at both stages. An Environmental Impact Statement should be submitted with the Site Characterization Report. Such an EIS is necessary to establish the environmental impacts of actual site characterization as well as provide the public with adequate data in order to evaluate the Site Characterization Report. Thus, §60.11(f) should be re-written to require that an EIS be submitted, and not just leave it to the discretion of the Department. Potential environmental impacts associated with site selection and site characterization must be carefully evaluated before the NRC can approve any site characterization report.

3) The essential role of state consultation and concurrence must be required in the proposed rule.

The historic role of the AEC/ERDA/DOE have left state and local governments and the public legitimately skeptical about the federal government's nuclear waste disposal policy and its implementation. Thus, states have in the past sometimes tried to prevent the federal government from even looking for possible waste repositories in their state. Such a situation is unacceptable, but this reality can be overcome only by ensuring a reasonable role for states and the public in all aspects of the federal waste management program. Specifically, a recognized consultation and concurrence role for states is essential.

Therefore §60.11(b) should require consultation and concurrence of the state at all parts of the site selection and characterization process, as well as in the actual repository construction and operation. Furthermore, §60.61 must require that NRC staff be readily available to the states to provide technical assistance and information to any state that requests it. Such a process can facilitate an adequate scientific analysis by the states and encourage their strong participation in--and thereby their likely acceptance of--waste repository siting in their state.

¹See for example, Betty L. Perkins, An Overview of the New Mexico Uranium Industry, Santa Fe, N.M., Energy & Minerals Department, 1979, p. 85.

- 4) Public participation must not be left just to the states, but rather must be required of the Department and the states, as well as by NRC.

Similarly to the states, the public is highly skeptical of past federal government efforts at nuclear waste disposal. Thus, most public opinion surveys show strong opposition to nuclear waste disposal sites, even among those people who favor nuclear power. To begin to acknowledge and respond to this public concern, stringent standards for public participation must be met by all agencies involved in the nuclear waste management program.

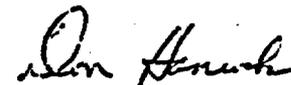
§60.62(c)(4) seems to imply that public participation be left exclusively to the states. NRC's rule should indicate that both the DOE and the states are expected to solicit and respond to citizen input. Specifically, §60.11(a)(6) should indicate that not only the means used to obtain public input but also the substance of such input and the Department's response to such comments be reported.

Furthermore, NRC should have public participation in its proceedings, including funding for such participation. At a minimum, a reimbursement method of citizen funding, similar to that used in the Public Utility Regulatory Policy Act (PURPA) should be included so that those citizen groups who are substantially involved in licensing proceedings can be reimbursed. Such involvement is necessary for a sound, scientific program which can merit public confidence.

Public participation should include opportunity for all intervenors to present testimony and cross-examine witnesses in any formal proceedings. Through such a process it will be clear whether information from all sides is accurate and can withstand scrutiny.

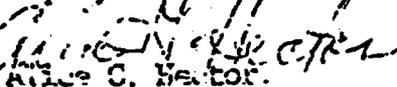
Finally, information must be readily available to the public, and not only through the NRC Public Document Room. Various public document rooms should be established throughout a potential host state. Public, university and state libraries can well fill this role. Additionally, important documents should be made available directly to citizen organizations who have demonstrated an interest in nuclear waste disposal issues. Such groups should be put on a mailing list and receive documents as they become available.

Thank you for your careful consideration of these comments.



Don Hancock,

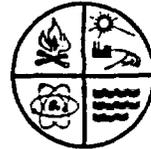
Deputy Executive Director



Alice C. Hector,
Attorney at Law.

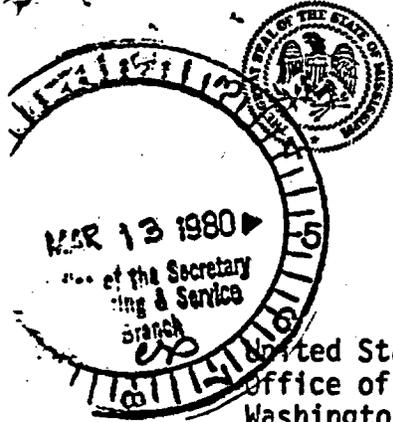
MISSISSIPPI DEPARTMENT OF NATURAL RESOURCES

Bureau of Geology
P. O. Box 5348
Jackson, Mississippi 39216
(601) 354-6228



March 3, 1980

DOCKET NUMBER PR-2, et al (24)
PROPOSED RULE 44 FR 70408



United States Nuclear Regulatory Commission
Office of the Secretary
Washington, D. C. 20555

Attn: Docketing and Service Branch

Re: Comments on Proposed Rules for NRC Licensing Procedures
for Nuclear Waste Repositories

Mr. Secretary:

These proposed rules are intended to present requirements applicable to the Department of Energy in submitting an application for a license for a nuclear waste repository. The proposed rules also set forth provisions for consultation and participation in the license review by State Government. With reference to the State participation, it is stated, "the Commission has undertaken a thorough review of the matter and now proposes a more extensive informal involvement during early phases of site characterization and a deferral of formal proceedings until site characterization has been completed." The term informal involvement appears to be somewhat out-of-step with previously stated ideas that target States would be actively involved by being assured of having the opportunity to engage in the decision making process. This idea is even stated in these proposed rules under the Site Characterization Review section. We object to the term informal involvement, especially, if the Federal government (including The President) is sincere in its many statements relative to the States' role of "consulting partners" to the Federal government in matters concerning nuclear waste repositories.

We fully agree with the concept of the Nuclear Regulatory Commission, as well as the States, having the opportunity to consult in and review the site characterization studies to help insure adequate data and safeguards are obtained before a site is finally selected.

It is stated in the Scope of Proposed Rule section, "The technical criteria against which the license application will be reviewed are still under development." Are the States going to be consulted during the development of these criteria, as we have been led to believe? If so, why isn't it indicated in the rules? If not, why not?

It is stated once the wastes have been emplaced the Department of Energy may submit an application to decommission the site. There is no mention of a long-term monitoring system. Will the site be monitored and will the States be involved in the design of same? Will appropriate State agencies be involved in any way in the monitoring process?

Acknowledged by cert. 3-11-80

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United States Nuclear Regulatory Commission
March 3, 1980
Page 2

Under Subpart D, Section 60.71 - Records and Reports - Why not also notify the affected State of any deficiency found in the site?

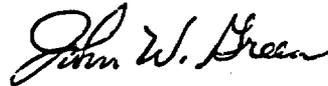
Section 60.73 - Inspections - Section states the Department of Energy shall allow the Nuclear Regulatory Commission to inspect on the premises of the repository. Why not allow appropriate State representatives to accompany on such inspections?

Obviously, we have the idea States are being excluded as much as possible in these matters which are of great concern to them. We sincerely hope the States can be involved in these matters which could have an economic, social and safety effect on them for centuries to come.

We appreciate the opportunity of reviewing these Proposed Rules.

Sincerely

BUREAU OF GEOLOGY



John W. Green
Environmental Geologist

JWG:js

cc: Hon. William A. Allain
State Attorney General

Alvin R. Bicker, Jr.
Acting Director
Bureau of Geology



MISSISSIPPI DEPARTMENT OF NATURAL RESOURCES

Office of Energy
P. O. Box 10586
Jackson, Mississippi 39209
(601) 961-5060



March 3, 1980

Secretary
Nuclear Regulatory Commission
Washington, D. C. 20555

Attn: Docketing and Services Branch

Dear Sirs:

RE: COMMENTS ON PROPOSED RULE FOR DISPOSAL OF
HIGH-LEVEL RADIOACTIVE WASTE (HLW) IN GEOLOGIC
REPOSITORIES; PROPOSED LICENSING PROCEDURES

The present approach to the HLW Disposal process evidenced by the proposed licensing procedures outlined in FR.Vol 44, No. 236 is an action in the proper direction. The Mississippi Office of Energy supports the concept of the NRC's involvement in expanded site characterizations rather than provisional construction authorizations and in the review of the Department of Energy's plans for site characterization and site selection procedures, methods and criteria prior to the use of such procedures, methods, and criteria.

There are, however, several comments and questions that deserve additional attention:

- 1) It is most important at the state and local level that agency representatives and citizens in general have a clear understanding of the roles to be played by DOE, NRC, EPA, and other federal agencies that might be involved. The process now defined tends to cloud and distort the view as to these roles.

Some overview of these relationships should be made an ongoing part of any state and local public hearing and/or meetings.

- 2) There are presently several site characterization decisions in progress by DOE, including three sites in Mississippi. The site characterization reports under the pre-application review should apply in retrospect to these efforts.
- 3) The site characterization report does not address directly the problems of site-related impacts, such as transportation, economic and social, on the local and state infrastructure and population. This should be specifically addressed in any site characterization report.

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Secretary, Nuclear Regulatory
Commission

Page 2

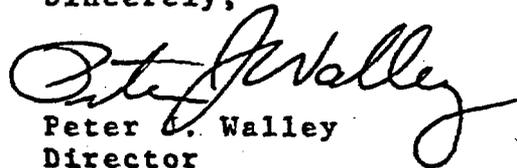
March 3, 1980

- 4) The contents of license applications require plans for coping with radiological emergencies. These types of plans place a considerable amount of responsibility for planning on the state and local governments. The extent and scope of the plans should be defined as in those regulations required for nuclear commercial power reactors.
- 5) In the license amendment to decommission the description of the program for post-decommissioning monitoring should be more specific and require some minimum level of activity in perpetuity.
- 6) The general tone of the Subpart C--Participation by State Governments--gives the impression that state and local governments are that of observers and occasional participants provided they generate enough activity.

The consultation process should give the state a stronger, more formalized role in the activities of site characterization, particularly those that relate to site specific data as opposed to generic data. The concurrence part of the consultation and concurrence process would then be addressed by any state and/or federal laws in place. The consultation definition and process should be made clearer to the extent that the state has the procedure available to recommend specific courses of action whereupon the Director of the NRC's Office of Nuclear Materials Safety and Safeguards would respond in writing as to why a particular recommendation was not taken, if so. This would define the state participation program in a formal sense. This, of course, would then modify the approval of proposals process (Section 60.83).

Please be assured that Mississippi is vitally concerned with this process and will provide additional comments and concerns as the issue matures.

Sincerely,


Peter C. Walley
Director

PJW/js

cc: Governor William Winter
Attorney General William A. Allain
Mississippi Congressional Delegation

Atomic Industrial Forum, Inc.
7101 Wisconsin Avenue
Washington, D.C. 20014
Telephone: (301) 654-9260
TWX 7108249602 ATOMIC FOR DC

Edwin A. Wiggin
Executive Vice President

DOCKET NUMBER
PROPOSED RULE PR-2, et al (25)
44 FR 70408

March 6, 1980

Secretary of the Commission
Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Docketing and Service Branch

Subject: Comments on "Disposal of High-Level Waste
in Geologic Repositories; Proposed Licensing
Procedures." 10 CFR Parts 2, 19, 21, 30,
40, 51, 60 and 70. FR Vol. 44 70408-70421,
December 6, 1979.

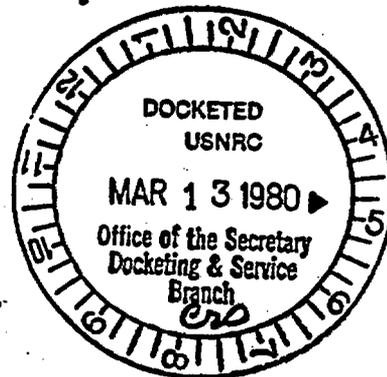
Dear Sir:

The Subcommittee on Radioactive Waste of the Atomic
Industrial Forum's Committee on Nuclear Fuel Cycle
Services is pleased to submit comments on the above
referenced subject.

Sincerely,

Edwin J. Wiggin

EAW:jmc
Enclosure



Acknowledged by card 3-14-80

8007110031-4pp

Comments of the AIF Subcommittee
on Radioactive Waste on
"Disposal of High-Level Wastes in Geologic
Repositories; Proposed Licensing Procedures"

10 CFR Parts 2, 19, 20, 21, 30, 40, 51, 60 and 70
Federal Register, Vol. 44 70408-70421, December 6, 1979

The AIF Subcommittee on Radioactive Waste is pleased to comment on the proposed rule for licensing the receipt and disposal of high-level radioactive wastes (HLW) at geologic repositories (10 CFR 60), which was published in the Federal Register by the Nuclear Regulatory Commission on December 6, 1979. We recognize that the proposed rule contains only the procedural requirements for licensing and does not address the technical requirements, and we are restricting our comments at this time to the proposed procedural requirements. However, it may not be possible to totally separate subsequent comments on the technical issues from these comments and observations on the procedural requirements. Thus, when we subsequently review the proposed technical requirements, we may offer additional comments on the procedural requirements.

The Subcommittee believes that a very high priority should be given to a well defined government program of action to resolve the nuclear waste issue; and that an important part of this program is the development of an operational geologic repository for High Level Waste without undue delay because of procedural or institutional issues. We believe that the definitions of appropriate licensing procedures and technical criteria for such repositories is a beneficial step; and we have reviewed the proposed rule with this objective in mind.

General Comment

Our major concern with the proposed rule is the implication that NRC must await DOE's completion of extensive site characterization programs for several sites in several media before it can establish licensing criteria. We are aware of the obligation imposed on DOE by the President's policy statement of February 12 to "focus on research and development, and on locating and characterizing a number of potential repository sites in a variety of different geologic environments with diverse rock types." That policy statement further states: "When four to five sites have been evaluated and found potentially suitable, one or more will be selected for further development as a licensed full-scale repository."

The rationale for this deliberate approach is to satisfy the public acceptance and political issues that over the years have come to be

associated with resolution of the waste management problem. We endorse the President's program and believe it has the potential for resolving public acceptance and political issues. On the other hand, NRC's responsibility in determining licenseability should be based solely on whether a particular site meets certain predetermined technical criteria. It should not be necessary for NRC to evaluate the characterization of multiple sites in multiple media to develop performance criteria. Further, such criteria should be available at an earlier date than is indicated in the President's policy statement in case the Congress, which it has within its powers to do, determines that the program should be accelerated.

Specific Comments

A. Our general comment applies specifically to the tone of the Supplementary Information as follows:

1. Page 70409 Vol. 44 No. 236

"...We anticipate that it will be necessary for the Department to explore at depth more than one site at different locations and in different geologic media...."

2. Page 70410 Vol. 44 No. 236

"...procedure here is consistent with the recommendation of the Interagency Review Group on Nuclear Waste Management which calls for simultaneous investigation of several potential sites...."

3. Page 70410 Vol. 44 No. 236

"...in light of the requirement discussed above that multiple sites must be characterized...."

It appears that the writer has used the careful selection of random points to develop the basis for an NRC requirement.

We would like to note that the IRG report also states, page 62 of TID-29442, "...a number of potential sites in a variety of geologic environments should be identified and early action should be taken to reserve the option to use them if needed at any appropriate time. In order to avoid working toward and ultimately having a single national repository, near-term options should create the option to have at least two (and possibly three) repositories become operational during this century, ideally, in different regions of the country."

We agree with the objective of the above paragraph, but do not believe that this objective requires any delay in proceeding with the development of NRC criteria.

- B. Our general comment also applies to the proposed modification to 10 CFR, Paragraph 51.40(d). We see no technical or environmental basis for the requirement that an environmental report must include "site characterization data for a number of sites in appropriate geologic media." A recommended approach would be for DOE to show that at the particular site for which construction authorization is sought, the geologic conditions fall within NRC technical requirements. The DOE submission could be supplemented by the results of preliminary borings and geophysical testing for alternate candidate sites.

C. Paragraph 60.2 Definitions

1. We believe the list of definitions may have to be significantly expanded once the technical requirements section of 10 CFR 60 are defined. Thus, we may have later comments on this section.
2. The term "decommissioning" has a significantly different meaning in this part than in other parts of 10 CFR. We suggest a different term be used, such as "Permanent Closure."
3. We suggest that the words "storage space" in Item (2) be changed to "repository." The word storage implies temporary rather than permanent.
4. With respect to Item (i), we would note that all irradiated reactor fuel is not High Level Waste. It may be a valuable resource. Therefore, for purposes of this definition, we recommend that the words "spent reactor fuel intended for disposal" be substituted for "irradiated reactor fuel."



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

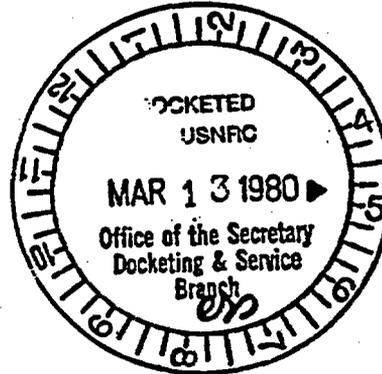
MAR 7 1980

DOCKET NUMBER
PROPOSED RULE

PR-2, et al (26)

OFFICE OF THE
ADMINISTRATOR

Mr. Samuel J. Chilk
Secretary of the Commission
U.S. Nuclear Regulatory Commission
Attn: Docketing and Service Branch
1717 H Street, N.W.
Washington, D.C. 20555



Dear Mr. Chilk:

The U.S. Environmental Protection Agency (EPA) has reviewed the proposed rule 10 CFR Parts 2, 19, 20, 21, 30, 40, 51, 60, and 70, "Disposal of High-Level Radioactive Wastes in Geologic Repositories; Proposed Licensing Procedure," which appears in Vol. 44, Federal Register, pages 70408-70421. While the proposed rule appears to offer a logical, systematic approach to licensing a high level radioactive waste (HLW) repository, we have a concern with respect to site acceptability criteria. We urge that the criteria be defined so as to avoid ambiguity and to assure proper attention and informed decisions at each critical step of the exploration and investigation.

The site acceptability criteria are fundamental to these proposed procedural rules for approval of a repository site. At each step of exploration and investigation of a candidate site, established criteria will be needed for determinations as to whether that site is suitable as a repository. This is important since it is reasonable to predict that several difficult decisions will be required during the exploration of a candidate site. Decisions to abandon "consideration of a candidate site" will be particularly difficult after considerable resources have been expended for the exploration of that site. We believe the NRC should carefully examine the proposed rules in this light.

Our review of the proposed rules focused on the application of the site acceptability criteria as discussed in the previous paragraph. We found that the requirements for the applicant's design criteria were somewhat confusing. In the Preapplication Review Section, Part 60.11(a), the requirements include the criteria used by the U.S. Department of Energy (DOE) to arrive at the candidate areas and the sites(s) selected. However, in the License Applications Section, Part 60.21(c)2, and the Construction Authorization, Part 60.31(a), the requirements specify both DOE and NRC criteria, including subparts E and F, which we assume will become the Sections containing the NRC technical criteria. This raises such questions as: (1) What is being done to assure compatibility of the criteria? and (2) When will the various criteria be available? We believe that you should resolve such questions before embarking on major site exploration activities.

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acknowledged by [unclear] 3-14-80

EPA is also concerned about apparent inconsistencies in the terminology for the materials to be included in a license. Various terms used include: high-level radioactive waste; waste radioactive material; source, special nuclear, or byproduct material; radioactive material; and wastes. This is noted in proposed Part 2.101(f)(1), Part 2.103(a), Part 2.104(e), Part 60.3(a), Part 60.21(C)(5), Part 60.31(a)(1), and Part 60.41. Either the terminology should be made consistent or the differences should be explained in the text.

The proposed rule appears to provide adequate opportunity for review by the public and by local, State, and Federal agencies. In addition, we note that the President intends to establish a State Planning Council which will strengthen intergovernmental relationships and help fulfill the joint responsibilities for the protection of public health and safety in radioactive waste matters.

EPA is currently developing the environmental standards for the disposal of high-level radioactive waste. On February 12, 1980, in his Statement on Radioactive Waste Management, the President directed EPA and NRC to complete a Memorandum of Understanding to address the issues of coordinating methodologies and procedures in the management of waste. Therefore, we suggest that the Commission, in its licensing procedures under 10 CFR 60, require that these EPA standards be met by its licensee.

We appreciate the opportunity to comment on this proposed rule and look forward to a unified, coordinated effort on this urgent national problem. Should you have questions concerning EPA's comments, please contact Ms. Betty Jankus of my staff (202-755-0770).

Sincerely yours,



William N. Hedeman, Jr.

Director

Office of Environmental Review (A-104)

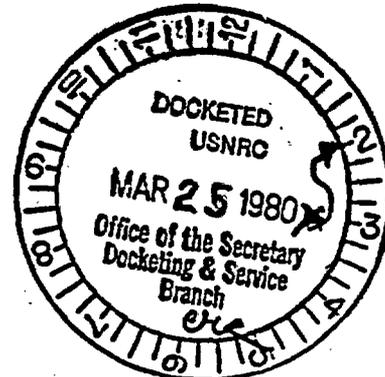


Department of Energy
Washington, D.C. 20585

DOCKET NUMBER 22-2, et al
PROPOSED RULE (44 FR 70408)

(27)

MAR 24 1980



MEMORANDUM FOR Honorable Samuel J. Chilt
Secretary of Nuclear Regulatory Commission
Washington, D.C. 20555

SUBJECT: Proposed NRC Rules - 10 CFT Parts, 2, 19, 20, 21, 30,
40, 51, 60, and 70 for the Disposal of High-Level
Radioactive Wastes in Geological Repositories; Proposed
Licensing Procedures

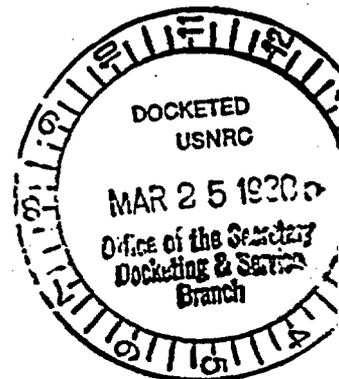
The Department of Energy (DOE) believes the proposed rules to be inadequate with regard to the participation of Indian Tribal governments. A failure to involve Tribes in the initial process will result in later practical and political difficulties which would be unnecessary. Further, to include Indian Tribal governments would be consistent with their unique governmental relationship with the U.S. Finally, to ignore Tribes would cause gaps in the effective implementation of HLW disposal because States have no jurisdiction over Tribes, absent express Federal legislation to the contrary.

Therefore, the DOE recommends the following language changes:

- FR, Vol. 44, No. 236, Thursday, December 6, 1979
- FR page 70413, Part 2
- 10 CFR 2.101
- § (f) (4) (ii) following "the county" insert "or Indian Tribe,"
- (iii) following "State," insert "Indian Tribe,"
- (5) following "State," insert "Indian Tribe,"
- 10 CFR 2.103 (a) following "State" insert, "Indian Tribe"
- 10 CFR 2.104 (e) following "county" insert "or Indian Tribe"

FR page 70416, Part 60
§ 60.2 (1) insert in lieu of the present (1) the following definition
"Indian Tribe" means any Indian Tribe, band, nation, or other organized group or community, including any Alaska Native village or regional or village corporation as defined in or established pursuant to the Alaska Native Claims Settlement Act which is recognized as eligible for the special programs and services provided by the United States to Indians because of their status as Indians."

Renumber the present (1) through (o) as (m) through (p)



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Subpart B

§ 60.11 (a)

New (6) "a description of conformity with P.L. 95-341" renumber old (6) and (7) as new (7) and (8). Old (6) (new (7)) following "public" insert ", Indian Tribal"

(b) following "State" insert ", Indian Tribes"

(c) insert at the end of the sentence, after "contiguous States" the following "and to the chief executive of any affected Indian Tribe"

(h) following "State" to insert "and Indian Tribes"

FR page 70417

§ 60.21 (b)

new (4) "A certification that the Department has exclusive jurisdiction over the lands designated in the application and that the Department holds such land in fee simple without encumbrances"

FR page 70420 and 70421

Subpart C

§ 60.61 (a) after "request of a State" insert "or an affected Indian Tribe," and after "representatives of State" insert ", Indian Tribes"

(c) after "States" insert "and Indian Tribes,"

§ 60.62 (a) after "scope of State" insert "or Indian tribal" ;and after "with the State" insert "or Indian Tribe"; and after "by the State" insert "or Indian Tribe."

(b) after "States" insert "and Indian Tribes"; and after "proposal for State" insert "or Indian Tribal"; and after "A State's" insert "or an Indian Tribe's."

(c) After "State" insert "or the chief executive of the Indian Tribe"

(1) After "State" insert "or Indian Tribe"

(2) After "State" insert "or Indian Tribe"

(3) After "State" insert "or Indian Tribe"

(5) After "State" insert "or Indian Tribe"

(d) After "If the State" insert "or Indian Tribe"

and after "exchange of State" insert "or Indian Tribal"

§60.83 (a) After "representatives of the State" insert "or Indian Tribes" and after "by the State" insert "or Indian Tribe."

(b) (1) After "State" insert "or Indian Tribe"

(2) (i) After "State" insert "or Indian Tribe"

(c) After "State" insert "or to the chief executive of the originating Indian Tribe."

I appreciate your consideration of these comments. Thank you for your time.



Richard J. Stone
Director
Intergovernmental Affairs

TASC
THE ANALYTIC SCIENCES CORPORATION

Six Jacob Way, Reading, MA 01867. (617) 944-6850

DOCKET NUMBER
PROPOSED RULE PR-2, et al

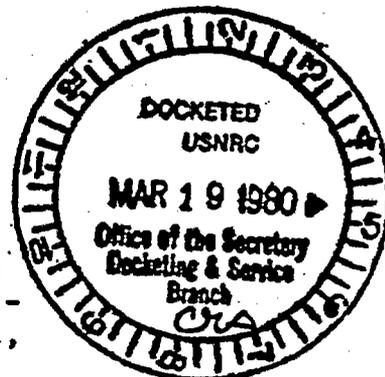
March 5, 1980

(44 FR 70408) 28

Secretary of the Commission
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Docketing and Service Branch

Regarding: Disposal of High-Level Radioactive Wastes
in Geologic Repositories; Proposed Licens-
ing Procedures 10 CFR Parts 2, 19, 20, 21,
30, 40, 51, 60 and 70 44 F.R. 70408
(December 6, 1979)



Dear Sir:

In response to the Commission's request for comments on its proposed procedural rule for licensing of disposal of high-level radioactive wastes in geologic repositories, I am pleased to submit the following comments on behalf of The Analytic Sciences Corporation (TASC).

We would like first to note that we have had an opportunity to review the comments submitted by Maurice Axelrad, Esq., of Lowenstein, Newman, Reis, Axelrad, and Toll, on behalf of the Utility Waste Management Group (UWMG) and the Edison Electric Institute (EEI). We would like to be recorded as endorsing the UWMG/EEI comments. Our own comments in some cases address the issues discussed by UWMG/EEI; we hope you will find our suggestions and theirs to be complementary and useful.

MULTIPLE SITES AND MEDIA

We fully concur with the idea of pursuing alternatives in parallel. Indeed, the need to do so was reported five years ago*. We do not, however, believe it is appropriate to specify in advance the number of sites and media to be explored. While the proposed rule does not explicitly make such specifications, supporting information (44 F.R. 70409, and various media reports) indicates at least a trend toward explicit, although "unofficial", requirements.

*"Ultimate Disposal - A Plan for Achievement", by J.W. Bartlett, in Waste Management '75, Proceedings of the Symposium on Waste Management at Tucson, Arizona, March 24-26, 1975.

Acknowledged by card... 3-19-80

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The scope of the site identification process can and should be established by the process itself. Suitability of a candidate site will, as noted in the discussion of the proposed procedures, be determined by social, environmental, and technical factors. In practice, social and environmental factors are more likely than technical factors to disqualify a candidate site, i.e., large areas of potentially suitable geology exist.

The key site selection technical issues are concerned with measurements and data analysis to assess how the geology will perform as an integral part of the repository system within the constraints imposed by performance criteria. We submit that the most efficient and appropriate way to proceed is to build an inventory, of unspecified number, of candidate-site-containing geologies, each with perhaps an area on the order of 100 square miles, each of which has passed a coarse social and environmental screening, and each of which is preliminarily assessed to be able to perform adequately.

This approach can in fact be expected to produce a multiplicity of acceptable sites, albeit with differing system design details. Refined evaluation leading to the Site Characterization Report may then show that it is appropriate to focus attention and resources on one or two sites at most.

It is obvious that this approach can be used effectively only if the technical criteria for assessing repository system performance are in place. We therefore urge early promulgation of such criteria. We also note a need for such criteria to be internally consistent and flexible enough to accommodate a variety of repository system concepts. We would also like to observe that the technical criteria and the procedures addressed in these proposed rules are closely linked. In an ideal world, the procedures would be deduced from the technical criteria.

SITE CHARACTERIZATION REPORT

We endorse the concepts and intent associated with the Site Characterization Report. We suggest, however, in view of its proposed function and content, that it would more appropriately be termed a "Site Identification Report". Our comments below concern the production and content of that report.

CONSISTENCY OF INFORMATION AND DECISION MAKING

Our greatest concern with the proposed rules is the potential for lack of consistency between information presented and decisions made in the early stages (i.e., site selection) of the proposed licensing process. The key issue can be expressed as follows: in the site selection stages of the licensing process,

will the scope and detail of data, and the amount and type of data analysis presented, be consistent with what the NRC really requires to make their decisions? Put another way, do the proposed rules, especially with respect to the content and use of the Site Characterization (Identification) Report, adequately reflect the NRC's intent and expectations?

The issue addressed is shown diagrammatically in the attached figure, which indicates that the NRC might pursue three alternative strategies in its process of certifying the safety of a proposed repository at the early stages of review: a high, intermediate, or low degree of confidence that the repository will indeed prove to be acceptable (curves 1, 2, and 3, respectively). The thrust of the discussion of Site Characterization Review (44 F.R. 70409) is clearly to favor a conservative approach, i.e., to have an early-on high degree of confidence such as is illustrated by curve 1.

We endorse this conservative approach. We do not, however, find clear evidence that the relationships among this approach, expenditures, data acquisition, data analysis, and review criteria are understood. In our estimation, the investments of funds and effort needed to prepare the Site Characterization (Identification) Report are very large. In this context, the incremental site characterization costs may indeed be small (44 F.R. 70410), but so are the incremental gains in knowledge. What, then, are the objectives and benefits for characterization excavations and in-situ testing? More is said later about this issue.

The definition of site characterization (item n, 44 F.R. 70416) specifically excludes data acquisition and analysis activities that precede site characterization. Indeed, the proposed rules and accompanying discussion are virtually silent on data acquisition and analysis during the reconnaissance phase. Consistency in the conservative approach inherently requires, however, that a high degree of confidence in the suitability of proposed sites be attained as a result of this effort. We submit, therefore, that the rules should give much more attention to this phase of the effort. Doing so may force revisions to succeeding procedures or validate the proposed procedures.

As noted in the rulemaking discussion (44 F.R. 70410), there is no point in proceeding (with site characterization) if reconnaissance reveals insuperable defects. We can expect that reconnaissance will indeed reject sites with detected insuperable defects. We can also expect, however, that there will be many places where defects are either not detected by reconnaissance procedures or deemed not to be insuperable.

The basis for a judgment that defects are not insuperable would be an expectation that engineering design can accommodate, or compensate for, "defects". It is unrealistic to expect a "perfect" geology, whatever that might be; it is realistic to expect differing "defects" at alternative sites (44 F.R. 70410). Thus it is necessary to expect differing engineering approaches to utilization of alternative sites.

The above observation reintroduces and reinforces our (and NRC's) assertions concerning the need for a systems approach to repository siting and licensing. Geologic issues do not stand alone; engineering issues enter the site selection process at an early stage, and corresponding recognition of their role in the licensing decision process should be made.

EXPLORATION AND TESTING AT DEPTH

The above issues are closely related to the question of when and how much to do exploration and testing at depth. The discussion in the Federal Register Notice (44 F.R. 70410, middle column) identifies several objectives for these activities:

- to determine whether the geology will retard waste migration
- to make meaningful comparisons among alternatives
- to determine whether serious but not readily observed defects are present
- to determine specific geologic properties
- to improve confidence in the determination of defects and key parameters.

With reference to these objectives, we offer the following observations:

- Capability of the geology to retard waste migration has three constituent issues: (1) whether it exists (good "ballpark" estimates can be made using currently available data); (2) whether it is needed, except as a redundant, backup barrier; and (3) whether it can be maintained.

With respect to the latter issue, we note that the exploration and testing will characterize the geology in its present

state. What we need to evaluate is the potential for change in state with adverse consequences, e.g., the potential for faulting, as a result of natural phenomena or thermal loading, which allows water to enter the repository and transport waste along paths that short-circuit the holdup capacity of the geology.

Analysis of present-state data is required at an early stage of the site selection process, i.e., in large measure before testing at depth. Early-on performance of such analysis will minimize the role and benefits of at-depth testing with respect to geologic holdup.

- Rather than focusing on "meaningful comparisons", which implies a hierarchy of "better thans", the objective should be to develop an inventory of acceptable sites at which acceptable repository systems can be implemented.
- For sites which have not been rejected because of insuperable defects, how the exploration and testing at depth will "...determine whether serious but not readily observed defects are present..." and improve confidence in the determination of defects and key parameters is not clear. If the geology has a high degree of homogeneity, the effort will do little except confirm the fact. If the geology is inhomogeneous (such condition having been deemed not to be an "insuperable defect"), the effort will make determinations only on a micro scale. Surprises might exist beyond the region of exploration but within the volume to be occupied by the total repository.
- Parameter measurements will be representative and meaningful only if the geology is reasonably homogeneous. If homogeneity is demonstrated by independent means (which can be expected also to determine if "serious defects" are present), the need for exploration and testing will be constrained.

March 5, 1980

- We interpret the phrase "...serious but not readily observed..." to be concerned with determinations not made under previous scope and/or methods of measurement. In practice, we would expect the scope and methods of prior measurement to have been highly comprehensive in order to arrive at the conclusion that the proposed site is a good one. The necessary exploration techniques do exist*; they need only to be used. The results of their use would then dictate what procedures and methods to use at depth. These at-depth efforts could have limited impact on confidence in measured results.

*Philip R. Romig, "Applications of Geophysical Methods in Nuclear Waste Disposal Siting", draft report of the results of Keystone conferences.

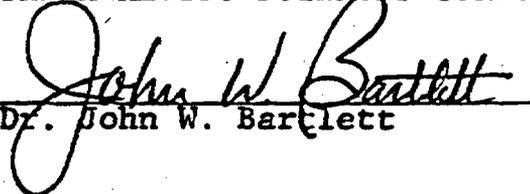
We would like to emphasize that we are not arguing against the concept of exploration and testing at depth. We do argue, however, that what is done and how it is done should be determined on a case-by-case basis. Indeed, the basic strategy of considering alternative sites and media demands a high degree of flexibility on this issue.

SUMMARY

In summary, we believe NRC requirements concerning site selection should be broad and flexible. If the DOE is to fulfill its responsibilities effectively and expeditiously, procedural specifications on this matter will have to be minimal. The NRC efforts should focus on development of sound, consistent technical criteria and review procedures.

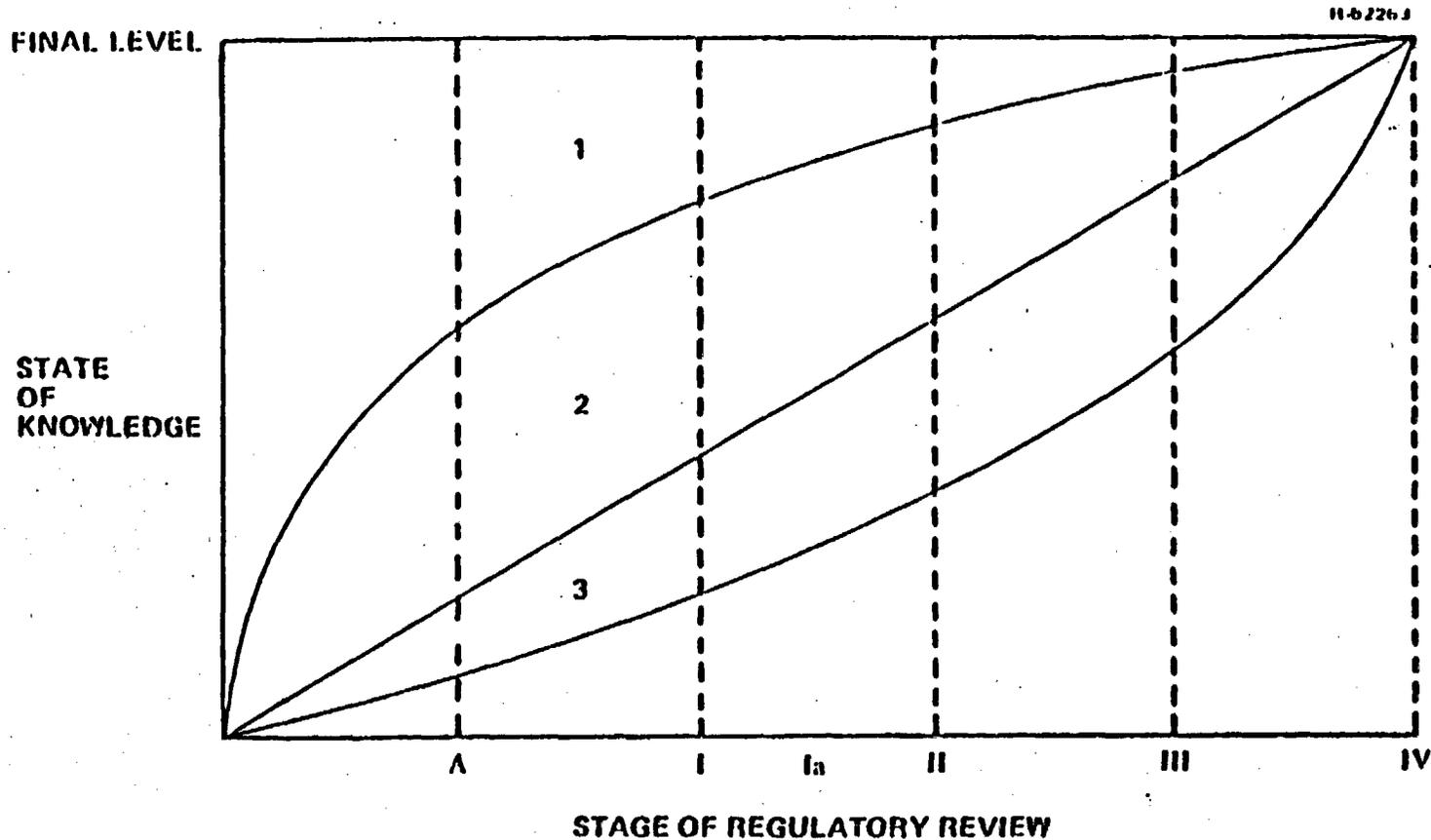
Very truly yours,

THE ANALYTIC SCIENCES CORP.


Dr. John W. Bartlett

JWB/mf

Enclosure



A. REGIONAL STUDIES (NO REVIEW)

I. SITE CHARACTERIZATION REPORT

Ia. CHARACTERIZATION PROGRESS REVIEWS

II. CONSTRUCTION APPLICATION

III. EMPLACEMENT APPLICATION

IV. DECOMMISSIONING APPLICATION

REGULATORY GUIDANCE, INFORMATION DEVELOPED, AND ANALYSES PERFORMED AT EACH STAGE MUST BE CONSISTENT WITH THE KNOWLEDGE GROWTH PROFILE THAT IS SOUGHT

G.V. "SONNY" MONTGOMERY
3RD DISTRICT, MISSISSIPPI

2367 RAYBURN HOUSE OFFICE BUILDING
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DISTRICT OFFICE:
MERIDIAN, MISSISSIPPI 39301
AREA CODE (601) 633-6681

Congress of the United States
House of Representatives
Washington, D.C. 20515

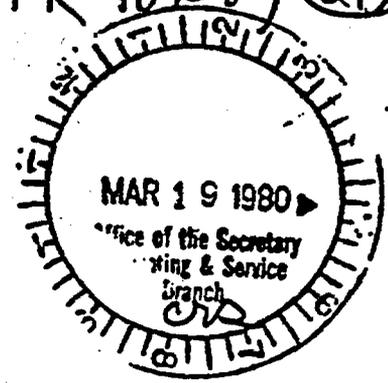
COMMITTEES:
ARMED SERVICES
VETERANS' AFFAIRS

ADMINISTRATIVE ASSISTANT
JACK VANCE

March 14, 1980

DOCKET NUMBER
PROPOSED RULE PR-2, et al
(44 FR 70408) (29)

Honorable Joseph M. Hendrie
Chairman
Nuclear Regulatory Commission
Washington, D. C. 20555



Dear Mr. Chairman:

I would like to invite your attention to the attached copy of a letter addressed to the Commission by Mr. Peter J. Walley, Director, Mississippi Department of Natural Resources, Jackson, Mississippi, which is self-explanatory.

Since I am vitally interested in this matter involving the State of Mississippi, I would appreciate very much being furnished a copy of your response to Mr. Walley.

Thank you for your attention to this request.

With kindest regards,

Sincerely,

G. V. Montgomery
GILLESPIE V. MONTGOMERY
Member of Congress

GVM:im
Enclosure

Acknowledged by card. *alh*.....

8005070561



MISSISSIPPI DEPARTMENT OF NATURAL RESOURCES

Office of Energy
P. O. Box 10586
Jackson, Mississippi 39209
(601) 961-5060



March 3, 1980

MAR 08 1980

Secretary
Nuclear Regulatory Commission
Washington, D. C. 20555

Attn: Docketing and Services Branch

Dear Sirs:

RE: COMMENTS ON PROPOSED RULE FOR DISPOSAL OF
HIGH-LEVEL RADIOACTIVE WASTE (HLW) IN GEOLOGIC
REPOSITORIES; PROPOSED LICENSING PROCEDURES

The present approach to the HLW Disposal process evidenced by the proposed licensing procedures outlined in FR. Vol 44, No. 236 is an action in the proper direction. The Mississippi Office of Energy supports the concept of the NRC's involvement in expanded site characterizations rather than provisional construction authorizations and in the review of the Department of Energy's plans for site characterization and site selection procedures, methods and criteria prior to the use of such procedures, methods, and criteria.

There are, however, several comments and questions that deserve additional attention:

- 1) It is most important at the state and local level that agency representatives and citizens in general have a clear understanding of the roles to be played by DOE, NRC, EPA, and other federal agencies that might be involved. The process now defined tends to cloud and distort the view as to these roles.

Some overview of these relationships should be made an ongoing part of any state and local public hearing and/or meetings.

- 2) There are presently several site characterization decisions in progress by DOE, including three sites in Mississippi. The site characterization reports under the pre-application review should apply in retrospect to these efforts.
- 3) The site characterization report does not address directly the problems of site-related impacts, such as transportation, economic and social, on the local and state infrastructure and population. This should be specifically addressed in any site characterization report.

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Secretary, Nuclear Regulatory
Commission

Page 2

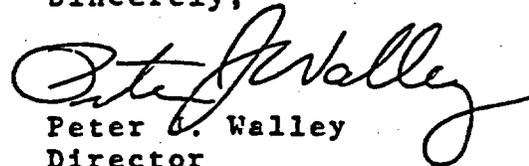
March 3, 1980

- 4) The contents of license applications require plans for coping with radiological emergencies. These types of plans place a considerable amount of responsibility for planning on the state and local governments. The extent and scope of the plans should be defined as in those regulations required for nuclear commercial power reactors
- 5) In the license amendment to decommission the description of the program for post-decommissioning monitoring should be more specific and require some minimum level of activity in perpetuity.
- 6) The general tone of the Subpart C--Participation by State Governments--gives the impression that state and local governments are that of observers and occasional participants provided they generate enough activity.

The consultation process should give the state a stronger, more formalized role in the activities of site characterization, particularly those that relate to site specific data as opposed to generic data. The concurrence part of the consultation and concurrence process would then be addressed by any state and/or federal laws in place. The consultation definition and process should be made clearer to the extent that the state has the procedure available to recommend specific courses of action whereupon the Director of the NRC's Office of Nuclear Materials Safety and Safeguards would respond in writing as to why a particular recommendation was not taken, if so. This would define the state participation program in a formal sense. This, of course, would then modify the approval of proposals process (Section 60.83).

Please be assured that Mississippi is vitally concerned with this process and will provide additional comments and concerns as the issue matures.

Sincerely,


Peter C. Walley
Director

PJW/js

cc: Governor William Winter
Attorney General William A. Allain
Mississippi Congressional Delegation

G.V. "SONNY" MONTGOMERY
3RD DISTRICT, MISSISSIPPI

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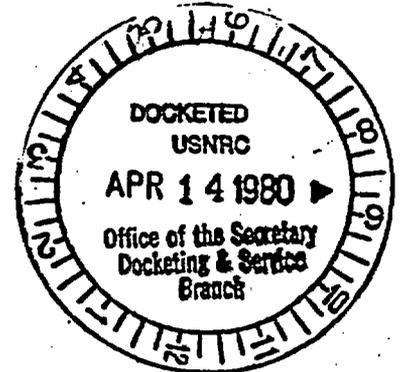
COMMITTEE:
ARMED SERVICES
VETERANS' AFFAIRS

ADMINISTRATIVE ASSISTANT
JACK VANCE

Congress of the United States
House of Representatives
Washington, D.C. 20515

April 8, 1980

DOCKET NUMBER
PROPOSED RULE PR-2, 19, 20, 21, 30, 40, 51, 60, 70 (30)
(44 FR 70408)



Honorable John F. Ahearne
Chairman
Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Chairman:

Recently, the Director of the Mississippi Department of Natural Resources submitted comments to you concerning the proposed rule for disposal of high-level radioactive waste (HLW) in geologic repositories; proposed licensing procedures.

This subject is one of considerable interest and concern to me and the purpose of this letter is to give my full support to the comments offered by Director Peter J. Walley. I feel that the comments and suggestions offered are valid issues and concerns and I urge you to give them full consideration in your evaluation for issuance of the final rule.

I think it is essential that the states be made full partners in the activities of site characterization.

Also, of the deepest concern to me is the fact that too many Federal agencies are involved in this process. I think it is absolutely essential that clearly defined roles and responsibilities must be established for each of the participating Federal agencies and one agency must have the lead role in dealing with the states on these issues.

Your full consideration of the issues raised by the Mississippi Department of Natural Resources will be appreciated. A copy of the letter submitted by the Department is attached for your convenience.

With kindest regards,

Sincerely,

G.V. Montgomery
GILLESPIE V. MONTGOMERY
Member of Congress

GVM:jvt

4/10..To OCA for Direct Reply..Suspense: April 21..Cpys to: Chm
EDO, RF, Docket...80-0703

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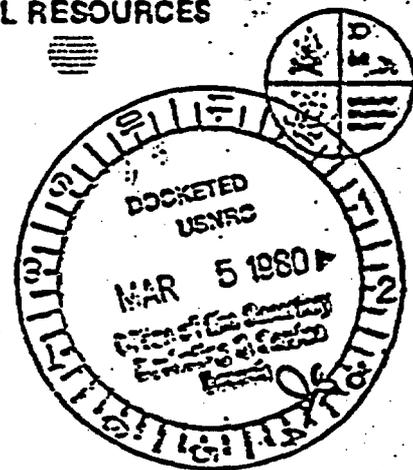


MISSISSIPPI DEPARTMENT OF NATURAL RESOURCES

Office of Energy
P. O. Box 10586
Jackson, Mississippi 39209
(601) 951-5050

15

March 3, 1980



DOCKET NUMBER
PROPOSED RULE PR-2 et al
(44FR 70408)

Secretary
Nuclear Regulatory Commission
Washington, D. C. 20555

Attn: Docketing and Services Branch

Dear Sirs:

RE: COMMENTS ON PROPOSED RULE FOR DISPOSAL OF
HIGH-LEVEL RADIOACTIVE WASTE (HLW) IN GEOLOGIC
REPOSITORIES; PROPOSED LICENSING PROCEDURES

The present approach to the HLW Disposal process evidenced by the proposed licensing procedures outlined in PR Vol 44, No. 238 is an action in the proper direction. The Mississippi Office of Energy supports the concept of the NRC's involvement in expanded site characterizations rather than provisional construction authorizations and in the review of the Department of Energy's plans for site characterization and site selection procedures, methods and criteria prior to the use of such procedures, methods, and criteria.

There are, however, several comments and questions that deserve additional attention:

- 1) It is most important at the state and local level that agency representatives and citizens in general have a clear understanding of the roles to be played by DOE, NRC, EPA, and other federal agencies that might be involved. The process now defined tends to cloud and distort the view as to these roles.

Some overview of these relationships should be made an ongoing part of any state and local public hearing and/or meetings.

- 2) There are presently several site characterization decisions in progress by DOE, including three sites in Mississippi. The site characterization reports under the pre-application review should apply in retrospect to these efforts.
- 3) The site characterization report does not address directly the problems of site-related impacts, such as transportation, electricity and cooling, the local and state infrastructure and population. This should be specifically addressed in any site characterization report.

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Secretary, Nuclear Regulatory
Commission

Page 2

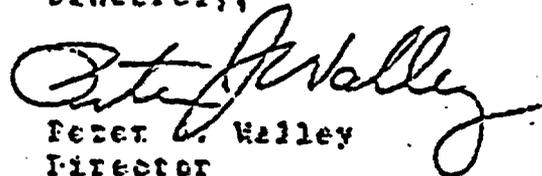
March 3, 1980

- 4) The contents of license applications require plans for coping with radiological emergencies. These types of plans place a considerable amount of responsibility for planning on the state and local governments. The extent and scope of the plans should be defined as in those regulations required for nuclear commercial power reactor
- 5) In the license amendment to decommission the description of the program for post-decommissioning monitoring should be more specific and require some minimum level of activity in perpetuity.
- 6) The general tone of the Subpart C--Participation by State Governments--gives the impression that state and local governments are that of observers and occasional participants provided they generate enough activity.

The consultation process should give the state a stronger, more formalized role in the activities of site characterization, particularly those that relate to site specific data as opposed to generic data. The concurrence part of the consultation and concurrence process would then be addressed by any state and/or federal laws in place. The consultation definition and process should be made clearer to the extent that the state has the procedure available to recommend specific courses of action whereupon the Director of the NRC's Office of Nuclear Materials Safety and Safeguards would respond in writing as to why a particular recommendation was not taken, if so. This would define the state participation program in a formal sense. This, of course, would then modify the approval of proposals process (Section 60.63).

Please be assured that Mississippi is vitally concerned with this process and will provide additional comments and concerns as the issue matures.

Sincerely,

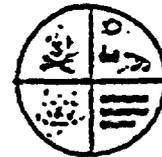

Peter J. Walley
Director

FJW/je

cc: Governor William Winter
Attorney General William A. Allain
Mississippi Congressional Delegation



MISSISSIPPI DEPARTMENT OF NATURAL RESOURCES
Bureau of Geology
P. O. Box 5348
Jackson, Mississippi 39216
(601) 354-6228



March 3, 1980

United States Nuclear Regulatory Commission
Office of the Secretary
Washington, D. C. 20555

Attn: Docketing and Service Branch

Re: Comments on Proposed Rules for NRC Licensing Procedures
for Nuclear Waste Repositories

Mr. Secretary:

These proposed rules are intended to present requirements applicable to the Department of Energy in submitting an application for a license for a nuclear waste repository. The proposed rules also set forth provisions for consultation and participation in the license review by State Government. With reference to the State participation, it is stated, "the Commission has undertaken a thorough review of the matter and now proposes a more extensive informal involvement during early phases of site characterization and a deferral of formal proceedings until site characterization has been completed." The term informal involvement appears to be somewhat out-of-step with previously stated ideas that target States would be actively involved by being assured of having the opportunity to engage in the decision making process. This idea is even stated in these proposed rules under the Site Characterization Review section. We object to the term informal involvement, especially, if the Federal government (including The President) is sincere in its many statements relative to the States' role of "consulting partners" to the federal government in matters concerning nuclear waste repositories.

We fully agree with the concept of the Nuclear Regulatory Commission, as well as the States, having the opportunity to consult in and review the site characterization studies to help insure adequate data and safeguards are obtained before a site is finally selected.

It is stated in the Scope of Proposed Rule section, "The technical criteria against which the license application will be reviewed are still under development." Are the States going to be consulted during the development of these criteria, as we have been led to believe? If so, why isn't it indicated in the rules? If not, why not?

It is stated once the wastes have been emplaced the Department of Energy may submit an application to decommission the site. There is no mention of a long-term monitoring system. Will the site be monitored and will the States be involved in the design of same? Will appropriate State agencies be involved in any way in the monitoring process?

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United States Nuclear Regulatory Commission

March 3, 1980

Page 2

Under Subpart D, Section 60.71 - Records and Reports - Why not also notify the affected State of any deficiency found in the site?

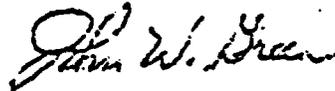
Section 60.73 - Inspections - Section states the Department of Energy shall allow the Nuclear Regulatory Commission to inspect on the premises of the repository. Why not allow appropriate State representatives to accompany on such inspections?

Obviously, we have the idea States are being excluded as much as possible in these matters which are of great concern to them. We sincerely hope the States can be involved in these matters which could have an economic, social and safety effect on them for centuries to come.

We appreciate the opportunity of reviewing these Proposed Rules.

Sincerely

BUREAU OF GEOLOGY



John K. Green
Environmental Geologist

JKG:js

cc: Hon. William A. Allain
State Attorney General

Alvin F. Bicker, Jr.
Acting Director
Bureau of Geology

State of Wisconsin/Department of Administration

*Pl. Make sure that these amounts are docketed.
Pl. Take care.*

May 27, 1980

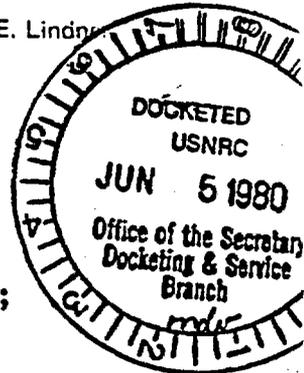
Docket Number:
PROPOSED RULE

**PR-2, 19, 20, 21, 30, 40, (31)
51, 60, 70 (44 FR 70408)**

Lee Sherman Dreyfus
Governor

Kenneth E. Lindner
Secretary

Mr. I. C. Roberts
Assistant Director for Siting Standards
Office Of Standards Development
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555



**RE: Disposal of High-Level Radioactive Wastes in Geologic Repositories;
Proposed Licensing Procedures**

Dear Mr. Roberts:

On behalf of the Wisconsin Ad Hoc Radioactive Waste Disposal Committee, I would like to thank you for extending to the Committee an opportunity to comment upon the Proposed Rule for Licensing High-Level Radioactive Waste Repositories published on December 6, 1979 (44 FR 70408-70421). Created by executive order on January 22 of this year, the Committee is composed of representatives of ten State agencies and is charged with the development of a unified State position on radioactive waste policies and programs. The full Committee did not hold its first meeting until March 5th, and was therefore unable to meet the March 3, 1980 deadline for submission of written comments on the proposed rule. While we were dismayed that our request for formal extension of the comment period was denied, we appreciate the invitation you extended during our April 29th telephone conversation to submit comments after the closing date.

The Committee is in full agreement with the stated rationale for this NRC rule making proceeding, namely that "the considerable differences between a geologic repository and other licensed facilities, particularly in view of the significance of a repository with respect to the health and safety of future generations, make it desirable to develop rules tailored specifically to geologic disposal of HLW." (44 FR 70408)

The Committee supports the Commission's decision to withdraw the proposed General Statement of Policy published in November, 1978, and endorses the three areas in which the proposed rule departs from that earlier Statement. Specifically, we support the Commission's requirement for review of site characterization plans and site selection criteria in advance of actual site characterization activities [10 CFR 60.11(e)]; the stipulation that site characterization plans must consider a minimum of three sites representing a minimum of two geologic media [10 CFR 51.40(d)]; and the expansion of the definition of site characterization to include exploration and in site testing of the proposed host media [10 CFR 60.2(n)]. Our support for the third point, the expanded definition of allowable site characterization activities, is qualified by our recommendation that public hearings must be held in the vicinity of the proposed site(s) prior to approval of the site

Acknowledged by card 6/5/80. mdy.

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Mr. I. C. Roberts

Page 2

May 15, 1980

characterization report. Moreover, our support for the expanded definition of allowable site characterization activities assumes that these activities will be carried out in full accord with the provisions of the Wisconsin Environmental Protection Act.

Development of a mined repository in Wisconsin would be considered similar to the development of a mine for mineral extraction. Both processes have four stages: reconnaissance, exploration (drilling), prospecting (taking of samples by trenching or bulk sampling), and mining. The last three activities are regulated by the Wisconsin Department of Natural Resources. Site characterization as described in the proposed rule would be considered prospecting in Wisconsin. Prospecting generally requires an environmental impact assessment, and site characterization activities such as described in the proposed rule would probably require preparation of a full environmental impact statement.

Finally, the Committee appreciates the Commission's endorsement of full State participation in the licensing process. To this end, we are recommending specific changes to 10 CFR Part 60, which will allow more meaningful participation by the affected public and by State and local officials. Our recommendations are attached in an accompanying enclosure. Also attached for your information is a copy of the comments submitted by the State of Wisconsin on the U. S. Department of Energy's Draft Environmental Impact Statement on Management of Commercially Generated Radioactive Waste (DOE/EIS-0046-D).

For the Wisconsin Ad Hoc Radioactive Waste Disposal Committee,

Sincerely,



Robert J. Halstad
Energy Policy Analyst
Division of State Energy

RJH:mse:3493C

Attachment

State of Wisconsin/Department of Administration

Lee Sherman Dreyfus
Governor

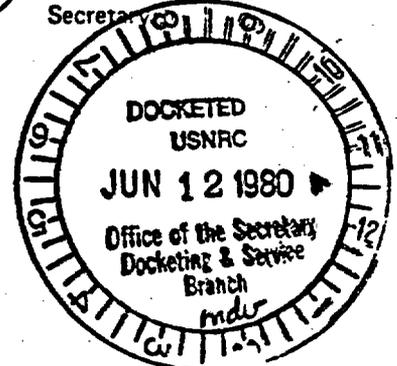
Kenneth E. Lindner
Secretary

June 4, 1980

32

LET NUMBER
PROPOSED RULE

PR-2, 19, 20, 21, 30, 40, 51, 60, 70
(44 FR 70408)



Mr. I. C. Roberts
Assistant Director for Siting Standards
Office of Standards Development
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

RE: Disposal of High-Level Radioactive Wastes in Geologic Repositories:
Proposed Licensing Procedures

Dear Mr. Roberts:

Enclosed are the attachments containing our suggested amendments to 10 CFR 60 and the referenced comments on DOE/EIS-0046-D which were inadvertently omitted from my letter of May 27.

If you have any questions, please call me at 608/266-9810.

For the Wisconsin Ad Hoc Radioactive Waste Disposal Committee.

Sincerely,

DIVISION OF STATE ENERGY

Robert J. Halstead
Energy Policy Analyst

RJH/db

enc.

acknowledged by *[Handwritten Signature]*

00710257-1988

Suggested Amendments to NRC Proposed Licensing
Procedures for HLW Repositories
10 CFR Part 60

Subpart B - Licenses

Section 60.11 Site Characterization Report

- (a)(6) [Footnote at end of phrase] To satisfy this requirement, the Commission has established the following criteria regarding public notification by the Department:
- (1) Contacting the Governor or his designee;
 - (2) Coordinating with appropriate state and local agencies; and
 - (3) Holding public meetings in the vicinity of the proposed site(s) to explain the proposals and process to be employed by the Department.
- (b) [Insert at beginning of paragraph] Immediately upon receiving a site characterization report, the Director shall notify the Governor of the State in which the site to be characterized is located.
- (d) [Insert after first sentence] The Director shall transmit copies of the draft site characterization analysis to the Governor of the affected state and to the chief executive of the affected municipality or county.
- (e) [Insert after first sentence] During this period, a public hearing shall be held in the county seat of the county in which the site to be characterized is located.

Section 60.22 Filing and Distribution of Application

- (d) [Insert at end of paragraph] Copies of the application, environmental report, and other amendments shall also be filed with the officials designated by the Governor of the affected State.

Section 60.23 Elimination of Repetition

[Strike last section of paragraph and replace with the following]

Provided, That such references are clear and specific and that copies of the information so incorporated are reasonably available to each recipient of the application, environmental report, or site characterization study.

Subpart C - Participation by State Governments

Section 60.62 Filing of Proposals for State Participation

- (e) [Insert after paragraph (d)] If a State desires to have its representatives accompany NRC personnel on site visits, under Section 60.11(g), the designated contact agency and person(s) shall be specified in the proposal.



LEE SHERMAN DREYFUS

STATE OF WISCONSIN
OFFICE OF THE GOVERNOR
STATE CAPITOL
MADISON. 53702

185
Telephone Number
(608) 266-1212

July 27, 1979

Dr. Colin A. Heath
Division of Waste Isolation
Mail Stop B-107
U. S. Department of Energy
Washington, D.C. 20545

Dear Dr. Heath:

Re: DOE/EIS-0046-D-Management of Commercially
Generated Radioactive Waste

The State of Wisconsin is aware of the sometimes conflicting, but urgent, issues related to the nuclear industry since we rely on nuclear power plants to provide 30 percent of our electrical energy.

While we recognize the primary Federal role in these issues, the problem of nuclear power and radioactive waste disposal are also state concerns and we will accept our responsibilities in these matters.

Wisconsin has a long history of accountable government involvement in proposals affecting the welfare of its citizens. I intend to maintain and improve this trust especially for nuclear waste disposal because of its serious implications to the energy and environmental future of Wisconsin and the Nation.

The responsibility over nuclear power and disposal of radioactive wastes must be a state and federal partnership. The Federal Government must make a special effort to recognize and comprehensively involve the states, local units of government and citizenry in all phases of the nuclear decision-making process.

The information contained in this Draft Environmental Impact Statement has serious overtones toward the future of our state, region and the Nation. The attendant problems will require our full and thorough attention. In order to begin a partnership approach of resolving these problems, I have directed several state agencies to provide my office with an interdisciplinary review of this Draft Environmental Impact Statement. These comments are attached.

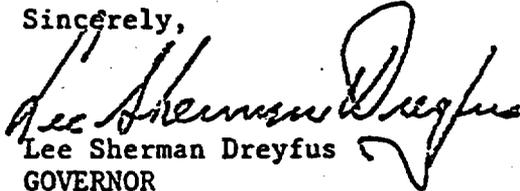
Our review of the DEIS identified several serious inadequacies.

I feel the objectives to provide evidence supporting a specific program have not been substantiated by the information provided in this text.

I am confident that our comments will prove useful in preparing a final document which will be considered adequate within the spirit and intent of the National Environmental Policy Act, case law and the guidelines of the President's Council on Environmental Quality.

We are prepared to assist in any way possible to fulfill our obligations in this matter.

Sincerely,



Lee Sherman Dreyfus
GOVERNOR

Attach.

cc: Honorable Jimmy Carter, President
Harold R. Denton, Director, Nuclear Regulatory Commission
Honorable Albert Quie, Governor of Minnesota
Members of National Governors Association
Douglas Costle - EPA, Washington
John McGuire - EPA, Region V, Chicago
Honorable Gaylord Nelson
Honorable William Proxmire
Members, Wisconsin State Legislature
Stanley York - PSC
Donald C. Percy - H&SS
Robert Durkin - H&SS
Lowell Jackson - DOT
Mike Early - DLAD
Ken Lindner - DOA
M. E. Ostrom - Geo. & Natural History
Honorable Bronson LaFollette - Attorney General
John Stolzenberg - Leg. Council Office
Anthony Earl - DNR

Review of Comments Provided for DOE/EIS-0046-D

Management of Commercially Generated Radioactive Wastes

The Review Committee providing the following comments was formed at the Governor's request and embraced the following state disciplines and jurisdictions:

1. Public Service Commission
2. Department of Transportation
3. Department of Health & Social Services
4. Geological and Natural History Survey
5. Department of Administration, Office of Energy & Planning
6. Department of Local Affairs and Development
7. Department of Natural Resources

For your convenience and ease of response, we have subdivided agency comments into five major categories.

A. GEOLOGICAL/NATURAL ENVIRONMENT - General Comments

1. In view of recent news articles from Mississippi reporting accidental releases of radioactive material from weapons testing sites, how does DOE view the integrity of salt as a waste repository media?

2. Substantial literature has been generated on the "multi-barrier" concept. The DEIS relies on this concept (p. 1.5) to achieve the necessary level of isolation. Yet its application as presented in the document is suspect. There exists serious challenges to the effectiveness of each of the five barriers listed in the report.

- a. The effectiveness of canisters as a barrier has been criticized by a number of sources. The Earth Science EPA report, 520/4-78-004, lists several questions relative to the integrity of the canister system itself. In the DEIS (3.1.59), it is stated that it has not been within the U.S. philosophy to consider canisters as barriers beyond initial emplacement. Furthermore, the DEIS states that an adequate data base has not been developed to support it as such. While the Swedish system is presented as a possible viable alternative; it is designed for reprocessed waste, not spent fuel rod assemblies, the currently accepted U.S. waste form.
- b. The projected performance of the waste form itself to act as a barrier has been challenged by both the Office of Science Technology, and Policy (OSTP) and EPA. Both agencies have suggested that leaching of glass (the commonly discussed form) is a real problem and that its effectiveness as a barrier may not last beyond a decade.
- c. The effectiveness of absorptive overpack to act as a barrier has not been sufficiently documented and serious reservations exist with regard to its sorptive qualities at elevated temperatures below 300°C (those expected in repositories).
- d. Reliance on "the institutions of man" is contradictory to the principle of developing safe waste disposal systems which are not dependent on the changes in social and political systems.
- e. The effectiveness of the host rock itself to act as a barrier is dependent on site specific qualities and cannot be attested to at this time.

For these and other reasons, the multiple barrier concept as applied in the DEIS should be reexamined.

3. The final document should address the interrelationship between deep and shallow groundwater aquifers and surface water systems and potential for transport of radioactive nuclides between the systems.

SPECIFIC COMMENTS

Page 3.1.2, last paragraph - Glaciation is identified as the greatest potential impact on the depth of isolation and erosion. Locally, such as along weak formations and fractured rocks, glaciation will in fact scour to great depths (but not to the depth of a repository). The general impression for the Precambrian Shield is that on an average about two meters of bedrock have been removed. The greatest consequence of glaciation is not erosion, but rather strain induced in the bedrock by the overlying ice column. Depending on the loci of the glacial edge, the stresses induced may be either compressive or extensive. The resultant compression or uplift should be investigated on in situ stress, and the formation or activation of fractures and faults.

Page 3.1.3, fourth paragraph - In addition to adding material on top of a repository, deposition would also lead to a change in the in situ stresses. What effect, if any, would increased compressive stress have on the repository design?

Page 3.1.9, Table 3.1.9 - Hydrologic properties are not adequately summarized with respect to fractures in bedrock. Both waterwell investigations and petroleum exploration have been drilling in fracture traces to great depth (below repository design) in the successful search for appropriate fluids. The argument that all fractures will seal due to high stress in the deep environment is probably not correct. Some fractures will be oriented such that the maximum in situ stress is not oriented perpendicular to the fracture, but rather the fracture may be oriented perpendicular to the least compressive stress, and effectively be open, or can be opened by rather low stress fields.

Page 3.1.9, first paragraph - Recent salt petrography and fluid inclusion work strongly suggests that many salt deposits have been recrystallized, in some cases by local groundwater. The presence of salt does not testify to their isolation from water, but merely testifies that water has not removed significant quantities of salt. The salt may well have been carried some distance and recrystallized.

Page 3.1.11, Figure 3.1.2 - Even as a generalized map, this figure is incorrect. We would disagree with the location of granitic rocks, particularly for Wisconsin. Recent geological mapping in Wisconsin indicates that much of northern Wisconsin is underlain by metavolcanic rocks of Middle Precambrian age. Similarly, the known granitic area of the Beartooths in Montana, and the Adirondacks in New York are not shown. The map could be improved by showing the general distribution of granitic bedrock at depths less than 300 meters, inasmuch as the repository design will be below that depth.

Page 3.1.13, second paragraph - We strongly disagree with limited porosity in basaltic rocks. The Keweenaw volcanic rocks of Michigan, Wisconsin and Minnesota are the host for hydrothermal copper ore deposits, attesting at least locally to rather high porosity.

Page 3.1.13, last paragraph - Rather than granitic, it might be more appropriate to refer to these rocks as igneous and metamorphic crystalline rocks.

Page 3.1.14, Figure 3.1.4 - Keweenaw lavas are incorrectly located on map. Also, Triassic lavas are much more extensive along the East Coast than depicted. Perhaps metabasaltic rocks should also be depicted on this diagram.

Page 3.1.17, third text paragraph - Two site selection criteria are identified: (1) scientific/technological basis, and (2) presently owned government property. Certainly, federally-owned property may be an easy way to select a site, but that site must satisfy all of the critical technological constraints.

Page 3.1.20, bottom of page - We strongly concur that the site specific investigations should look at a regional framework to better assess the reliability of the repository.

Page 3.1.41, fourth paragraph - Approximately 50 million tons of rock will be left on the surface during operation of the repository. This is 70 million yards of material, or a mound of material 60 feet high occupying one square mile. Has the leaching consequences of this pile been addressed? Can suitable acreages be identified in the model site area to accommodate this material? How will the residual waste rock at the surface be reclaimed?

Page 3.1.48, third paragraph - Anisotropies in the rock body are identified (bedding, etc.). This is contradictory with the avowed goal of an homogeneous host rock. Anisotropies, whether in horizontal or inclined units are anisotropies. Even in horizontal units, lateral anisotropies are common. Horizontal bodies may have greater roof problems than an equivalent weakness along the footwall of the repository.

Page 3.1.56, general sections - Has the Eh-pH dependency of the waste form been investigated? The waste itself, having multiple oxidation states, will have different solubilities with differing Eh-pH. Can we adequately characterize the Ep-pH of groundwaters after they have reacted to some extent with wall rocks? We are not talking of an hypothetical distilled water interaction. Appendix I does not seem to consider water quality.

Page 3.1.72, fourth paragraph - Please discuss the relevance of the EPA Assessment method cited here?

Page 3.1.107, and other pages - What is the volume of material for permanent onsite storage? How does this affect the projected site area? The suggestion is given that the total volume of the mine complex will be completed in seven years. This is approximately 30,000 tons per day, as large as the largest underground metal mines. Is it reasonable to assume that such a large tunnel system can be excavated in such a short time with the available shaft system? Are you sure that there will be few material handling problems?

Page 3.1.122 - State and Federal discharge parameters should be discussed in the section. Ph is not the only controlling factor.

Page 3.1.241, first paragraph - We would hope that airborne and ground electromagnetic systems (INPUT, SLINGAM, etc.) be a standard part of the site investigation. These systems can provide critical detail on fractures, rock type, etc.

Page 3.1.244, (Table 3.1.94 - If your zero corresponds to the year 1986, this project was started in 1973. Is this assumption correct?

Page 3.2.2, third paragraph - Monazite may be a poor example to use to defend the mineralogic options. Geochronologic methods (U-Pb systematics) clearly document that monazite is normally discordant, typically through the loss of uranium. The stability of these minerals should be addressed through geochronologic methods such as U-Pb dating, and uranium disequilibrium methods. We think that this kind of an approach will identify that many minerals lose uranium and other elements. Once radioactive decay has occurred (and many daughter elements are radioactive), the new element no longer has the ion size to fit precisely in the crystalline mineral structure.

Page 3.2.13, first paragraph - Detrital metamict grains are not a basis for determining stability. As discussed above, we are not interested in the integrity of the mineral, but rather whether or not the radioactive elements are retained within the structure. Of the minerals tabulated on Table 3.2.11, most, if not all, when analyzed by geochronologic methods are commonly discordant.

Page 3.3.7, first paragraph - Fracture porosity should not be discounted. Fracture traces are systematically used in the exploration of oil and gas to at least three kilometers. In areas of the crystalline shield, water well drilling commonly uses the concept of fracture traces to develop high capacity water wells.

Page 3.4.9, Rock Melting process - A major point missed with rock melting is the consequent melt cooling. Differentiation will result, and the last formed liquids will concentrate elements such as uranium. This will form late hydrothermal liquids of extreme radioactivity. Whether or not this might result in criticality should be investigated.

Section 3.7, Ice Sheet disposal - This entire section should be rewritten. Additional data from the Dry Valley Drilling Project, and the Ross Ice Shelf Project provide significant additional geologic scenario.

Page 3.7.4, third paragraph - A small body of data have been advanced in the past few years of more recent local glaciations (alpine type) and flooding of the dry valleys. Glacial permafrost drift locally exceeds 300 meters in Taylor Valley.

Page 3.3.7, Transportation - How many tons per year are we talking about? The realistic shipping season is two-three months (more like two months). Can the ground transport system handle the projected volume? In recent years, about one aircraft accident per year has occurred. The safety records, although enviable for harsh environmental areas, are still not good enough for carrying large quantities of waste.

Page 3.7.9, Table 3.7.1 - The cost figure seems too low. Recent purchases of C-130's for polar work are expensive. Logistics support is extremely high. The present USARP (NSF) program is about \$40 million per year to support about 1,000 men and women in the summer and about 40 in the winter. About 90 percent of the costs are in logistics, and less than 10 percent is useful science. The environmental impact of large scale technology in polar regions may be too much to pay.

Page 3.7.10, last two paragraphs - Elsewhere in the text sub-ice lakes are identified. Present hydrogeologic studies strongly suggest that the sub-ice lakes provide the groundwater for the discharges in the dry valleys. One drill hole by the Dry Valley Drilling Project (DVDP 13) identified upward moving groundwater at -16°C at a depth of 150 meters. The water appears to have moved through fractures in the crystalline bedrock. Preliminary heat flow studies by DVDP suggest high heat flow (equivalent to the basin and range province of the U.S.), and the possibility that uranium has been leached to a depth of 300 meters.

Section 3.8, Inclusive, "Reverse Well Disposal" - The section adequately enumerates the advantages, disadvantages, and potential problems that must be addressed if well injection is to be used as a method of radioactive waste disposal. There are several considerations which, although briefly mentioned in the report, realistically cast serious doubt on the entire concept of utilizing well injection as a safe method of radioactive waste disposal.

Beginning with the shale-grout method, the critical aspects are the control of the orientation of fractures in which the waste is implaced, the leachability of the shale-grout mixture and its stability over time in a groundwater environment, the relatively shallow depth at which the waste is stored and the problems in maintaining an undisturbed or unpenetrated geologic environment over long periods of time.

In isotopic homogeneous model studies, control of hydrofracture orientation is accomplished in a relatively straight-forward manner. In a real geologic environment, anisotropy and inhomogeneity are the rule. In addition, existing fracture systems controlled by post depositional stress on the rock units and later tectonic forces are present in rock units from granite to poorly consolidated glacial till. Those zones of weakness are difficult to detect in rock cores but will be the controlling factor in the orientation of artificially induced fracture systems, as important as the vertical and horizontal stress components discussed in Section 3.8.

The effects of existing fracture and joint systems should be addressed in a much more specific manner. It is probable that the presence of fracture systems will be found in any proposed repository zone and that their presence would be cause for the elimination of the shale-grout disposal method.

A further note here which is also applicable to the other following points of discussion is that in groundwater flow through shales of low permeability it is the fracture system which will control the amount of water flowing through the unit and not the low permeability of the shale itself.

This leads to the leachability and stability of the grout mixture. The binding agent is a combination of calcium carbonate and calcium silicate, both of which will be under-saturated in most flow systems encountered at the shallow depths required for this system. The stability of this binding agent should be addressed in more detail. It is not sufficient to rely on the presence of the shale to sorb any ions released by the dissolution of the cementing agent as most flow will be occurring in fractures created in the shale-grout mixture.

The relatively shallow depth of 300 to 500 meters required for the shale-grout method is within the normal depth of local to intermediate groundwater flow systems. As such it is a common depth to which water wells are drilled. It would be difficult to ensure that no wells have been drilled in an area prior to its selection as a waste disposal site and to guarantee that the site will continue to be safe over the time scale considered. This requirement is much more critical for the shale-grout method because of its shallow depth.

The deep well injection concept has many apparent advantages over other more costly concepts. One point which must be kept in mind in evaluating this method is that the waste, once it enters the reservoir rock, is completely mobile and free to move in response to thermal and chemical gradients, as well as hydrostatic gradients. In deep sedimentary basins, flow paths may be as long as 500 miles and travel times in excess of 10,000 years, if the flow system is undisturbed. If waste is injected into these zones, radically different thermo-chemical-hydrostatic gradients are created instantly. The flow system response to this type of stress is not fully understood and inadequately modelled with the numerical tools available at present.

The deep sedimentary basins represent the most suitable environment for disposal using the deep well injection system. However, if it is necessary to site a waste processing facility on an area which is not underlain by a groundwater flow system having very low gradients and extremely long residence times, then the deep well injection concept should be eliminated as a viable method of waste disposal.

Appendix D Models Used in Dose Calculations - The following is stated in the Draft Environmental Impact Statement, page D.1: Dose to Regional Population. Calculational models and parameters used in evaluating the radiological dose from both chronic and accidental releases of gaseous and liquid effluents from the facilities and processes investigated in this study have been selected to give a realistic but conservative appraisal. These models represent the state of the art, keeping in mind that, because of the natural variability of the input parameters, excessive sophistication does not necessarily lead to more accurate results.

The following questions concern the input parameters for models used in dose calculation:

- 1) What accuracy is required for input parameters derived from environmental measurements of radioactivity?
- 2) Can the computer programs FOOD and PABLM noted on page D.3 use existing data from nuclear power plant environmental measurements to assess doses to the population? If so, could the Department of Energy make these calculations using facility or state data?

Appendix F A Reference Environment for Assessing Environmental Impacts Associated with Construction and Operation of Waste Treatments, Interim Storage and/or Final Disposition Facilities - This section contained a variety of data relevant to land use, hydrology, meteorology, ecology, and wildlife. However, no baseline data relevant to existing radiation background levels is cited. Perhaps this is not a critical omission in the Draft Environmental Impact Statement but examples of existing natural radioactivity levels would be helpful to the reader. Examples of existing

radioactivity levels for man-made or naturally occurring radionuclides in surface water, drinking water, air, and other sampling media would illustrate conditions prior to existence of a radioactive waste disposal site. A discussion on natural background for the reference site might also be helpful to the reader in understanding the radiological significance of measurements from monitoring data.

Further significance of the pathway parameters used on pages F.15-17 could be demonstrated if referenced to a model radioactivity surveillance program. Examples of the sampling media could be more directly related to the discussion in Appendix D, Models Used in Dose Calculations, concerning Ingestion of Food Crops and Animal Products and Accumulated Doses from Foods.

The reference environment in Appendix F seems rather specific. Although this is supposed to be a "generic" site, the geology, hydrology, topography seems to describe the Waupaca/Shawano County area of Wisconsin, with the major metropolitan area the Fox River Valley including the metropolitan Green Bay to Oshkosh area. If this in fact is close to the reference site, consideration should be given to the glacial rebound in the area. This rebound will change the in situ stress at the site, and could lead to changes in the surface drainage. The rocks in this area are part of a rapakivi massif (the Wolf River Batholith). This general rock type is noted for its ease of weathering to reasonably deep depths.

An alternative area that would satisfy many of the "generic" site requirements is Waushara County, about 100 kilometers south of the Waupaca area. The bedrock in this area is massive red granite, a granite that has high compressive strengths, and is commonly studied for rock mechanic properties. Mirolitic cavities reportedly have been found in this granite, but their presence has not been confirmed. This area is close to the cryptovolcanic structure at Glover Bluff in Marquette County, and lies close to a major gravity gradient that may reflect major crustal differences to the north and south. This zone is also the loci of several Wisconsin earthquakes.

Inasmuch as other "generic" sites were not extensively described, the rather extensive description of the north central site suggests that some studies have been undertaken, and serious consideration is being given to sites other than salt, Hanford and NTS.

An additional alternate area that satisfies all the information of the generic site is in Sherburne County, Minnesota, northwest of Minneapolis, and in the vicinity of the Monticello power plant of NSP. The Precambrian bedrock in this area is the Reformatory Granite, a relatively massive rock, but almost every exposure contains inclusions of hornblende schist, biotite schist, or garnetiferous biotite schist, gross inhomogeneities in terms of homogeneous granite.

The point in the preceding paragraphs is that a number of sites in the Upper Midwest satisfy the engineering criteria for a repository, and (albeit possibly small) engineering data to exist for "generic sites" in the Upper Midwest, that some site specific studies may well have been undertaken. If, in fact, siting may be directed towards the Upper Midwest, consultation should be made with appropriate state agencies to adequately identify suitable areas, rather than DOE proposing a site that may well have serious drawbacks when viewed from a state perspective.

Why was the reference environment described in Appendix F used in this document and no other additional reference environments included? Does this imply crystalline disposal is DOE's preferred alternative?

Appendix P, page P-42 - See earlier comments on monazite. Consideration particularly in the discussion of zircon, should be directed toward the mechanisms for discordancy in the geochronologic systems (U-Pb). Two mechanisms are pertinent: the diffusion loss mechanism of Tilton, and the dilatancy loss mechanism of Goldich and Mudrey. Diffusion models have the daughter lead isotopes diffusing from the zircon at a rate proportion to the amount of uranium in the sample through various radiation damage models. A large body of data support this model. The dilatancy model has lead loss due to low temperature effects related to uplift and release of stress. Both models suggest that various ions are not held quantitatively in the structure, although the main framework of the zircon may remain intact. Similar models can be advanced for other radioactive minerals.

B. TRANSPORTATION - General Comments

1. The evaluations of the various technologies for waste management discussed in the body of this report fail to deal directly with transportation details in connection with the wastes discussed. Although it is apparent that the document is intended to present the advantages and disadvantages of the various methodologies for disposing of commercially generated radioactive wastes, it seems that the concept of waste transportation should be an important factor in judging the feasibility and impacts of these options. The evaluations made include such things as socio-economic factors and increases in demands for services. However, there is no reference to the factors involved in transporting wastes, such as, adequacy and availability of present systems, risk, safety, etc.
2. Some of the concepts discussed in Chapter 3.0 "Technology Alternatives for Final Disposal" are much more transportation dependent than others. Even though it appears that island disposal, subsealed geologic disposal, ice sheet disposal, and space disposal are not the concepts that are the most likely to be readily available for commercial usage, they are nonetheless the ones that would probably have the most substantial transportation related impacts. The feasibility of accomplishing the required transportation as well as the impacts associated with them should be studied and presented as part of the development of each concept.
3. In Wisconsin, transportation considerations would include both land and water routes. The Great Lakes system could possibly be used to reach a northern location. Both rail and highway facilities would be possible corridors throughout the state. Obvious considerations such as capacity of facilities, ability to serve a new demand, availability of equipment, etc., would have to be studied. Also, a very important factor is that of public reaction to transportation of hazardous wastes. This is a serious obstacle to overcome and deserves to be very carefully considered. Public awareness and concern is very strong today and is especially likely to be aroused in a rural area.

4. It would seem reasonable to give serious consideration to locating repositories near adequate existing rail facilities to potentially maximize transportation efficiency.

5. In judging environmental impact from transportation connected with moving radioactive wastes, it is important to evaluate the standard environmental impacts associated with any transportation, such as air pollution, noise, and water quality impacts.

SPECIFIC COMMENTS

Page 3.1.25 (fourth paragraph) - Transportation demands are not adequately addressed. What grade of highways and railroads will be needed? How frequent will shipment be? Will this disrupt the normal traffic flow? What would be the routing from the various power reactors to the disposal site? How might transportation routing affect major metropolitan areas? Will vehicles be escorted?

Page 3.1.116, Tables - Denormalize the values. Exactly, how many tons of materials are we talking about? How many cubic meters of concrete (total) etc.? Can the transportation and power grid handle the amount of material, or will additional roads, rails and high-power lines be needed? What is the daily electrical use, and what percentage of the model site is this? Will additional local power facilities need to be built? Or is this covered in Table 3.1.85 on page 3.1.217?

Appendix F - Although it is clearly stated that the reference environment is hypothetical, it appears from a cursory overview of the description that such a site could very possibly be located in Wisconsin. From a transportation viewpoint there would have to be serious consideration given to the transportation problems associated with development of any of the facilities described for this reference environment. Again, these factors are not considered in the description given. There is no reference to existing transportation facilities in the region or of the problems likely to be involved in placing the wastes at that particular site for disposal.

Appendix N - This section deals generically with some of these transportation issues. However, they are treated entirely separately and not as a part of the total cumulative impacts of a particular method of management. It would be difficult from this appendix to determine a direct impact relationship between the transportation factors discussed there and the disposal techniques discussed in the body of the document.

C. NUCLEAR GROWTH ASSESSMENT - General Comments

1. One of the documents stated objectives were to "exhibit neutrality regarding nuclear growth." (p.vi) As the reference scenario, your agency has chosen a high growth projection which assumes 400 GWe of installed nuclear capacity (approximately 400 reactors) by the year 2000. (Pp. 1.5, 1.7, 2.3, 2.1.2) The choice of an alternative scenario, a low growth projection, is unclear. In the Summary, an alternative scenario assumes 225 GWe installed nuclear capacity in the year 2000. (Pp. 1.9 and 1.11)

Throughout the remainder of the DEIS, the alternative scenario assumes 250 GWe installed nuclear capacity. (Pp. 2.3 and 5.6) Is this a typographical error?

In order to meet its stated objective of presenting all analysis from "the standpoint of alternative nuclear growth futures which will bracket what is now thought reasonably possible," (p.vi) consideration should be given to:

a. A high growth scenario of 550 GWe installed nuclear capacity by the year 2000: The Atomic Industrial Forum has projected that 550,000 megawatts of installed nuclear capacity by the end of the year 2000 is achievable, given "regulatory reform, resolution of fuel-cycle and proliferation questions and the electric utilities ability to compete more favorably in the money markets for capital." (AIF, "The Nuclear Industry in 1978," News Release dated January 17, 1979, p.8).

b. A low growth scenario of 150 GWe installed nuclear capacity by the year 2000: This would bring the stated low growth scenario into agreement with that of the Interagency Review Group on Nuclear Waste Management which examined a low growth scenario of 148 GWe in its March, 1979, Report to the President (Appendix D, p.3). According to data provided by the Atomic Industrial Forum, a low growth scenario assuming 150 GWe would reflect the capacity of the 72 existing reactors with operating licenses (52.4 GWe) plus the capacity of 92 reactors with current construction permits (101.1 GWe) as of June 30, 1979. (Telephone conversation with Mary Ellen Warren, AIF Statistician, June 28, 1979)

2. The discussion of the effects of different energy projections in the DEIS is contradictory and misleading. At several points the document states that "the quantity of wastes can be directly scaled to the total energy generated during operating reactor life cycles." (p.1.5; see also Pp. 1.1, 2.1.26, and A.47) The DEIS further states that the alternative growth scenario, which assumes an installed nuclear capacity of 250 GWe in 2000, would generate HLW or spent fuel canisters at a ratio of 0.64 compared to the reference scenario, which assumes installed capacity of 400 GWe. (Pp. 2.1.27, A.47, and A.55)

From this information, a reader could logically assume that the alternative growth scenario would generate one-third less waste, and require one-third less waste storage capacity, than the reference growth scenario. A reader could therefore conclude that the number of repositories required for the alternative growth scenario would be one-third less than the three to ten repositories (depending upon fuel cycle and geologic media) which Tables 3.1.84 to 3.1.87 (Pp. 3.1.215 3.1.222) indicate are required for the reference scenario. However, the DEIS does not provide any information on the specific number of ultimate repositories required under the alternative scenario. This is a serious omission, since environmental impacts will vary according to the number of repositories which are actually constructed.

The DEIS not only omits the required number of repositories for the alternative scenario, it is misleading with regard to the required number of predisposal facilities. At three points in the DEIS, the discussion of the scaled relationship between total energy generated and the resulting waste quantities is immediately followed by statements which might lead a reader to suppose that the total number of predisposal facilities required is not significantly reduced under the alternative growth scenario. (Pp. 1.5, 2.1.27, A.47) The reader is referred to Appendix A for details. The information provided in Appendix A, Tables A.46 and A.47, however, indicates a significant reduction in the number of predisposal facilities required for the alternative growth scenario. For the once through fuel cycle, the ratio of Independent Spent Fuel Storage Facilities and Spent Fuel Packaging Facilities (5 of each, compared to 8 of each) is 0.63 compared to the reference scenario. For the Uranium and Plutonium recycle, the ratio of Fuel Reprocessing Plants (5 compared to 7) is 0.71, the ratio of Mixed Oxide Fuel Fabrication Plants (6 compared to 10) is 0.60, as compared to the reference scenario. Please calculate the number of ultimate repositories required for the alternate growth scenario.

In order to clarify the effects of different energy projections:

- a. Specify the number of ultimate repositories required for both the reference and alternative scenarios for each fuel cycle and geologic media.
- b. Specify the number of ultimate repositories required for a high growth scenario assuming 550 GWe installed nuclear capacity by the year 2000, and for a low growth scenario assuming 150 GWe installed capacity.

3. The lack of a waste disposal policy has brought into question the viability of existing and future nuclear power programs. Economic as well as environmental uncertainties regarding waste disposal have contributed to the unattractiveness of nuclear program expansion, while existing plants face concerns of shutdown and/or additional expenditures due to spent fuel storage inadequacy.

D. SITE SELECTION - General Comments

1. The DEIS endorses the IRG recommendation for a regional site selection approach to radioactive waste management (p. iv, 1.2, 4.32-4.33), but does not provide a comparative analysis of the regional (multiple) and national (single) repository approaches. The final IRG Report (p. 53) specifically directs the DEIS to provide this analysis to support its contention that regional siting would reduce waste transportation requirements and provide redundancy that would hedge against the possibility of an unexpected repository shutdown. The DEIS, however, does not present sufficient information to substantiate the transportation and redundancy advantages which are claimed, thereby weakening the entire case for regional site selection.

2. In early 1977, the Energy Research and Development Administration pledged to include State Officials in any site investigations conducted in Wisconsin. G.W. Cunningham, then Director of ERDA's Division of Waste Management, made the following commitment in a letter dated April 13, 1977, to Commissioner Matthew Holden, Public Service Commission of Wisconsin:

"We at ERDA understand the public concern that the solution we implement be safe and environmentally acceptable. We would like to reassure you of our commitment to work with you and other state officials to develop the siting criteria in achieving these objectives. We would propose to initiate our investigations of the geology in coordination with the state geologist and to keep you advised of the progress of the geological investigations. Simultaneously, we would like to outline whatever mechanism for joint discussion of the program that you feel needs to be addressed for the longer range procedures regarding potential siting of such a facility in Wisconsin."

At every major decision-making point since 1977, the State of Wisconsin has reiterated its support for maximum state participation in the siting process. A number of Wisconsin representatives stressed the importance of state involvement during the September, 1977, NRC workshops on State Review of Site Suitability Criteria for High-Level Radioactive Waste Repositories. During the spring and summer of 1978, the State of Wisconsin provided technical assistance to the Nuclear Power Subcommittee of the National Governor's Association, and concurred in the policy statement drafted by the Subcommittee and adopted at the 1978 NGA annual meeting. That statement reads:

Early in the process of preparing environmental impact statements for specific sites or facilities, the Department of Energy should involve state and local officials. State and local officials should assist in furnishing the information needed for these activities. DOE must obtain state concurrence prior to final site determinations.

In December, 1978, the State of Wisconsin again emphasized its position in comments upon the IRG Draft Report. While in agreement with the IRG approach under which the States "would continue the involvement begun in the planning phase by reviewing early site characterizations and potential sites of disposal facilities," (IRG Draft Report, p.52), Wisconsin expressed dissatisfaction with the IRG's ambiguous definition of state "concurrence." In a letter of December 11, 1978, to IRG Chairman John Deutsch, the Director of the Wisconsin Office of State Planning and Energy, Victoria Potter, urged that "provision be made, in whatever process of consultation and concurrence is developed, to ensure that states already having adequate siting programs for construction and/or disposal be minimally disrupted." The Wisconsin Legislature is currently considering a proposal (Assembly Bill 212) which would require a state Certificate of Compatibility for construction of radioactive waste disposal facilities in the state.

To address these institutional issues, the final DEIS must:

- a. Specify a firm mechanism for state and local participation prior to detailed site investigations in Stage III of the proposed site selection process; and
- b. Identify the "socioeconomic" and "sociopolitical" factors which the DEIS states will be evaluated early in Stage III. Provision should be made for public participation in these evaluations.

3. Environmental analysis cannot be done in detail until the site is specifically defined. While use of the reference site concept is useful for a generic comparison of several alternative courses of action, unique site characteristics which are outside the scope of the environmental criteria contained in the DEIS must be evaluated when specific sites and project designs are selected.

E. GENERAL AGENCY CONCERNS/COMMENTS

1. The DEIS is a step in the process of developing a national program for radioactive waste disposal.

2. The forward or background sections of the DEIS should have a discussion of the process and schedule being used to resolve radioactive waste problems. The reader is told that this document provides the required environmental analysis for the selection of a national strategy for disposal of high level radioactive wastes from the commercial fuel cycle. The reader is forced to presume that the final EIS will be followed by: 1) a decision on a particular national strategy for waste management, 2) research and development activities (including those defined in Section 3.16), 3) a public site identification and selection process, and 4) a site specific licensing process including the development of a site specific EIS. There is not a concise statement of the likely sequence of events, or of what final outcomes are likely.

3. The assessments of impacts through abnormal sequences as well as routine operations produce a false sense of predictability. In reality the information contained in most of the tables between Table 3.1.29 and 3.1.92 are based on a series of nested assumptions beginning with an assumed initiating event (e.g., meteorite, nuclear warheads, encroachment by drilling, leaching, earthquakes, etc.), followed by an assumed transport mechanism (e.g., groundwater ingestion, inhalation of airborne radioactivity; etc.), and followed by an assumed environment to be affected. These are very difficult to predict over the long term, although their significance can be assumed away through statements such as "At about 1.4 million years after disposal, assuming the region and its population remain unchanged. . ." (pg. 31.62). Regarding the quantitative analysis, it is unclear from the DEIS as to what assumptions are made and what their effect is. This deficiency might be alleviated through the use of sensitivity analysis for assumed variables to determine how substantially they affect the outcome. (This type of analysis was performed for portions of the cost estimates.) The reason for the selection of certain assumed values should have been stated. Additionally, while the document was too massive to check each

table for consistency, a spot check identified an error in the calculated dose from a repository breach in Table 3.1.37, where the dose received after one million years is greater than the dose received after one hundred thousand years.

4. From the aspect of a utility regulatory commission, the DEIS inadequately described the cost of radioactive waste management. There was insufficient information to determine whether the projected costs of the various options are realistic.

5. We interpret the objectives of this DEIS to be two-fold:

1. To provide evidence supporting the IRG's March 1979 recommendations on this subject.

2. To replace the DEIS (WASH-1539) prepared September 1974 by the Atomic Energy Commission concerning the program for developing interim and permanent repositories for high-level and transuranic radioactive wastes.

In the reviewers opinion these objectives have not been met.

6. In the summary contained on page 1.1 of Volume one it is stated:

"In evaluating the various technical strategies, issues and environmental impacts have been analyzed as best understood currently. Based on the analysis presented here, and in the light of the greater depth of knowledge on geologic disposal, DOE proposes that: (1) the disposal of radioactive wastes in geologic formations can likely be developed and applied with minimal environmental consequences, and (2) therefore the program emphasis should be on the establishment of mined repositories as the operative disposal technology."

The reviewers feel that the above conclusions have not been substantiated by the information provided by the text. Such conclusions are at this time premature.



AMERICANS for INDIAN OPPORTUNITY

LaDonna Harris
President

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PROPOSED RULE

FR 2, 19, 20, 21, 30, 40, 51, 63, 13, 170

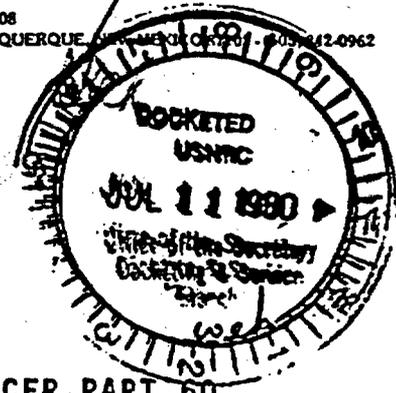
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Sanchez/Gastaniz 7/9/80
Make sure this is docketed

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600 SECOND STREET, N.W. ALBUQUERQUE, N.M. 87102-120962

June 27, 1980



Mr. Craig Roberts
Assistant Director for Siting Standards
Office of Standards Development
U.S. Nuclear Regulatory Commission
Washington, DC 20555

RE: COMMENTS ON PROPOSED REGULATION 10 CFR PART 60,
SUBPART C.

Americans for Indian Opportunity is a national, non-profit Indian advocacy organization which promotes the reality of tribal sovereignty in all areas affecting tribal welfare, including natural resource ownership, economic development, and environmental protection. Tribes are self-governing units and are not subdivisions of states, as are counties and municipalities.

Our concern is that Part 60, Subpart C, entitled "Participation by State Governments," does not mention Indian tribes. Tribes, as sovereign governments, have every right to be involved in the licensing procedures for DOE's high-level radioactive waste repositories. The threat of radioactive contamination to water supplies or rivers used for fishing is, in one respect, greater for Indians than for other citizens. Indians have been guaranteed their reservation lands through treaties and other acts of Congress in perpetuity. If their lands become contaminated, they have no other lands to go to. Evacuation is meaningless to Indian tribes.

Additionally, tribes who have off-reservation hunting and fishing rights must have the same rights regarding these off-reservation areas as they do on-reservation areas. These are, after all, property rights which may not be denied without due process of law.

Tribes are greatly concerned about siting of radioactive waste repositories on or near Indian land. Tribes should be included in all aspects of consultation and license review to the same extent as states. Sections 60.61, 60.62, and 60.63 should all be amended to give tribes the same level of participation and review as states.

Thank you.

LaDonna Harris
LaDonna Harris
President

Acknowledged by card...

LDH:trt

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Part 60 - PROCEDURAL