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Tel. 301/504-2240 (Tuesday, December 8, 1992)

NOTE TO EDITORS:

The Nuclear Regulatory Commission (NRC) has received from its Advisory Committee on Nuclear Waste (ACNW) the attached letter-type report that provides comments on significant issues in the high-level waste repository program.

In addition, the ACNW has sent to the NRC's Executive Director for Operations the attached letter report that comments on the NRC staff's technical position on consideration of fault displacement hazards in geologic repository design.

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Attachments:
As stated

December 1, 1992

The Honorable Ivan Selin, Chairman
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Chairman Selin:

SUBJECT: SIGNIFICANT ISSUES IN THE HIGH-LEVEL WASTE REPOSITORY PROGRAM

The Advisory Committee on Nuclear Waste (ACNW) was asked at a meeting with the Commissioners to continue to identify significant issues that have the potential for delaying or otherwise interfering with the timely development of a repository for high-level nuclear waste (HLW). The ACNW focused on items of large scope that could hinder the development of an HLW repository, severely impact the schedule set by the Department of Energy (DOE), or disrupt the orderly licensing process by extensive delays or untimely polemics. In addition, the ACNW was asked to provide an outline of the process of developing an HLW repository. The following is in response to these requests.

The issues that appear to qualify for inclusion in this communication constitute a fluid assembly because various parties to the HLW repository program are engaged in ongoing analytical studies, research, development, demonstration, full-scale tests and the like. Further, many studies and other activities are not clearly visible or the outcome of these efforts is not predictable. Therefore, we provide this communication with the caveat that the issues believed to be important today may not be so in the near future. In addition, the Committee provides a summary in which the issues cited in this communication are ordered by the Committee according to their impact on the outcome of the repository development process. Finally, the impact of the recently passed legislation under the Energy Policy Act of 1992 is likely to result in further uncertainties about the relevance of some of the issues raised in this communication.

1. A number of issues have been identified under the heading of regulatory considerations pertinent to site characterization and licensing of a repository.

   a. The NRC staff should develop positions that can serve as a basis for recommendations to the National Academy of Sciences (NAS) relative to the Academy's role, mandated by the Energy Policy Act of 1992, of providing findings and recommendations on reasonable standards for the protection of public health and safety for the proposed HLW repository at Yucca Mountain.

   b. It is likely that regulations, issued by the NRC and other agencies, will not be wholly compatible or consistent. It is not clear what constitutes resolution of the issue of compatibility and the stage at which this should be accomplished. The Commission should request the NRC staff to clarify this issue and, if appropriate, initiate rulemaking.

   c. The DOE has promulgated 10 CFR Part 960 but its relationship to 10 CFR Part 60 as far as the licensing process is concerned is not clear. There may be a need to clarify this relationship, especially in light of the emphasis of the DOE on 10 CFR Part 960 in its Early Site Suitability Evaluation to the exclusion of inferences from 10 CFR Part 60. The Commission should request the NRC staff to identify the role, if any, of 10 CFR Part 960 in the licensing process.

   d. Considerable data that are useful or necessary for a licensing application and are anticipated to be involved in the licensing process will be or have been obtained without use of the rigorous quality assurance (QA) procedures now being implemented. The Licensing Support System (LSS) has been established to encompass pertinent data but has not yet been inaugurated.

Further, the LSS may contain data or results that have similar deficien-cies. Also, the guidance for the application of QA procedures to development and validation of models, and to decision-making among competing conclusions is at present substantially absent. The inclusion of QA-deficient data or protocols in selection, validation and evaluation of uncertainties in models could pose signif-icant difficulties in the licensing process. The Commission should request the NRC staff to initiate a comprehensive review of the guidance to the DOE that is necessary to define the quality requirements for the use of all important data obtained prior to promulgation of the QA requirements and for relevant models developed for the licensing-related repository description.

e. Expert judgment will be a necessary and important part of the licensing process. Acceptance of expert judgment, its methodologies and its results in the waste management arena continues to be controversial and could disrupt a licensing process. The Commission should request the NRC staff to proceed with rulemaking to delineate the processes and standards for application of expert judgment to ensure that this technique can make a useful contribution to the licensing process and that its application will be accepted in an adversarial setting.

f. The NRC staff has apparently taken the position that performance enhancement of the engineered barrier system (EBS) cannot be used to offset the potential deficiencies likely to be encountered in the geologic media. This position has caused significant concept and design difficulties, appears to be without technical justi-fication and also appears to be without bases in regulations.[1] Owing to the inability to

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[1]As specifically stated in 10 CFR 60.112, it is the total system that must be judged in terms of meeting the regulatory requirements, i.e., "... The geologic setting shall be selected and the engineered barrier system ... shall be designed to assure that releases of radioactive materials to the accessible environment following permanent closure conform to such generally applicable environmental standards for radioactivity as may have been established by the Environmental Protection Agency ...." In addition, 60 CFR 102(e)2 indicates that "... special emphasis is placed upon the ability to achieve isolation by virtue of the characteristics of the geologic repository. The engineered barrier system works to control the release of radioactive material to the geologic setting and the geologic setting works to control the release of radioactive material to the accessible

predict for any site if all of the attributes will meet all regulatory requirements, the Commission may wish to examine this position to ensure that the DOE is not burdened with a requirement that is neither necessary nor feasible to implement, and with one that contributes little additional assurance of protection of the health and safety of the public. The Commission should instruct the staff to devise means to ensure that major improvements in the EBS can and should be used to offset inadequate retention/confinement properties of the geologic environment of the waste. The NRC staff should identify functional criteria for such trade-offs.

g. The properties of HLW that was previously stored in pools or dry storage and is assumed to constitute a waste form suitable for disposal in a repository are uncertain. The Commission may wish to require the NRC staff to identify those properties of the stored spent fuel that are of importance to the repository and those tests that are considered necessary for qualification of this waste as the interim storage time lengthens. Similar consider-ations should also be given to HLW glass that may have been stored for some time under various conditions.

h. A significant part of the licensing process for an HLW repository involves the selection and analysis of scenarios of postulated events in the repository, coupled with the application of a variety of models of the physical system. The processes by which models are designed, tested and, where appropriate, validated to be representative of the present and future behavior of parts of the repository system are not included in regulations or guidance to DOE. Particularly, the protocols for obtaining agreement that a specific model adequately describes the future state of a system have not been defined. The Commission should request the staff to define a methodology for obtaining agreement on this issue in advance of the licensing process. We recommend that this topic be included in early rule-making, in order to provide guidance to DOE for the performance assessment process.

i. The Environmental Protection Agency (EPA) regulations have not been codified and considerable uncertainty remains about the existing standards for ^{14}C and other gaseous radionuclides. In addition, the NRC has not developed specific and comprehensive guidance to DOE on its requirements for the confinement of such

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environment."

radioactive material. This uncertainty could strongly influence the entire EBS design, testing and analysis. The Commission may wish to instruct the NRC staff to begin development of such guidance in the near future, recognizing that the new environmental standards will influence the details of such guidance.

j. Protocols for testing of the EBS and its components under repository-relevant conditions have been difficult to define and apparently such testing has not been conducted in a manner agreed to be satisfactory. The DOE, as well as the Center for Nuclear Waste Regulatory Analyses (CNWRA), has initiated tests that are believed to be repository-relevant. Owing to the extensive time requirements for tests whose results are to be extrapolated over the expected life of the EBS, the Commission should initiate development of guidance, perhaps in the form of staff technical positions, on the criteria for determining when test conditions are repository-relevant.

k. The DOE has indicated that the overall performance assessment of the repository system may not include an allocation from the performance of the waste form. This approach apparently does not agree with the view of the NRC staff and has resulted in exchanges that appear to be at an impasse. Since the waste form (spent fuel, glass) is now either prepared or in the process of being prepared in facilities that are substantially completed, the Commission should request the NRC staff to clarify the details of this disagreement and adjudicate, at an early stage, the position it wishes to take in this matter.

2. The Monitored Retrievable Storage (MRS) Facility has received attention by the Congress, DOE, various Indian Tribes, cities, counties, and States, but has not developed into an accepted project with a currently valid starting point or a schedule for its completion, licensing and operation. Owing to the pivotal position of the MRS in the disposal of spent fuel, several issues are pertinent.

a. The required life of the MRS needs to be defined and the specifications, criteria for siting and construction, the content of licensing documents, and the anticipated licensing process need to be established, published and approved. The Commission should request the NRC staff to develop the details of regulations related to the licensing of an MRS.

b. There has been no substantial development of a backup concept to the MRS in the event that it is not feasible to locate, site, license, or operate such a facility.

While the reasons for such a failure will be non-technical, their effect could be profound. There has been little planning for this eventuality, and the Commission should request the NRC staff to initiate such studies in cooperation with the DOE and the Office of the Nuclear Waste Negotiator.

3. The scientific/technical investigations for the repository program being conducted by DOE are aimed at a comprehensive licensing document for NRC review. The studies that have been completed and those that are in progress are likely to produce results of variable quality or applicability. Further, there will certainly not be enough time and resources devoted to these studies to provide full insight into all scientific/ technical questions. The NRC staff has commented on the Site Characterization Plan (SCP) prepared by the DOE and has provided DOE with a significant list of issues to be resolved. This list is in the form of the Site Characterization Analysis (SCA) issued by the NRC. The Commission should initiate inquiry about the importance to the function of NRC of having all of the issues and questions raised in the SCA resolved to the satisfaction of the NRC staff on a time schedule commen-surate with licensing needs. Similar questions should be answered regarding the importance of having all study plans which are based on the contents of the SCP completed and submitted to the NRC staff before work on the associated topics is initiated.

4. The post-emplacement process for a repository involves a period during which the repository is to be monitored and for which retrieval of the waste is to be planned.

   a. There are no criteria for the thermal and other measure-ments that are to be made during this period. The Commission may want to explore the need for such criteria and, if found necessary, request the NRC staff to develop and promulgate them in order to ensure that technologies for data acquisition and interpretation can be provided in a timely fashion for the design of the EBS and the repository.

   b. The need to retrieve the waste after emplacement and backfilling influences the design of the repository and the EBS. The staff has not defined what type of retrieval will be required, the extent to which retrieval is likely to be needed, under what conditions retrieval is to be practiced, or the standards and criteria that would govern the retrieval. Owing to the importance of these issues to the design of the repository, the Commission should encourage the NRC staff to define more closely, prior to licensing, criteria for the various parts of the emplacement and

retrieval process, the monitoring protocols that are expected to be applied by DOE, and the regulations that are needed for this part of the HLW disposal system.

SUMMARY:

A review of the HLW disposal system, its development by DOE, and the regulatory structure emplaced by the NRC and the EPA resulted in identification of issues that can be arranged under several major headings and subheadings. These are listed below in general order of decreasing impact on the successful and timely development of a functional repository.

A. Regulations and Guidance

		Report Section
1.	NRC Recommendations to the NAS	(1a)
2.	EBS Performance and Natural Barriers	(1f)
3.	Protocols for Use of Expert Judgment	(1e)
4.	Model Selection and Qualification	(1h)
5.	QA Applied to Models and Data	(1d)
6.	Condition of Aged HLW	(1g)
7.	Relevance of Waste Form Performance	(1k)
8.	Repository-Relevant EBS Testing	(1j)
9.	Regulations for Gaseous Radionuclides	(1i)
10.	Regulatory Consistency	(1b)
11.	Role of 10 CFR Part 960	(1c)

B. Completion of SCP Comments and Study Plans (3)

C. Post-Emplacement Regulations

1.	Retrieval of HLW	(4b)
2.	Thermal and Other Measurements	(4a)

D. Monitored Retrievable Storage Facility

1.	Definition of Licensing Process	(2a)
2.	Back-Up to MRS	(2b)

The importance of rulemaking as a process that can remove from contention selected aspects of the licensing process appears to be rising. This is particularly true as the development of experi-mental methods, scenarios, and experimental results is proving to be a much slower process than originally envisioned. The following topics for potential rulemaking have been identified in this communication.

1.	Consistency between EPA Standards and NRC Regulations	(1b)
2.	Protocols for Use of Expert Judgment	(1e)
3.	Model Selection and Qualification	(1h)

The Commission should initiate a more aggressive rulemaking process and seek to complete, at an early date, those rulemaking items that impact the repository design and the development of experimental data. In addition, we provide this response with the recognition that additional considerations could be added.

Further, we plan to review and continue monitoring the results of systems analyses being conducted by DOE and its contractors. The schedule of these efforts may allow a report on their status before the end of this fiscal year.

Sincerely,

Dade W. Moeller, Chairman
Advisory Committe on
Nuclear Waste

Enclosure:
HLW Relational Diagram

Novmeber 24, 1992

Mr. James M. Taylor
Executive Director for Operations
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Taylor:

SUBJECT: STAFF TECHNICAL POSITION ON CONSIDERATION OF FAULT DISPLACEMENT HAZARDS IN GEOLOGIC REPOSITORY DESIGN

During its 48th meeting, November 19-20, 1992, the Advisory Committee on Nuclear Waste met with the NRC staff to discuss the subject technical position.

The Committee has no objection to the staff's proposal to issue this technical position for public comment. We recommend, however, that the NRC staff review the transcript of our meeting for detailed comments and criticisms.

The Committee plans to review the proposed final version of this technical position after public comments have been received and resolved.

Sincerely,

Dade W. Moeller, Chairman
Advisory Committee on
Nuclear Waste

Reference:

Memorandum dated October 28, 1992, from B. J. Youngblood, NMSS, to Raymond F. Fraley, ACRS, Subject: Transmittal of Draft Staff Technical Position (STP) on "Consideration of Fault Displacement Hazards in Geologic Repository Design" to the Advisory Committee on Nuclear Waste (ACNW)

cc: H. Thompson, EDO
J. Blaha, EDO
R. Bernero, NMSS
J. Linehan, NMSS
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