DEC 23 1985

MEMORANDUM FOR: R. F. Fraley
Executive Director
Advisory Committee on Reactor Safeguards

FROM: William J. Dircks
Executive Director for Operations

SUBJECT: RESPONSE TO ACRS COMMENTS ON EPA HLW STANDARDS (FOLLOW-UP ITEMS FROM 306th and 307th ACRS MEETINGS)

In letters dated October 16 and November 14, 1985, David A. Ward transmitted to Chairman Palladino the comments of the ACRS regarding the high-level radioactive waste standards published by the Environmental Protection Agency (EPA) on September 19, 1985. As the NRC staff understands, these comments can be summarized as follows:

1. In comparison with other risks, the standards are unduly restrictive.

2. Because the standards are so restrictive, and because of the probabilistic nature of the standards, it will be very difficult, if not impossible, for the NRC to determine compliance with the standards in a licensing review for an actual repository.

3. The standards contain internal inconsistencies (e.g., the dose limits during repository operations are slightly different for licensed and unlicensed repositories) and the standards do not incorporate the latest ICRP recommendations regarding doses to individual organs.

Regarding the first item above, the ACRS has stated that the level of risk allowed by the EPA HLW standards is much lower than that allowed by other standards for radiological and non-radiological hazards. However, the staff has found that under certain reasonable scenarios and assumptions (e.g., the size of the population at risk) the EPA standards can be shown to be comparable to other standards now in place for other nuclear activities, as we discussed in our presentation to the ACRS on November 8, 1985. Since the risks allowed by the EPA standards can be viewed in such widely different ways, the staff has concentrated on the achievability of the standards rather than on comparisons with the risks allowed by other standards.

The ACRS is concerned that the low level of allowable risk, combined with the probabilistic nature of the standards, will make the standards difficult to implement in an actual repository licensing review. Previous NRC contractor

studies (documented in NUREG/CR-3235) demonstrated (1) that analytical techniques exist, or are under development, to evaluate potential releases from a geologic repository, and (2) that repository sites can likely be found for which repository performance can be demonstrated to be in compliance with the EPA HLW standards. The NRC staff will further develop its views regarding its ability to implement the EPA standards in the rulemaking package currently being prepared to incorporate the EPA standards into Part 60.

Regarding inconsistency within the standards, the NRC staff recognizes that EPA has, for pragmatic reasons, chosen to maintain consistency with other existing EPA standards including the uranium fuel cycle and drinking water standards. This has resulted in internal inconsistencies within the EPA HLW standards which, while not desirable, do not appear to endanger public health and safety nor to pose inordinate costs or difficulties for implementation of the standards by the NRC. In the NRC staff's view, a general overhaul of EPA's radiation protection standards would be needed to adopt the revised ICRP recommendations and to promote consistency between (and within) standards. The NRC staff would support such an initiative by the EPA.

The ACRS also recommended: (1) acceleration of NRC staff efforts to develop analytical methods for evaluating repository performance and (2) that a consensus be sought, possibly through rulemakings, on these methods as they are developed. With respect to the first recommendation, we note that, in a meeting on October 24, 1985, we briefed the ACRS Subcommittee on Waste Management on our HLW program plan and described how we have allocated resources to each major program element. As we described in this briefing, a major program element is development of licensing assessment methodologies; we believe this represents an aggressive effort. We will continue to seek ways to accelerate licensing assessment methodology development and still meet other requirements of the Nuclear Waste Policy Act and Commission priorities. As stated in our October program briefing, we look forward to receiving Subcommittee comment on our program strategies and specific feedback on the tradeoffs we have made among program elements in allocating resources and setting schedules. With respect to the second recommendation, the staff agrees that rulemaking may prove to be an appropriate means of developing consensus regarding certain aspects of the staff's analytical methods. We note that the staff has an on-going effort to identify licensing

issues and to seek early resolution through such means as public review and comment on technical positions developed by the staff. We will continue to pursue early resolution of licensing issues using technical positions and, as appropriate, rulemakings.

As suggested by the staff requirements memorandum for SECY-85-272, the staff would appreciate an opportunity to discuss the staff's proposed conforming amendments relating to proposed implementation procedures with the ACRS in the near future.

(Signed) Jack W. Roe

William J. Dircks
Executive Director for Operations

EDO
WJDircks
12/ /85

*See previous concurrence

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| C | WMRP | WMRP | WMRP | DWM | DWM | NMSS | NMSS |
| ME | DFehringer* | RBoyle* | HJMiller* | MJBell* | RBrowning* | DMausshardt* | JGDavis |
| TE | 12/02/85 | 12/03/85 | 12/03/85 | 12/ /85 | 12/ /85 | 12/ /85 | 12/17/85 |

Bernero for Appropriate Action
(EDO Signature)
cys: Stello
Taylor
Thompson
Blaha
Murley, NRR
Beckjord, RI
Jordan, AEOI
Scinto, OGC
Central File

UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON NUCLEAR WASTE
WASHINGTON, D.C. 20555

May 3, 1989

The Honorable Lando W. Zech, Jr.
Chairman
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Chairman Zech:

SUBJECT: PROPOSED WASTE CONFIDENCE DECISION BY THE WASTE CONFIDENCE REVIEW GROUP

During its ninth meeting, April 26-28, 1989, the Advisory Committee on Nuclear Waste (ACNW) met with members of the NRC Staff to discuss the preliminary draft of the proposed Waste Confidence Decision (see reference) by the Waste Confidence Review Group. This matter was also a subject of discussion during a meeting held on April 19, 1989 by an ACNW Working Group.

On August 31, 1984, the NRC issued a final decision on what has come to be known as its "Waste Confidence Proceeding." The current review is an update of that assessment, and a significant feature in this latest review is the incorporation of the changes brought about by the Nuclear Waste Policy Amendments Act of December 1987.

On the basis of our discussions on this matter, we offer the following comments:

1. We believe the present report appears to be technically sound, and in this assessment, we endorse both the expanded application of the generic approach to the majority of nuclear power plants and the incorporation into the proceedings of a more realistic timetable for the availability of a licensed repository and an extended time interval for the storage of spent fuel.

2. We continue to have concerns about the ability of the NRC staff to confirm that the repository complies with the probabilistic standards developed by the U.S. Environmental Protection Agency. The explanations given in the proposed Waste Confidence Decision on how this is to be accomplished do not illuminate the process nor do they provide convincing arguments that it can be accomplished.

(2)

8905120118

The report also needs organizational and editorial changes to enhance the ease with which it can be read and assimilated.

Sincerely,

Dade W. Moeller

Dade W. Moeller
Chairman

Reference:
Memorandum dated April 17, 1989 from Robert M. Bernero, Director, Nuclear Material Safety and Safeguards, to Dade Moeller, Chairman, ACNW, transmitting Preliminary Draft of Waste Confidence Review Group Proposed Waste Confidence Decision (PREDECISIONAL)

UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON NUCLEAR WASTE
WASHINGTON, D.C. 20555

July 3, 1989

The Honorable Kenneth M. Carr
Chairman
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Chairman Carr:

SUBJECT: ACNW REVIEW OF NRC COMMENTS ON DOE SITE CHARACTERIZATION PLAN

During its twelfth meeting, June 28-30, 1989, the Advisory Committee on Nuclear Waste (ACNW) completed its review of the Site Characterization Analysis (SCA) being prepared by the NRC staff on the Site Characterization Plan (SCP) developed by the U.S. Department of Energy (DOE) for the proposed high-level waste (HLW) repository at Yucca Mountain. During this meeting, the Committee had the benefit of discussions with staff members from the NRC and DOE. This matter was also a subject for discussion during the sixth through eleventh meetings of the ACNW, as well as during an ACNW Working Group meeting on April 19, 1989. During the seventh meeting, February 21-23, 1989, we had discussions and interactions with representatives from the State of Nevada's Nuclear Waste Project Office. The Committee also had the benefit of the documents referenced.

In approaching this task, the Committee assigned the responsibility for reviewing specific subject categories in the SCA to individual ACNW consultants. These consultants met with members of the NRC staff for in-depth discussions and then served as leaders for reviews of the assigned subject categories during the eleventh and twelfth meetings of the Committee. Throughout our reviews, we have interacted with the NRC staff on a continuing basis, and many of our comments are the culmination of this iterative process.

As a result of our review, we have reached certain conclusions and want to offer specific recommendations concerning the SCP and/or the SCA. Our more significant comments deal with:

- the absence in the SCP of statements addressing the systematic and early identification and evaluation of potentially disqualifying features at the Yucca Mountain Site;

- the apparent lack of sufficient attention to the limitations and uncertainties in the Yucca Mountain data bases, and the associated difficulties in demonstrating that the repository will comply with the Environmental Protection Agency (EPA) standard (40 CFR Part 191, "Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes"); and

- Delays by DOE in implementing satisfactory quality assurance (QA) programs.

Our specific comments follow:

1. Although the SCP is an action plan for site characterization, we believe that a much stronger focus should be placed on early detection of potentially disqualifying features. The SCA is not sufficiently emphatic in its critique of the lack of such a focus. We believe that the SCA should point out the need in the SCP for an integrated section of the plan that explicitly addresses the activities leading to an evaluation of characteristics of the site directly related to disqualifying features (e.g., groundwater travel time) as stated in the regulations.

2. Uncertainties and limitations in the data used to justify conclusions will be the center of most contentions. Since the ability to resolve these uncertainties experimentally may well be beyond the practicality of the program, planning for their management is required. We recommend that the NRC staff strengthen its treatment of this topic in the SCA.

   As was briefly discussed with the Commission during our meeting on April 27, 1989, we believe that the NRC staff should encourage DOE to develop a scoping Level 2 (Release Estimate) probabilistic risk assessment (PRA) for the proposed Yucca Mountain repository. Such a PRA should be useful in defining those parameters that are critical to the adequate performance of the proposed facility, and would help to set priorities for the accompanying investigations.

   Subsequent to our discussions with the Commission, we were pleased to learn that DOE plans to begin conducting in 1990 or 1991 probabilistic system performance assessments for the proposed repository. We recommend that the NRC allocate resources sufficient to develop the expertise necessary to conduct an adequate, independent evaluation of the probabilistic system performance assessments that will be submitted by DOE as part of its application for a construction permit for the proposed repository.

   The Committee was told by the NRC staff (and this view was supported by one of our consultants) that the DOE staff may have considerable difficulties in generating a complementary cumulative distribution function (CCDF) for the site and, if this is the case, they may not be able to demonstrate the required compliance with the EPA standard. This difficulty in demonstrating compliance could represent a disqualifying feature for the proposed repository location. We urge that this concern be addressed in the SCA.

3. We believe that the NRC staff has been extremely tolerant of the delays by DOE in establishing a satisfactory QA process by the Office of Civilian Radioactive Waste Management (OCRWM) for

the Yucca Mountain project. Although one of the Objections in the SCA being prepared by the NRC staff addresses this matter, we believe that this troublesome issue should be promptly resolved since continued absence of approvable QA systems will increase the burden on the participants in licensing processes when qualification of data is at issue.

4. Additional comments on selected topics include:

   a. Because the Calico Hills formation is intended to serve as a barrier between the radioactive waste and the underlying saturated zone, some form of compromise must be reached between maintaining this formation as a barrier and drilling into or exploring within it to determine its critical characteristics. The NRC staff should include in the SCA a recommendation that DOE be definitive on how they will obtain the data necessary to determine the characteristics of the Calico Hills formation.

   b. Because of the significance of the waste package in the containment of the associated radionuclides, it is important that decisions be made soon on the materials to be used in fabricating the waste packages and the manner in which they are to be sealed. Such information is essential in considering possible interactions between the packages and the repository materials with which they will be in contact. Consideration of these interactions will require determination of the specific chemical composition of the repository water, and the SCA should reflect this concern.

   c. One of the key parameters in determining the adequacy of the proposed site is the rate of groundwater flow. In this regard, the NRC staff should emphasize in the SCA the need to obtain information on whether matrix or fracture flow (or a combination of the two) will govern water movement.

   d. Current concerns with the location of the Exploratory Shaft Facility (ESF) pertain to its distance from faults and the appropriateness of the samples it will yield in providing data that are representative of the proposed repository location. We believe the SCA should emphasize the need for the application of a comprehensive range of techniques (e.g., subsurface mapping, geophysical surveys) to the study of this problem.

      In the development of the Title I design for the ESF, the DOE staff was supposed to have provided a conceptual approach for construction of the facility. Reviews by the NRC staff (and ACNW consultants) indicate that this was not the case. The staff should ensure that the SCA states that before DOE proceeds further with the Title II design, which will provide

additional details on the proposed ESF, DOE should promptly address the errors and deficiencies in the Title I design.

e. We believe that consideration should be given to extending the geoscience (hydrology, geology, geophysics) investigations to a distance sufficient to provide data on conditions within the region surrounding the site. Some of the existing investigations appear to be too limited in their geographical coverage. For example, because of the importance of the potential of volcanism, such an extension would appear mandatory to ensure that these studies have the potential for uncovering any disqualifying features.

f. A range of alternative conceptual models will be used in conducting performance assessments for the repository. In our opinion, there are two problems associated with these models, namely, they are incomplete and they are not integrated. The SCP should be constructed so as to provide data that identifies the correct model, rather than merely confirming the preferred model. Since modeling is essential in determining the performance of the proposed repository and for uncovering potential disqualifying features, these deficiencies must be corrected. Such determinations should be scheduled as early as possible in the site characterization process, and this should be reflected in the SCA.

g. The potential for natural resources in the area and the scenarios that are to be considered relative to possible human intrusion (some of which are related to exploration for such resources) need to be given more attention. A much more thorough assessment of potential mineral resources, including petroleum, should be required in the SCP, and the SCA should indicate this need.

With respect to human intrusion, the Committee notes that guidance on this matter is provided in EPA standard 40 CFR Part 191. We support the NRC staff recommendation that the DOE staff should consider this guidance in the development of the CCDF for the site.

h. The NRC staff has apparently accepted the lack of details in the SCP on test procedures and schedules for various site analyses since these are to be provided in the Study Plans being prepared by DOE. This places an increased burden for reviewing the Study Plans on the NRC staff. We recommend that the NRC staff note this problem in the SCA and that enhanced details of the characterization program be included in the periodic progress reports that will be submitted by DOE to supplement the SCP.

5. The SCA methodology and its basis are sharply focused on the individual sections of the SCP. Nevertheless, it might be useful if the NRC staff would produce an addendum that, among other items, contains those comments related to global or generic matters. For example, we believe that a useful comment in such a section would be to urge DOE to recognize that the licensing process and any decisional activities connected with it are adversarial. We also believe that this characteristic of the licensing proceedings should encourage DOE to ensure that its technical arguments are as much beyond challenge by responsible scientists as reasonable. The context of the SCA should be responsive to this need.

We trust these comments will be helpful in the development of the Site Characterization Analysis. In closing, we want to acknowledge and thank staff members of both the NRC and DOE for their cooperation and support during our review. All the people with whom we have interacted have been helpful and responsive to our questions.

Sincerely,

Dade W. Moeller

Dade W. Moeller
Chairman

References:

1. U. S. Department of Energy, DOE/RW-0199, "Site Characterization Plan - Yucca Mountain Site," December 1988
2. U. S. Nuclear Regulatory Commission draft Site Characterization Analysis, Sections 1, 2, and 3, received June 27, 1989 (Predecisional)
3. U. S. Department of Energy, DOE/RW-0206, "Site Characterization Plan - Public Handbook, Yucca Mountain, Nevada," January 1989
4. U. S. Department of Energy, DOE/RW-198, "Site Characterization Plan Overview, Yucca Mountain Site," December 1988
5. U. S. Nuclear Regulatory Commission, "Administrative Plan and Procedures for NRC Staff Review of DOE's Consultation Draft Site Characterization Plan," December 18, 1987
6. U. S. Nuclear Regulatory Commission, "Draft Technical Review Plan for NRC Staff Review of DOE's Site Characterization Plans," December 18, 1987
7. U. S. Nuclear Regulatory Commission, "Review Plan for NRC Staff Review of DOE's Site Characterization Plan," December 12, 1988
8. U. S. Nuclear Regulatory Commission, Regulatory Guide 4.17, "Standard Format and Content of Site Characterization Plans for High-Level-Waste Geologic Repositories," March 1987
9. Ross, B., Disposal Safety Incorporated, Prepared for Sandia National Laboratories, SAND 85-7117, "A First Survey of Disruption Scenarios for a High-Level-Waste Repository at Yucca Mountain, Nevada," December 1987